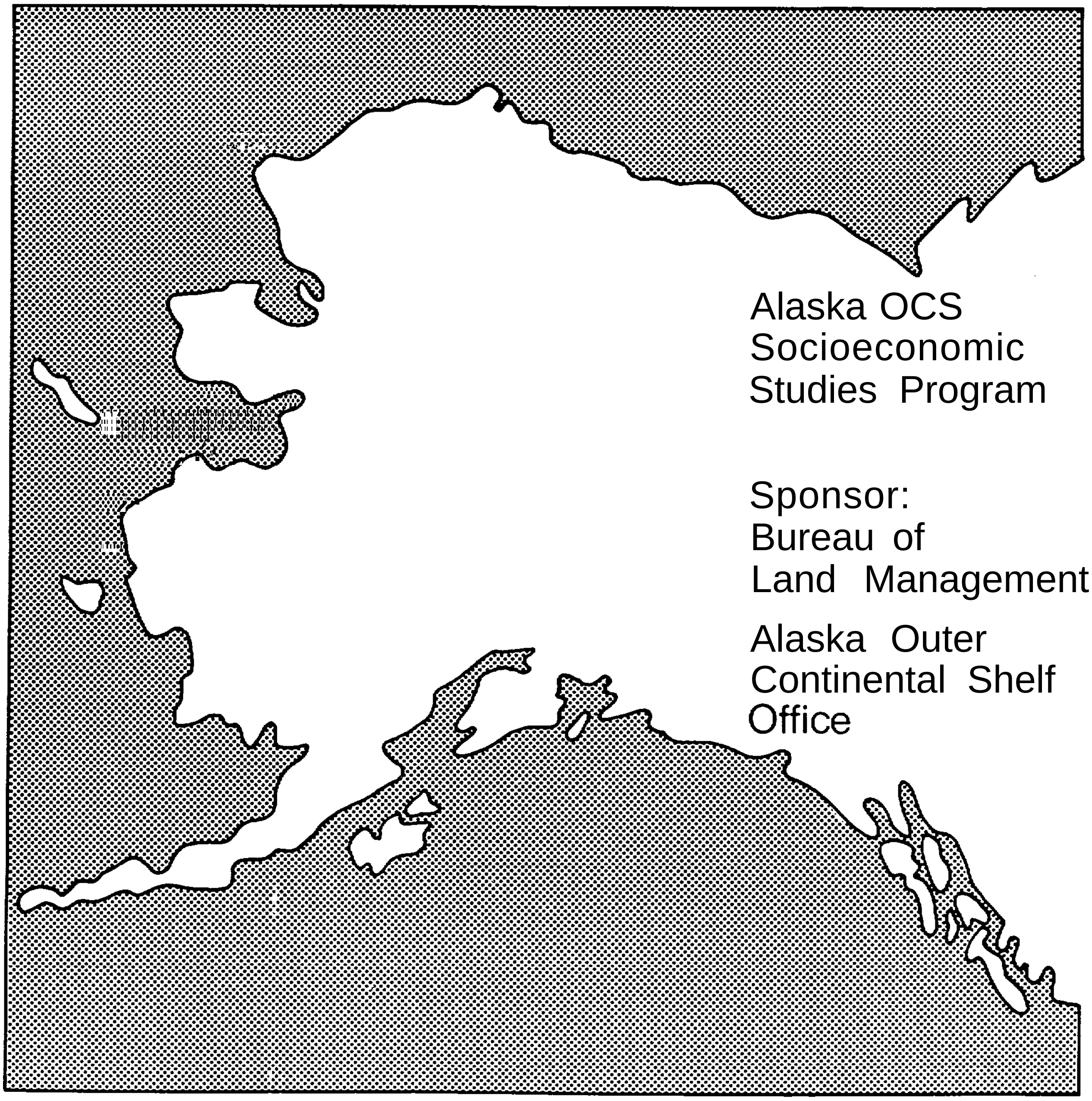
Technical Report
Number 30



Alaska OCS
Socioeconomic
Studies Program

Sponsor:
Bureau of
Land Management

Alaska Outer
Continental Shelf
Office

Northern and Western Gulf of Alaska
Petroleum Development Scenarios
Commercial Fishing Industry Analysis

The United States Department of the Interior was designated by the Outer Continental Shelf (OCS) Lands Act of 1953 to carry out the majority of the Act's provisions for administering the mineral leasing and development of offshore areas of the United States under federal jurisdiction. Within the Department, the Bureau of Land Management (BLM) has the responsibility to meet requirements of the National Environmental Policy Act of 1969 (NEPA) as well as other legislation and regulations dealing with the effects of offshore development. In Alaska, unique cultural differences and climatic conditions create a need for developing additional socioeconomic and environmental information to improve OCS decision making at all governmental levels. In fulfillment of its federal responsibilities and with an awareness of these additional information needs, the BLM has initiated several investigative programs, one of which is the Alaska OCS Socioeconomic Studies Program (SESP).

The Alaska OCS Socioeconomic Studies Program is a multi-year research effort which attempts to predict and evaluate the effects of Alaska OCS Petroleum Development upon the physical, social, and economic environments within the state. The overall methodology is divided into three broad research components. The first component identifies an alternative set of assumptions regarding the location, the nature, and the timing of future petroleum events and related activities. In this component, the program takes into account the particular needs of the petroleum industry and projects the human, technological, economic, and environmental offshore and onshore development requirements of the regional petroleum industry.

The second component focuses on data gathering that identifies those quantifiable and qualifiable facts by which OCS-induced changes can be assessed. The critical community and regional components are identified and evaluated. Current endogenous and exogenous sources of change and functional organization among different sectors of community and regional life are analyzed. Susceptible community relationships, values, activities, and processes also are included.

The third research component focuses on an evaluation of the changes that could occur due to the potential oil and gas development. Impact evaluation concentrates on an analysis of the impacts at the statewide, regional, and local level.

In general, program products are sequentially arranged in accordance with BLM's proposed OCS lease sale schedule, so that information is timely to decisionmaking. Reports are available through the National Technical Information Service, and the BLM has a limited number of copies available through the Alaska OCS Office. Inquiries for information should be directed to: Program Coordinator (COAR), Socioeconomic Studies Program, Alaska OCS Office, P. O. Box 1159, Anchorage, Alaska 99510.

TECHNICAL REPORT NO. 30

CONTRACT NO. AA550-CT6-61

ALASKA OCS SOCIOECONOMIC STUDIES PROGRAM

NORTHERN AND WESTERN GULF OF ALASKA PETROLEUM DEVELOPMENT SCENARIOS:

COMMERCIAL FISHING INDUSTRY ANALYSIS

PREPARED FOR

BUREAU OF LAND MANAGEMENT
ALASKA OUTER CONTINENTAL SHELF OFFICE

DOCUMENT IS AVAJLABLE TO THE PUBLIC THROUGH THE
NATIONAL TECHNICAL INFORMATION SERVICE
5285 PORT ROYAL ROAD
SPRINGFIELD, VIRGINIA 22161

FEBRUARY 1980

ALASKAOCS SOCIOECONOMIC STUDIES PROGRAM
NORTHERN AND WESTERN GULF OF ALASKA PETROLEUM DEVELOPMENT SCENARIOS: COMMERCIAL FISHING INDUSTRY ANALYSIS

Prepared by:

J. M. Terry, A. H. Gorham, D. M. Larson, B. C. Paust, and R. G. Stoles
Alaska Sea Grant Program, University of Alaska

R. S. Johnston and F. J. Smith
Department of Agricultural and Resource Economics, Oregon State University

F. L. Orth and P. W. Rogers
Frank Orth and Associates

February 1980

GENERAL TABLE OF CONTENTS

VOLUME I

CHAPTER I — INTRODUCTION

CHAPTER 11 — MEASURING AND FORECASTING COMMERCIAL FISHING INDUSTRY ACTIVITY

CHAPTER III — PROJECTIONS OF THE COMMERCIAL FISHING INDUSTRIES OF KODIAK, SEWARD, CORDOVA, AND YAKUTAT IN THE ABSENCE OF OCS ACTIVITY PURSUANT TO LEASE SALE NO. 46 AND/OR NO. 55

CHAPTER IV — POTENTIAL IMPACTS OF ALTERNATIVE LEVELS OF OCS DEVELOPMENT

APPENDIX

REFERENCES

VOLUME II

APPENDIX A — FISHERY BIOLOGY

APPENDIX B — AN OVERVIEW OF THE ALASKA COMMERCIAL FISHING INDUSTRY

APPENDIX C — DOCUMENTATION OF THE DEVELOPMENT OF THE COMMERCIAL FISHING INDUSTRIES OF KODIAK, SEWARD, CORDOVA, AND YAKUTAT

REFERENCES

TABLE OF CONTENTS

	PAGE
Table of Contents	VII
List of Tables	XV
List of Figures	XXV
1. Introduction	1
General Objective and Methodology	2
Scope	5
The Nature of the Non-OCS Projections	8
The Nature of the Impact Analysis	9
Study Outline	11
II. Measuring and Forecasting Commercial Fishing Industry Activity	14
Measures of the Activity of a Commercial Fishing Industry	14
Harvesting	14
Catch	15
Number of Boats	16
Employment	16
Income	17
Frequency and Seasonality of Ocean Space and Harbor Use	19
Local Fishing Activity	19
Processing	21
Number of Plants	21
Employment	21
Income	22
Existing Capacity	22
Real Versus Nominal Dollars	23

PAGE

Forecasting Traditional Commercial Fishing Industry Activity in the Absence of the OCS Development Associated with Lease Sale No. 46 and No. 55 . . . 24

Harvesting . . . 25

Catch by Weight . . . 26

Catch by Volume, Income . . . 41

Number of Boats . . . 46

Number of Fishermen . . . 48

Number of Landings . . . 49

Processing . . . 49

Input Requirements . . . 50

Income . . . 54

The Nature of Forecasts . . . 55

Methods Used to Project Harvesting and Processing Activity for the Groundfish Industries . . . 57

III. Projections of the Commercial Fishing Industries of Kodiak, Seward, Cordova, and Yakutat in the Absence of OCS Activity Pursuant to Lease Sale No. 46 and/or No. 55 . . . 88

The Kodiak Commercial Fishing Industry . . . 88

Harvesting . . . 96

Salmon . . . 97

Herring . . . 98

Halibut . . . 102

Groundfish . . . 109

King Crab . . . 115

Tanner Crab . . . 118

Dungeness Crab . . . 119

Shrimp . . . 122

PAGE

Razor Clam 125

Summation of Harvesting Activity Projections 130

Local Harvesting Effort 146

Processing 146

Water 150

Electricity 150

Employment 150

Income 153

Number of Plants 153

Local Processing Effort 153

The Feasibility of the Projected Growth 157

Small Boat Harbor. 157

Port Facility. 158

Labor, Electric Power, and Water. 159

Processing Facilities 161

Land 162

Conclusion 162

The Seward Commercial Fishing Industry 163

Harvesting. 167

Salmon 167

Herring 172

Halibut 172

Groundfish. 175

King Crab 183

Tanner Crab 186

Dungeness Crab 186

PAGE

Shrimp 189

Razor Clam 192

Summation of Harvesting Activity Projections 192

Local Harvesting Effort 210

Processing 214

Water 214

Electricity 216

Employment 216

Income 216

Number of Plants 216

Local Processing Effort 220

The Feasibility of the Projected Growth 220

Small Boat Harbor 222

Port Facilities 222

Labor, Electric Power, and Water 223

Processing Facilities 227

Land 227

Conclusion 228

The Cordova Commercial Fishing Industry 228

Harvesting 232

Salmon 232

Herring 233

Halibut 237

Groundfish 238

King Crab 246

Tanner Crab 251

PAGE

Dungeness Crab 251

Shrimp 254

Razor Clams 259

Summation of Harvesting Activity Projections 260

Local Harvesting Effort 281

Processing 281

Water 281

Electricity 284

Employment 284

Income 284

Number of Plants 284

Local Processing Effort 288

The Feasibility of the Projected Growth 288

Small Boat Harbor 290

Port Facilities 290

Labor, Electric Power, and Mater 291

Processing Facilities 293

Land 294

Conclusion 294

The Yakutat Commercial Fishing Industry 295

Harvesting 299

Salmon 299

Halibut 300

Groundfish 300

King Crab 306

Tanner Crab 313

PAGE

Dungeness Crab 313

Shrimp 318

Scallops 318

Summation of Harvesting Activity Projections 319

Local Harvesting Effort 324

Processing 335

Water 335

Electricity 338

Employment 338

Income 338

Number of Plants 338

Local Processing Effort 342

The Feasibility of the Projected Growth 342

Small Boat Harbor 344

Port Facilities 345

Labor, Electric Power, and Water 345

Processing Facilities 348

Land 349

Conclusion 349

IV. Potential Impacts of Alternative Levels of OCS Development 350

The Hypothesized Characteristics of OCS Development 352

Lease Sale No. 55 355

Low Find Case, 95 Percent Probability Resource Scenario 355

Mean Find Case, Mean Probability Resource Scenario. . . . 359

High Find Case, 5 Percent Probability Resource Scenario 372

PAGE

Lease Sale No. 46 377

Low Find Case, 95 Percent Probability Resource Scenario, ... 377

Mean Find Case, Mean Probability Resource Scenario. . 377

High Find Case, 5 Percent Probability Resource Scenario, ... 389

Using Past Interactions Between the Offshore Petroleum and Commercial Fishing Industries and Economic Analyses to Identify Potential Impacts 397

Competetion for Labor 397

Skill Requirements 398

Wage Differentials 399

Hiring Practices. 399

Source of Labor 401

Effects of OCS Activity on the Supply of Labor 402

Cook Inlet 1961 -1968 403

The North Slope 408

North Sea. 409

Competition for Ocean Space 412

Competition for the Services of the Infrastructure 421

Potential Impacts, ... 425

Competition for Labor 425

Low Find Cases 426

Mean Find Cases 432

High Find Cases. 439

Competition for Ocean Space. 444

Competition for the Services of the Infrastructure 472

	PAGE
Summary of Potential Impacts	475
Lease Sale No. 55, Low Find Case	475
Yakutat	475
Cordova	475
Seward	476
Lease Sale No. 55, Mean Find Case	476
Yakutat	476
Cordova	477
Seward	477
Lease Sale No. 55, High Find Case	478
Yakutat	478
Cordova	479
Seward	479
Lease Sale No. 46, Low Find. Case	480
Kodiak	480
Seward	480
Lease Sale No. 46, Mean Find Case	481
Kodiak	481
Seward	482
Lease Sale No. 46, High Find Case	482
Kodiak	482
Seward	482
Appendix 1	485
References	505

LIST OF TABLES

TABLE #		PAGE #
2.1	Basis of Salmon Catch Projections	29
2.2	Basis of Halibut Catch Projections	33
2.3	Basis of Herring Catch Projections	35
2.4	Basis of King Crab Catch Projections	36
2.5	Basis of Tanner Crab Catch Projections	37
2.6	Basis of Dungeness Crab Catch Projections	39
2.7	The Statistical Relationship Between Statewide Ex-vessel Prices	43
2.8	Basis of Groundfish Catch Forecasts	66
2.9a	Domestic Projected Groundfish Harvest for Alaska, 1980-2000	67
2.9b	Domestic Projected Groundfish Harvest for the Bering Sea, 1980-2000	68
2.9c	Domestic Projected Groundfish Harvest for the Gulf of Alaska, 1980-2000	69
2.9d	Domestic Projected Groundfish Harvest for South-east Alaska, 1980-2000	70
2.10a	Alaska Groundfish Industry, 1980-2000	71
2.10b	Bering Sea Groundfish Industry, 1980-2000	72
2.10C	Gulf of Alaska Groundfish Industry, 1980-2000	73
2.10d	Southeast Alaska Groundfish Industry, 1980-2000	74
2.11	Projected Allocation of Groundfish Catch by Community	79
2.12	The Distribution of Groundfish Resources in the Gulf of Alaska	84
2.13	Basis of Groundfish Ex-vessel Price Forecasts	87
3.1	Kodiak Commercial Fisheries in Perspective, 1969-1977	89
3.2	Estimated Gross Earnings of Kodiak Fishermen, 1969-1976	91
3.3	Number of Kodiak Residents Holding a Commercial Fisherman's License, 1969-1976	91
3.4	Kodiak Fish Processing Employment and Income in Perspective, 1970-1977	92
3.5	Number of Employees by Industry (Average for Entire Year from Monthly Data)	94
3.6	Yearly Payroll by Industry	95
3.7	Characteristics of the Kodiak Salmon Fisheries	97
3.8	Projected Harvesting Activity Kodiak Salmon Fishery, 1980-2000	99
3.9	Projected Percentage Change from 1980, Kodiak Salmon Fishery	100
3.10	Projected Kodiak Salmon Catch by Species, 1980-2000	101
3.11	Projected Harvesting Activity Kodiak Herring Fishery, 1980-2000	103
3,12	Projected Percentage Change from 1980, Kodiak Herring Fishery	104
3.13	Projected Harvesting Activity Kodiak Halibut Fishery, 1980-2000	107

LIST OF TABLES (continued)

TABLE #		PAGE #
3.14	Projected Percentage Change from 1980, Kodiak Halibut Fishery	108
3.15	Projected Harvesting Activity Kodiak Groundfish Fishery, 1980-2000	111
3.16	Projected Percentage Change from 1980, Kodiak Groundfish Fishery	112
3.17	Kodiak Groundfish Projected Catch by Species, 1980-2000	113
3.18	Projections of Kodiak Groundfish Harvesting Activity as a Percentage of Total Kodiak Harvesting Activity	114
3.19	Projected Harvesting Activity Kodiak King Crab Fishery, 1980-2000	116
3.20	Projected Percentage Change from 1980, Kodiak King Crab Fishery	117
3.21	Projected Harvesting Activity Kodiak Tanner Crab Fishery, 1980-2000	120
3.22	Projected Percentage Change from 1980, Kodiak Tanner Crab Fishery	121
3.23	Projected Harvesting Activity Kodiak Dungeness Crab Fishery, 1980-2000	123
3.24	Projected Percentage Change from 1980, Kodiak Dungeness Crab Fishery	124
3.25	Projected Harvesting Activity Kodiak Shrimp Fishery, 1980-2000	126
3.26	Projected Percentage Change from 1980, Kodiak Shrimp Fishery	127
3.27	Projected Harvesting Activity Kodiak Razor Clam Fishery, 1980-2000	128
3.28	Projected Percentage Change From 1980, Kodiak Razor Clam Fishery	129
3.29	Projected Harvesting Activity Kodiak All Fisheries, 1980-2000	131
3.30	Projected Percentage Change from 1980, Kodiak All Fisheries	132
3.31	Projected Harvesting Activity Kodiak Traditional Fisheries, 1980-2000	133
3.32	Projected Percentage Change from 1980, Kodiak Traditional Fisheries	134
3.33	Percentage of Catch by Weight by Kodiak Fishery Including Groundfish, 1980-2000	135
3.34	Percentage of Value by Kodiak Fishery Including Groundfish, 1980-2000	137
3.35	Percentage of Boats by Kodiak Fishery Including Groundfish, 1980-2000	138
3.36	Percentage of Fishermen by Kodiak Fishery Including Groundfish, 1980-2000	139
3.37	Percentage of Number of Landings by Kodiak Fishery Including Groundfish, 1980-2000	140
3.38	Percentage of Catch by Weight by Kodiak Fishery Excluding Groundfish, 1980-2000	141

LIST OF TABLES (continued)

TABLE #		PAGE #
3.39	Percentage of Value by Kodiak Fishery Excluding Groundfish, 1980-2000	142
3.40	Percentage of Fishermen by Kodiak Fishery Excluding Groundfish, 1980-2000	143
3.41	Percentage of Boats by Kodiak Fishery Excluding Groundfish, 1980-2000	144
3.42	Percentage of Number of Landings by Kodiak Fishery Excluding Groundfish, 1980-2000	145
3.43	Adjusted Projections of the Number of Boats for the Kodiak Commercial Fishing Industry, 1980-2000	147
3.44	Local Harvesting Factor for Kodiak, 1976	149
3.45	Projected Peak Kodiak Processing Requirements for Water	151
3.46	Projected Peak Kodiak Processing Requirements for Electricity	152
3.47	Projected Kodiak Processing Employment and Income, 1980-2000	154
3.48	Projected Percentage Change in Kodiak Processing Employment and Income, 1980-2000	155
3.49	Projected Kodiak Groundfish Processing Activity, 1980-2000	156
3.50	Comparative Rates of Growth, High Find Case and the Kodiak Fishing Industry	160
3.51	Current Processing Capacity and Forecasted Harvest	162
3.52	Cook Inlet Fisheries, 1973-1977	164
3.53	Estimated Gross Earnings of Seward Fishermen, 1969-1976	165
3.54	Number of Seward Residents Holding a Commercial Fisherman's License, 1969-1976	165
3.55	Characteristics of the Cook Inlet Salmon Fisheries	167
3.56	Projected Harvesting Activity Cook Inlet Salmon Fishery, 1980-2000	169
3.57	Projected Percentage Change from 1980, Cook Inlet Salmon Fishery	170
3.58	Projected Cook Inlet Salmon Catch By Species, 1980-2000	171
3.59	Projected Harvesting Activity Cook Inlet Herring Fishery, 1980-2000	173
3.60	Projected Percentage Change from 1980, Cook Inlet Herring Fishery	174
3.61	Projected Harvesting Activity Cook Inlet Halibut Fishery, 1980-2000	176
3.62	Projected Percentage Change from 1980, Cook Inlet Halibut Fishery	177
3.63	Projected Harvesting Activity Cook Inlet Groundfish Fishery, 1980-2000	179
3.64	Projected Percentage Change from 1980, Cook Inlet Groundfish Fishery	180
3.65	Seward Groundfish Projected Catch by Species, 1980-2000	181

LIST OF TABLES (continued)

TABLE #		PAGE #
3.66	Projections of Cook Inlet Groundfish Harvesting Activity as a Percentage of Total Cook Inlet Harvesting Activity	182
3.67	Projected Harvesting Activity Cook Inlet King Crab Fishery, 1980-2000	184
3.68	Projected Percentage Change from 1980, Cook Inlet King Crab Fishery	185
3.69	Projected Harvesting Activity Cook Inlet Tanner Crab Fishery, 1980-2000	187
3.70	Projected Percentage Change from 1980, Cook Inlet Tanner Crab Fishery	188
3.71	Projected Harvesting Activity Cook Inlet Dungeness Crab Fishery, 1980-2000	190
3.72	Projected Percentage Change from 1980, Cook Inlet Dungeness Crab Fishery	191
3.73	Projected Harvesting Activity Cook Inlet Shrimp Fishery, 1980-2000	193
3.74	Projected Percentage Change from 1980, Cook Inlet Shrimp Fishery	194
3.75	Projected Harvesting Activity Cook Inlet All Fisheries, 1980-2000	195
3.76	Projected Percentage Change from 1980, Cook Inlet All Fisheries	196
3.77	Projected Harvesting Activity Cook Inlet Traditional Fisheries, 1980-200	198
3.78	Projected Percentage Change from 1980, Cook Inlet Traditional Fisheries	199
3.79	Percentage of Catch by Weight by Cook Inlet Fishery Including Groundfish, 1980-2000	200
3.80	Percentage of Value by Cook Inlet Fishery Including Groundfish, 1980-2000	201
3.81	Percentage of Boats by Cook Inlet Fishery Including Groundfish, 1980-2000	202
3.82	Percentage of Fishermen by Cook Inlet Fishery Including Groundfish, 1980-2000	203
3.83	Percentage of the Number of Landings by Cook Inlet Fishery Including Groundfish, 1980-2000	204
3.84	Percentage of Catch by Weight by Cook Inlet Fishery Excluding Groundfish, 1980-2000	205
3.85	Percentage of the Value by Cook Inlet Fishery Excluding Groundfish, 1980-2000	206
3.86	Percentage of Boats by Cook Inlet Fishery Excluding Groundfish, 1980-2000	207
3.87	Percentage of Fishermen by Cook Inlet Fishery Excluding Groundfish, 1980-2000	208
3.88	Percentage of the Number of Landings by Cook Inlet Fishery Excluding Groundfish, 1980-2000	209
3.89	Adjusted Projections of the Number of Fishermen for the Seward Commercial Fishing Industry, 1980-2000	211

LIST OF TABLES (continued)

TABLE #		PAGE #
3.90	Adjusted Projections of the Number of.Boats for the Seward Commercial Fishing Industry'; 1980-2000	212
3.91	Harvesting Factor for Seward, 1976	213
3.92	Projected Peak Seward Processing Requirements for Water	215
3.93	Projected Peak Seward Processing Requirements for ' Electricity	217
3.94	Projected Seward Processing Employment and Income, 1980-2000	218
3.95	Projected Percentage Change in Seward Processing Employment and Income, 1980-2000	219
3.96	Projected Seward Groundfish Processing Activity, 1980-2000	221
3.97	Comparative Rates of Growth, High Find Case and the Seward (Northern and Western Gulf) Fishing Industry	224
3.98	Seward Processing Capacity	227
3.99	Prince William Sound Fishery, 1973-1877	229
3.100	Estimated Gross Earnings of Cordova Fishermen	231
3.101	Number of Cordova Residents Holding a Commercial Fisherman's License, 1969-1976	231
3.102	Projected Harvesting Activity Prince William Sound Salmon Fishery, 1980-2000	234
3.103	Projected Percentage Change from 1980 Prince William Sound Salmon Fishery	235
3.104	Projected Prince William Sound Salmon Catch by Species, 1980-2000	236
3.105	Projected Harvesting Activity Prince William Sound Herring Fishery, 1980-2000	238
3.106	Projected Percentage Change from 1980, Prince William Sound Herring Fishery	239
3.107	Projected Harvesting Activity Prince William Sound Halibut Fishery, 1980-2000	241
3:108	Projected Percentage Change from 1980, Prince William Sound Halibut Fishery	242
3.109	Projected Harvesting Activity Prince William Sound Groundfish Fishery, 1980-2000	244
3.110	Projected Percentage Change from 1980, Prince William Sound Groundfish Fishery	245
3.111	Projections of Prince William Sound Groundfish Harvesting Activity as a Percentage of Total Prince William Sound Harvesting Activity	247
3.112	Cordova Groundfish Projected Catch by Species, 1980-2000	248
3.113	Projected Harvesting Activity Prince William Sound King Crab Fishery, 1980-2000	249
3.114	Projected Percentage Change from 1980, Prince William Sound King Crab Fishery	250
3.115	Projected Harvesting Activity Prince William Sound Tanner Crab Fishery, 1980-2000	252

LIST OF TABLES (continued)

TABLE #		PAGE #
3.116	Projected Percentage Change from 1980, Prince William Sound Tanner Crab Fishery	253
3.117	Projected Harvesting Activity Prince William Sound Dungeness Crab Fishery, 1980-2000	255
3.118	Projected Percentage Change From 1980, Prince William Sound Dungeness Crab Fishery	256
3.119	Projected Harvesting Activity Prince William Sound Shrimp Fishery, 1980-2000	257
3.120	Projected Percentage Change from 1980, Prince William Sound Shrimp Fishery	258
3.121	Projected Harvesting Activity Prince William Sound Razor Clam Fishery, 1980-2000	261
3.122	Projected Percentage Change from 1980, Prince William Sound Razor Clam Fishery	262
3.123	Projected Harvesting Activity Prince William Sound All Fisheries, 1980-2000	264
3.124	Projected Percentage Change from 1980, Prince William Sound All Fisheries	265
3.125	Projected Harvesting Activity Prince William Sound Traditional Fisheries, 1980-2000	266
3.126	Projected Percentage Change from 1980, Prince William Sound Traditional Fisheries	267
3.127	Percentage of Catch by Weight by Prince William Sound Fishery Including Groundfish, 1980-2000	268
3.128	Percentage of Value by Prince William Sound Fishery Including Groundfish, 1980-2000	270
3.129	Percentage of Boats by Prince William Sound Fishery Including Groundfish, 1980-2000	271
3.130	Percentage of Fishermen by Prince William Sound Fishery Including Groundfish, 1980-2000	272
3.131	Percentage of the Number of Landings by Prince William Sound Fishery Including Groundfish, 1980-2000	273
3.132	Percentage of Catch by Weight by Prince William Sound Fishery Excluding Groundfish, 1980-2000	274
3.133	Percentage of Value by Prince William Sound Fishery Excluding Groundfish, 1980-2000	275
3.134	Percentage of Boats by Prince William Sound Fishery Excluding Groundfish, 1980-2000	276
3.135	Percentage of Fishermen. by Prince William Sound Fishery Excluding Groundfish, 1980-2000	277
3.136	Percentage of the Number of Landings by Prince William Sound Fishery Excluding Groundfish, 1980-2000	278
3.137	Adjusted Projections of the Number of Boats and the Number of Fishermen for the Cordova Commercial Fishing Industry, 1980-2000	279
3.138	Local Harvesting Factor for Cordova, 1976	282
3.139	Projected Peak Cordova Processing Requirements for Water	283
3.140	Projected Peak Cordova Processing Requirements for Electricity	285

LIST OF TABLES (continued)

TABLE #		PAGE #
3.141	Projected Cordova Processing Employment and Income, 1’380-2000	286
3.142	Projected Percentage Change in Cordova Processing Employment and Income, 1980-2000	287
3.143	Projected Cordova Groundfish Processing Activity, 1980-2000	289
3,144	Comparative Rates of Growth, High Find Case and the Cordova Fishing Industry	292
3,145	Cordova Processing Capacity	294
3.146	Yakutat Fisheries, 1973-1977	296
3.147	Estimated Gross Earnings of Yakutat Fishermen, 1969-1976	297
3.148	Number of Yakutat Residents Holding a Commercial Fisherman's License, 1969-1976	297
3.149	Projected Harvesting Activity Yakutat Salmon Fishery, 1980-2000	301
3.150	Projected Percentage Change from 1980, Yakutat Salmon Fishery	302
3.151	Projected, Yakutat Salmon Catch by Species, 1980-2000	303
3.152	Projected Harvesting Activity Yakutat Halibut Fishery, 1980-2000	304
3.153	Projected Percentage Change from 1980, Yakutat Halibut Fishery	305
3.154	Projected Harvesting Activity Yakutat Groundfish Fishery, 1980-2000	307
3.155	Projected Percentage Change from 1980, Yakutat Groundfish Fishery	308
3.156	Yakutat Groundfish Projected Catch by Species, 1980-2000	309
3.157	Projections of Yakutat Groundfish Harvesting Activity as a Percentage of Total Yakutat Harvesting Activity	310
3.158	Projected Harvesting Activity Yakutat King Crab Fishery, 1980-2000	311
3.159	Projected Percentage Change from 1980, Yakutat King Crab Fishery	312
3.160	Projected Harvesting Activity Yakutat Tanner Crab Fishery, 1980-2000	314
3.161	Projected Percentage Change from 1980, Yakutat Tanner Crab Fishery	315
3.162	Projected Harvesting Activity Yakutat Dungeness Crab Fishery, 1980-2000	316
3.163	Projected Percentage Change from 1980, Yakutat Dungeness Crab Fishery	317
3.164	Projected Harvesting Activity Yakutat All Fisheries, 1980-2000	320
3.165	Projected Percentage Change from 1980, Yakutat All Fisheries	321
3.166	Projected Harvesting Activity Yakutat Traditional Fisheries, 1980-2000	322

LIST OF TABLES (continued)

TABLE #		PAGE #
3.167	Projected Percentage Change from 1980, Yakutat Traditional Fisheries	323
3.168	Percentage of Catch by Weight by Yakutat Fishery Including Groundfish, 1980-2000	325
3.169	Percentage of Value by Yakutat Fishery Including Groundfish, 1980-2000	326
3.170	Percentage of Boats by Yakutat Fishery Including Groundfish, 1980-2000	327
3.171	Percentage of Fishermen by Yakutat Fishery Including Groundfish, 1980-2000	328
3.172	Percentage of Number of Landings by Yakutat Fishery Including Groundfish, 1980-2000	329
3.173	Percentage of Catch by Weight by Yakutat Fishery Excluding Groundfish, 1980-2000	330
3.174	Percentage of Value by Yakutat Fishery Excluding Groundfish, 1980-2000	331
3.175	Percentage of Boats by Yakutat Fishery Excluding Groundfish, 1980-2000	332
3.176	Percentage of Fishermen by Yakutat Fishery Excluding Groundfish, 1980-2000	333
3.177	Percentage of Number of Landings by Yakutat Fishery Excluding Groundfish, 1980-2000	334
3.178	Local Harvesting Factor for Yakutat, 1976	336
3.179	Projected Peak Yakutat Processing Requirements for Water	337
3.180	Projected Peak Yakutat Processing Requirements for Electricity	339
3.181	Projected Yakutat Processing Employment and Income, 1980-2000	340
3.182	Projected Percentage Change in Yakutat Processing Employment and Income, 1980-2000	341
3.183	Projected Yakutat Groundfish Processing Activity, 1980-2000	343
3.184	Comparative Rates of Growth, High Find Case and the Yakutat Fishing Industry	347
3.185	Yakutat Harvesting Capacity	348
4.1	Assumptions for the Distribution of Employment Among the Coastal Areas of Seward, Cordova, and Yakutat, 95 Percent Probability Resource Level Scenario - Exploration Only Northern Gulf of Alaska	356
4.2	Yakutat Population and Employment Projections, A Comparison of the Base Case and the Low Find Case	358
4.3	Cordova Population and Employment Projections, A Comparison of the Base Case and-the Low Find Case	360
4.4	Seward (Northern Gulf) Population and Employment Projections, a Comparison of the Base Case and the Low Find Case	361

LIST OF TABLES (continued)

TABLE #		PAGE #
4.5	Assumptions for the Distribution of Employment Among the Coastal Areas of Seward, Cordova, and Yakutat Mean (and 5 Percent) Probability Resource Level Scenario Northern Gulf of Alaska	363
4.6	Yakutat Population and Employment Projections, a Comparison of the Base Case and the Mean Find Case	368
4.7	Cordova Population and Employment Projections, a Comparison of the Base Case and the Mean Find Case	370
4.8	Seward (Northern Gulf) Population and Employment Projections, a Comparison of the Base Case and the Mean Find Case	371
4.9	OCS Vessel Traffic Mean Find Case	372
4.10	Yakutat Population and Employment Projections, a Comparison of the Base Case and the High Find Case	373
4.11	Cordova Population and Employment Projections, a Comparison of the Base Case and the High Find Case	374
4.12	Seward (Northern Gulf) Population and Employment Projections, a Comparison of the Base Case and the High Find Case	375
4.13	OCS Vessel Traffic, High Find Case	376
4.14	Assumptions for the Distribution of Employment Among the Coastal Areas of Seward and Kodiak, 95 Percent Probability Resource Level Scenario - Exploration Only Western Gulf of Alaska	378
4.15	Kodiak Population and Employment Projections, a Comparison of the Base Case and the Low Find Case	380
4.16	Seward (Western Gulf) Population and Employment Projections, a Comparison of the Base Case and the Low Find Case	381
4.17	Assumptions for the Distribution of Employment Among the Coastal Areas of Seward and Kodiak Mean Probability Resource Level Scenario Western Gulf of Alaska	383
4.18	Kodiak Population and Employment Projections, a Comparison of the Base Case and the Mean Find Case	387
4.19	Seward (Western Gulf) Population and Employment Projections, a Comparison of the Base Case and the Mean Find Case	388
4.20	Projected OCS Vessel Traffic, Mean Find Case Western Gulf	389
4.21	Assumptions for the Distribution of Employment Among the Coastal Areas of Seward and Kodiak, 5 Percent Probability Resource Level Scenario - Oil and Gas Western Gulf of Alaska	391
4.22	Kodiak Population and Employment Projections, a Comparison of the Base Case and the High Find Case	395
4.23	Seward (Western Gulf) Population and Employment Projections, a Comparison of the Base Case and the High Find "Case.	396

LIST OF TABLES (continued)

TABLE #		PAGE #
4.24	Projected OCS Vessel Traffic, High Find Case, Western Gulf	397
4.25	Upper Cook Inlet Commercial Fishing and Petroleum Industry Statistics, 1961-1968	406
4.26	Alaska Employment and Work Force Statistics, 1970-1977	408
4.27	Seward (Northern Gulf) Population and Employment Projections, a Comparison of the Base Case and the Low Find Case	427
4.28	Cordova Population and Employment Projections, a Comparison of the Base Case and the Low Find Case	428
4.29	Kodiak Population and Employment Projections, a Comparison of the Base Case and the Low Find Case	429
4.30	Seward (Western Gulf) Population and Employment Projections, a Comparison of the Base Case and the Low Find Case	430
4.31	Yakutat Population and Employment Projections, a Comparison of the Base Case and the Low Find Case	431
4.32	Seward (Northern Gulf) Population and Employment Projections, a Comparison of the Base Case and the Mean Find Case	433
4.33	Seward (Western Gulf) Population and Employment Projections, a Comparison of the Base Case and the Mean Find Case	434
4.34	Kodiak Population and Employment Projections, a Comparison of the Base Case and the Mean Find Case	435
4.35	Cordova Population and Employment Projections, a Comparison of the Base Case and the Mean Find Case	436
4.36	Yakutat Population and Employment Projections, a Comparison of the Base Case and the Mean Find Case	438
4.37	Seward (Northern Gulf) Population and Employment Projections, a Comparison of the Base Case and the High Find Case	440
4.38	Kodiak Population and Employment Projections, a Comparison of the Base Case and the High Find Case	441
4.39	Seward (Western Gulf) Population and Employment Projections, a Comparison of the Base Case and the High Find Case	442
4.40	Cordova Population and Employment Projections, a Comparison of the Base Case and the High Find Case	443
4.41	Yakutat Population and Employment Projections, a Comparison of the Base Case and the High Find Case	445

LIST OF FIGURES

FIGURE #		PAGE #
1.1	Gulf of Alaska Study Areas	6
2.1	International Pacific Halibut Commission Management Areas	32
2.2a	Mean Annual Catch (MT) of Walleye Pollock by the Japanese Trawl Fishery, 1964-1974	80
2.2b	Mean Annual Catch (MT) of Pacific Cod by the Japanese Trawl Fishery, 1964-1974	81
2.2c	Mean Annual Catch (MT) of Sablefish (blackcod) by the Japanese Trawl Fishery, 1964-1974	82
2.2d	Mean Annual Trawl Fishery Catch (MT) by Japan, 1964-1974	83
4.1	Major Salmon Fishing Areas, Cook Inlet	447
4.2	Major Halibut Fishing Areas, Cook Inlet	448
4.3	Major King Crab Fishing Areas, Cook Inlet	449
4.4	Major Tanner Crab Fishing Areas, Cook Inlet	450
4.5	Major Dungeness Crab Fishing Areas, Cook Inlet	451
4.6	Major Shrimp Fishing Areas, Cook Inlet	452
4.7	Major Herring Fishing and Razor Clamming Areas, Cook Inlet	453
4.8	Major Salmon Fishing Areas, Prince William Sound	454
4.9	Known Distribution of Scallops and Razor Clams and Known Herring Spawning Areas, Prince William Sound	455
4.10	Major Crab Fishing Areas, Prince William Sound	456
4.11	Major Shrimp Fishing Areas, Prince William Sound	457
4.12	Major Salmon Fishing Areas, Yakutat	458
4.13	Major Crab Fishing Areas, Yakutat	459
4.14	Major Shrimp Fishing Areas, Yakutat	460
4.15	Major Shrimp Fishing and Razor Clamming Areas, Kodiak	461
4.16	Major Halibut Fishing Areas, Yakutat	463
4.17	Major Halibut Fishing Areas, Prince William Sound	464
4.18	Major Halibut Fishing Areas, Kodiak	465
4.19	Major King Crab Fishing Areas, Kodiak	466
4.20	Major Tanner Crab Fishing Areas, Kodiak	467
4.21	Major Dungeness Crab Fishing Areas, Kodiak	468
4.22	Major Salmon Fishing Areas, Kodiak	470

I. INTRODUCTION

This report is a product of the Alaska Outer Continental Shelf Socio-economic Studies Program (SESP). The principal objective of the Studies Program is to analyze potential impacts and changes likely to occur at the statewide, regional, and community levels as a result of proposed Outer Continental Shelf (OCS) lease sales in federal offshore areas of Alaska. The Studies Program has completed impact studies of the proposed federal/state Beaufort Sea lease sale and is completing impact studies of the proposed federal lease sales in the Northern and Western Gulf of Alaska.

The Studies Program has focused attention on several key issues about which relatively little was known, but which are of particular concern to the impact analysis of the Gulf of Alaska lease sales. Principal among these issues is the potential relationship between the commercial fishing and oil industries. This relationship is of particular importance in the Gulf of Alaska for two reasons: (1) the commercial fishing industry currently dominates the economic base of the communities adjacent to the proposed lease sale areas and (2) due to the Fisheries Conservation and Management Act of 1976 with which the United States claimed the rights to fishery resources within 200 miles of the U.S. coastline, due to improved fishery resource management, rehabilitation, and/or enhancement programs, and due to favorable market conditions, the growth potential of the Gulf of Alaska commercial fishing industry is significant. Therefore, the potential for competition between the commercial fishing and oil industries is increased.

General Objective and Methodology

The objective of this study is to increase our understanding of the potential relationships between these industries and to project the potential impacts on the commercial fishing industry of the Gulf of Alaska that may occur as a result of the proposed OCS lease sales No. 46 and No. 55.

The methodology used to meet this objective is as follows:

- The history and current trends of the Gulf of Alaska commercial fishing industry were documented and examined to develop a basis for projecting fishery development and potential interaction with the oil industry.

- Methods were developed and used to forecast the level of commercial fishing industry activity in the absence of OCS oil activity pursuant to lease sales No. 46 and No. 55.

- The nature and magnitude of projected activities of the commercial fishing and oil industries were analyzed to determine the potential impacts of lease sales No. 46 and No. 55.

The projections of commercial fishing industry activity in the absence of OCS activity, that is, the non-OCS case projections, serve two purposes. They provide a measure of the importance of the commercial fishing industry which may be jeopardized by OCS activity, and they provide a development scenario of the commercial fishing industry that, together with the OCS petroleum development scenarios, is used to analyze the potential impacts of lease sales No. 46 and No. 55.

The impact evaluation process of the Studies Program is divided into three parts: preparation of petroleum development scenarios, analysis of statewide and regional impacts, and analysis of community impacts. The scenarios presented in Technical Report Number 29, Northern Gulf of Alaska Petroleum Development Scenarios, and Technical Report Number 35, Western Gulf of Alaska Petroleum Development Scenarios, are the oil and gas development hypotheses driving the impact analysis. Four scenarios of different magnitudes were prepared for each lease sale. One scenario was constructed for each of three U.S. Geological Survey (USGS) resource estimates and the fourth was constructed assuming that exploration occurs but that commercial quantities of gas and/or oil are not found. The petroleum development scenarios provide a range of potential direct employment and equipment characteristics together with the hypothesized timing and location of both in a region. The latter two parts of the evaluation process are dependent on the petroleum development scenarios and are themselves interdependent.

The studies that are summarized in the following reports are of particular importance in forecasting the development of the commercial fishing industry:

- Technical Report Number 31
  Northern Gulf of Alaska
  Petroleum Development Scenarios
  Transportation Systems Impacts

- Technical Report Number 32
  Northern and Western Gulf of Alaska
  Petroleum Development Scenarios
  Local Socioeconomic Baseline

- Technical Report Number 33
  Northern Gulf of Alaska
  Petroleum Development Scenarios
  Local Socioeconomic Impacts

- Technical Report Number 34
  Northern Gulf of Alaska
  Petroleum Development Scenarios
  Economic and Demographic Impacts

- Technical Report Number 37
  Western Gulf of Alaska
  PetroleumD evelopment Scenarios
  Transportation Systems Impacts

- Technical Report Number 38
  Western Gulf of Alaska
  Petroleum Development Scenarios
  Economic and Demographic Impacts

- Technical Report Number 40
  Western Gulf'of Alaska
  Petroleum Development Scenarios
  Local Socioeconomic Impacts

These studies hypothesize: (1) the OCS petroleum activity that may occur, (2) economic and demographic conditions, (3) the nature of the transportation system that will serve and interact with the commercial fishing industry, and (4) the availability of the local public services upon which the industry is dependent. In short, these studies project many of the characteristics of the environment in which the commercial fishing industry may operate and which affects the development of the fisheries.

Scope

The Gulf of Alaska OCS petroleum development scenarios constructed in Technical Reports Number 29 and Number 35, have identified Kodiak and Seward, and Seward, Cordova, and Yakutat as potential sites for onshore OCS activity and have identified adjacent areas of the Gulf of Alaska as potential areas of OCS ocean space use associated with lease sales No. 46 and No. 55 respectively. The focus of this study, therefore, is on the fish processing activities in Kodiak, Seward, Cordova, and Yakutat and the fishing activities in the adjacent waters of the Gulf of Alaska. The latter are included in the fishing grounds of the Kodiak, Cook Inlet, Prince William Sound, and Yakutat management areas (see Figure 1.1).

The commercial fishing industry of a community is defined as the processing activities in the community and the harvesting activities which occur in the adjacent management area. This definition of a community's commercial fishing industry will include some harvesting activity that is not closely associated with the community and will exculde some harvesting activity that is. The reason for this is that fishermen and fishing boats are extremely mobile; fishermen and boats from each of the four study area communities participate in the fisheries of both near and distant communities and fishermen and boats from outside the study area participate in the Kodiak, Cook Inlet, Prince William Sound, and Yakutat Management Area fisheries.

With this problem in mind, the definition of a commercial fishing industry was selected in consideration of: (1) the objective of this study,

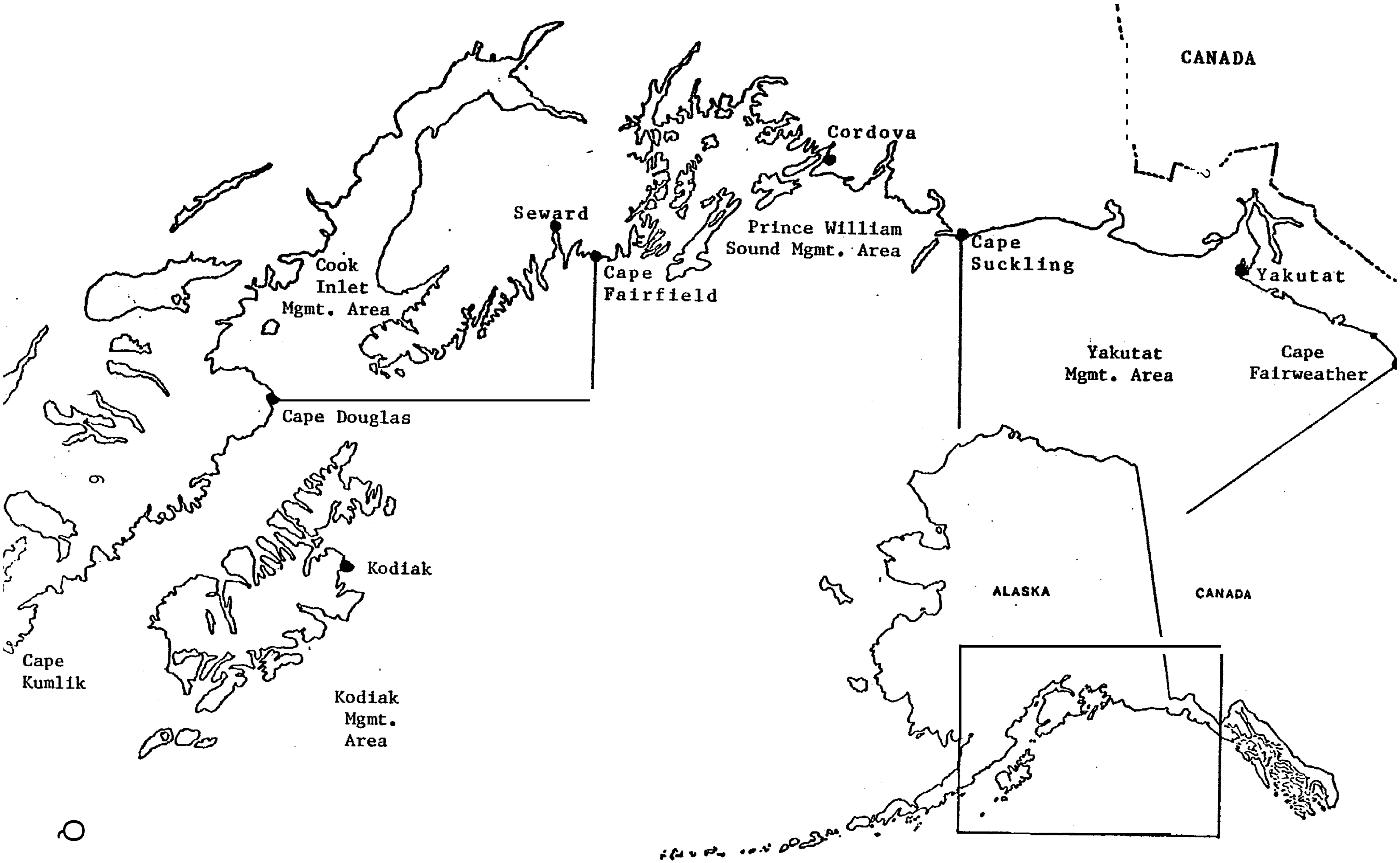


Figure 1. : Gu f of Alaska Study Areas.

which is to determine the impact of OCS petroleum activity that is encompassed in these management areas, (2) the expectation that OCS activity will primarily compete with fishing industry activities included in this definition, and (3) the absence of the data required to measure and project industry activity with alternative definitions of a commercial fishing industry.

Past levels of harvesting and processing activity are documented, future levels of activity are projected through 2000 in the absence of OCS petroleum activity pursuant to lease sales No. 46 and No. 55, and the potential differences that may occur as a result of various levels of OCS activity are analyzed for each commercial fishing industry. The indexes of harvesting activity include:

- weight and value of harvest by species and/or species groups,
- number of boats,
- employment and income,
- frequency and seasonality of ocean and harbor space use.

The indexes of processing activity considered are:

- number of processing plants,
- employment and income,
- processing capacity,
- requirements for water and electricity.

The items that are discussed in the development and assessment of the forecasts of these indexes of commercial fishing industry activity include:

- local participation in harvesting and processing activities,
- market channels and arrangements,
- factors of change,
- ocean space use conflicts,
- conflicts between recreational and commercial fisheries,
- the organization of the commercial fish industry and potentially critical economic and political trends. -

The Nature of the Non-OCS Projections

There are two reasons one cannot predict with complete certainty the level of activity of a commercial fishing industry: (1) the level of activity is determined by complex and generally poorly understood relationships among the level of activity and the elements of the biological, physical, governmental, and market environments a fishery inhabits and (2) the future characteristics of these environments are not known with certainty. However, based both on the past relationships between industry activity and a small number of elements of these environments and on the expected characteristics of these elements, one can determine how the level of activity is expected to change. The projections presented in this" study, therefore, indicate how a commercial fishing industry is expected to change and not necessarily how it will, in fact, change. For example, if the probability of an industry expanding is 90 percent and the probability that it will decline is 10 percent, we would expect the industry to expand although it may, in fact, decline. The projections, therefore, indicate where an industry appears to be headed. The models on which the projections are based and the projections themselves are presented and discussed in later chapters.

The Nature of the Impact Analysis

This study considers three potential sources of OCS impacts on the commercial fishing industries of Kodiak, Seward, Cordova, and Yakutat. They are the competition for (1) labor, (2) components of a community's infrastructure, and (3) ocean space. The competition can potentially have beneficial and/or adverse impacts on a commercial fishing industry. It is generally not possible to quantify the potential impacts and thus calculate the level of fishing industry activity in the presence of OCS activity. The reasons for this are as follow:

- Past experiences of interactions between the commercial fishing and OCS petroleum industries such as have occurred in the North Sea, the Gulf of Mexico, or Upper Cook Inlet, are not sufficiently well documented to indicate whether changes which occurred in the associated fisheries once OCS activity began were a result of the OCS activity or other factors.
- The nature of the fisheries, OCS activity, and other economic activities may be sufficiently different in the Gulf of Alaska that experiences elsewhere may not

indicate the magnitude of potential impacts in the Gulf of Alaska.

- The impacts that will occur will be determined by the degree of compatibility which exists between the activities of these industries and efforts that are taken to reduce the adverse effects and increase the beneficial effects; but since the Studies Program is not a planning study seeking alternative or mitigating solutions and is not intended to make recommendations for actions, it is inappropriate to make impact projections on the basis of assumptions as to what mitigating actions will be taken.
- Although the fisheries will be potentially impacted by the changes in the biological environment that will result from OCS activities, the potential biological effects are so varied and at this time so poorly understood that there is not sufficient information to generate scientifically defendable projections of the biological changes that will occur and the resulting impacts on the activity of the commercial fishing industry.

This does not, however, mean that no meaningful impact analysis is possible, but it does mean that neither an empirically nor a theoretically sound basis exists which can, for example, be used to forecast a 15 percent reduction in catch in 1995 due to the OCS activity associated with the high find case. The characteristics of the activities of these industries and, in some instances, the data of past experiences can be used to analyze the nature of the interactions that are expected to occur and to determine which aspects of commercial fishing activity may potentially be affected.

It should be remembered that projected impacts are based on hypothetical levels, timings, and locations ofOCS activity reacting with hypothetical levels of fishing activity and, therefore, indicate what may happen if the commercial fishing and OCS petroleum industries attempt particular activities at a particular time and place; the projected impacts, therefore, indicate what can happen and not what will necessarily happen.

Study Outline

The remainder of this chapter consists of a brief outline of the subjects addressed in subsequent chapters and appendixes.

- Chapter II includes a discussion of the specific methods and assumptions, (i. e., the models) used to forecast the levels of activity of the Kodiak, Seward, Cordova, and Yakutat commercial fishing industries in the absence of OCS activity associated with lease sale No. 46 and/or No. 55. The specifications of the forecast models are included in the appendix to Chapter II,
- Chapter III is divided into four sub-chapters, one for each of the four commercial fishing industries. Each

sub-chapter includes: (1) a brief introduction to one of the four industries, (2) the non-OCS case projections generated for that industry using the models developed in Chapter II, and (3) an assessment of the feasibility of such forecasts in terms of the projections of population, employment, physical systems, and transportation systems presented in other Studies Program reports and in terms of the components of the market and governmental environments that are not included in the projection models. The introduction to each commercial fishing industry includes selected historical data; the remainder of the historical data are presented in an appendix.

- Chapter IV consists of: (1) a summary presentation of both the OCS petroleum scenarios and the associated pertinent projections of economic conditions, physical systems, and transportation systems presented in other SESP reports, (2) an analysis of the potential impacts on the commercial fishing industries of projected OCS activity, and (3) a summary of potential impacts.
- Appendix A, which is entitled Fishery Biology, includes reference material that is useful in: (1) analyzing the future of the fisheries for both the OCS and non-OCS cases, and (2) understanding the difficulty associated with projecting the biological base of a fishery. The latter is of particular importance in comprehending the nature of the commercial fishing industry projections.

The topics presented include causes of fluctuation of resource abundance and life histories.

- Appendix B is an overview of the Alaska commercial fishing industry and as such it provides a reference to the development, market structure, and statistics of the industry, as well as a description of the market and governmental environments in which the industry operates. This material serves as a basis for determining the market and governmental environments that are expected to exist during the forecast period (1980-2000).
- Appendix C consists of tables which document the development of the commercial fishing industries of Kodiak, Seward, Cordova, and Yakutat.

II. MEASURING AND FORECASTING COMMERCIAL FISHING INDUSTRY ACTIVITY

Two of the principal objectives of this study are to document the past levels of activity of the commercial fisheries of Kodiak, Seward, Cordova, and Yakutat and to develop forecast models of fishery activity. The indexes of fishery activity used in this documentation and the models used to project the value of these indexes are the subject of this chapter.

Measures of the Activity of a Commercial Fishing Industry

A commercial fishing industry consists of a harvesting sector and a processing sector. There are also industries or sectors of industries that are directly and perhaps wholly dependent on one or both sectors of the fishing industry but are not strictly part of the fishing industry. Examples of this include, but are not limited to, firms which sell fuel, repair services, and mechanical or electronic gear to fishing boats and firms that provide transportation, construction, and/or maintenance services for fish processing plants. Although the levels of activities of these industries are interdependent, the focus of this study is on the commercial fishing industry, and therefore the measures or indexes of activity discussed in the following two sections are those for the harvesting and processing sectors of the commercial fishing industry and not those for peripheral industries.

HARVESTING

Several of the measures of harvesting activity addressed in this study are quite straightforward and require little explanation; others due to their less frequent usage and/or more ambiguous meanings require a more complete explanation. Both types of measures are defined and discussed in this section.

Catch

Catch refers to the weight and/or value of a harvest during a specific period of time. Typically the weight is stated in pounds and the value is in dollars, however, for herring and groundfish the weight is often stated in tons. When catch is measured in terms of dollars, it is typically the value of the harvest to the fishermen that is being measured. This will, of course, equal the product of the average ex-vessel price of the fish harvested and pounds harvested, where the ex-vessel price is the price, in dollars per pound, paid by whoever buys the fish from a fisherman.

It should be noted that there are two sources of bias in the harvest value and ex-vessel price data that are available: (1) accurate records of the ex-vessel price of each sale have not been kept by the Alaska Department of Fish and Game (ADF&G) or the other governmental agencies (e. g., Commercial Fisheries Entry Commission (CFEC)) which publish average ex-vessel price and/or harvest value data; therefore, these data are estimates and at times rather rough estimates of prices and values, and (2) in addition to the direct payments per pound of fish, processors may on occasion also pay bonuses to fishermen or provide non-monetary rewards such as storage space or assistance in obtaining credit. These monetary and non-monetary payments that are not made per pound of fish sold are indeed part of the value of the catch to fishermen but they are not included in ADF&G or CFEC estimates of value or average ex-vessel price.

Number of Boats .

" The number of boats that participate in a fishery is a limited measure of fishery activity since the degree of participation measured in terms of the number of landings, days fished, or catch varies greatly among boats. Data on the number of boats are, however, available from the ADF&G and CFEC and, as will be seen, they serve as a basis for estimating employment,

Employment

Employment statistics for the harvesting sector of a commercial fishing industry are not available from the Alaska Department of Labor because fishermen, including crew members, are typically considered to be self-employed and, therefore, are excluded from the Department of Labor's chief source of employment statistics, the quarterly reports of employers. In the absence of historical employment data, employment is defined as participation in a fishery, and the historical and projected time series data of employment by fishery are calculated based on estimates of the number of boats and the average crew size by fishery; that is, employment is defined as the product of the two. This measure of employment does approximate the number of fishermen who are at one time during the year associated with a fishery but it does not indicate the amount of time spent in a fishery. When the employment data are summed over all the fisheries in a management area to calculate the employment in the harvesting sector of a commercial fishing industry, double counting occurs since a fisherman often participates in more than one fishery. The method used to reduce the latter problem is discussed in a subsequent section.

Income

There are numerous ways to define income in the harvesting sector, but the data that are available dictate which definition is used in this study. Alternative measures of income and a discussion of the measure used are presented below.

Gross income, net income, and fishermen's income are three alternative measures of income. Gross income equals the income directly generated by harvesting activities and as such would include all payments both monetary and non-monetary made in exchange for the harvesting activity of vessels. Net income equals gross income minus non-labor costs, and fishermen's income equals the pre-tax monetary and non-monetary income received by the crews including skippers in exchange for the labor services they provide.

The measure of income that is used in this study, harvest value, is an approximation of gross income which in turn is the basis of the other measures of income. As was mentioned in a previous section, the harvest value data that are available exclude bonuses and non-monetary payments that are made in exchange for harvesting activities and, therefore, understate gross income. But the values of the excluded payments are not available, therefore, the harvest value data as reported by the ADF&G and CFEC are used to approximate gross income. Time series data on net income and fishermen’s income are not available nor are the data necessary to accurately estimate them. It is, therefore, not possible to estimate net or fishermen’s income on the basis of estimates of gross income. Changes in gross income, however, accurately reflect changes in the other two measures of income if the three measures of income change proportionately. If the cost of fuel and other non-labor costs increase more rapidly than gross income, the rate of growth of gross income will exceed that of net income; however, in the past large increases in ex-vessel prices have tended to prevent this from happening and expected increases in ex-vessel prices may do the same in the future. Differences in the rates of growth of gross and net income and/or changes in crew share agreements can cause a divergence between the rates of growth of gross income and fishermen’s income. Due to the complexity and variety of crew share agreements within a fishery and among fisheries, it is not possible to determine if the average crew share is becoming a larger or smaller fraction of gross or net income; it is, therefore, not known which will tend to grow more rapidly, gross income or fishermen’s income. Industry sources have indicated, however, that the ratio of fishermen’s income to gross income may be decreasing. If this assessment is and continues to be correct, the forecasted rates of increase in gross income will tend to overstate the rates of increase in fishermen's income.

In addition to being the most readily available measure of income, gross income may also be the most useful concept in terms of community impact analysis. Some of the expenses that are subtracted from gross income in calculating net income are for goods and services purchased locally and the boat's or owner's share that is not included in fishermen's income may be income to a local resident and, therefore, part of the economic base as is local fishermen's income.

Frequency and Seasonality of Ocean Space and Harbor Use

The frequency and seasonality of ocean space and harbor use is the final index of harvesting activity considered. There is very little historical data concerning the movements of fishing vessels. Their use of ocean and harbor space has not been as well monitored and reported as that of larger vessels. ADF&G and CFEC data on the annual number of landings by fishery, however, provide a measure of ocean space use, data of varying levels of detail from the local harbormasters provide measures of harbor use, and ADF&G and CFEC data on the number of boats and landings per month provide a measure of the seasonality of ocean space use.

Local Fishing Activity

Due to the mobility of fishermen and boats among geographically dispersed fisheries, it is difficult to define local fishing effort in a meaningful way; and, due to the lack of data concerning the expenditure and work patterns of fishermen, it is clifficult to measure local effort once a definition is selected. The difficulties of defining and measuring local effort in a way that is useful for local economic base analysis is demonstrated by the following example. Consider two fishermen (1) a fisherman from Cordova who fishes for salmon in Prince William Sound and in Oregon and Washington and who resides in Hawaii during the winter, and (2) a shrimp fisherman from Washington who resides in Kodiak with his family during the shrimp season. The proportions of the Cordova fisherman's Prince William Sound fishing income that is spent in Cordova may not be greater than the proportion of the Washington fisherman's Kodiak fishing income that is spent in Kodiak.

Although precise definitions and measures of local fishing effort are neither meaningful nor feasible, the rough measures of local participation that are available do indicate whether or not a fishery is predominately local in nature. For a fishery in which gear permits are area specific (e.g., salmon, herring, and king crab), the index of local participation is the ratio of locally owned permits to total permits. For the other fisheries, statewide gear permits are issued and the index of local participation equals P in the following equation:

$$p = ((PF/TP)\ LP)/B$$

where PF is the number of permits fished statewide, TP is the number of fishable permits statewide, LP is the number of locally owned permits, B is the number of boats that participated in a local fishery, and a gear permit is defined to be locally owned if the gear permit holder listed the local community as his home address on the gear permit application form.

This index is intended to measure the proportion of harvesting activity that is local. The range of such an index would be from zero to one, with zero indicating no local participation and one indicating no non-local participation. For fisheries with permits that are not area specific, the index can exceed one; each index which exceeded one was set equal to one.

PROCESSING

The indexes of processing activity to be addressed in this study require only brief explanations.

<u>Number of Plants</u>

A fish processing plant is defined as a semi-autonomous fish processing, facility, therefore, a single firm may have more than one plant in a community or in a management area.

<u>Employment</u>

Average monthly and/or average annual employment statistics are used.

Income

Annual income data are used. For small coastal communities of the Gulf of Alaska, more income and employment data are often available for manufacturing of food and kindred products than for food processing or fish processing alone due to confidentiality requirements. When employment data are not available for fish processing alone and when the category for which data are available is dominated by fish processing, the data are reported for the broader category.

Existing Capacity

The concept of processing plant capacity is ambiguous. There 'are typically a number of constraints of varying strengths and durations. Consider, for example, a canning operation in a plant with unused floor space. It may be possible to process 50 metric tons (110,000 pounds) of fish per day using two ten-hour shifts, but if the machinery cannot be operated at this rate for long before it wears out, the long-term and short-term capacities differ. The long-term capacity is, however, not necessarily less than the short-term capacity since, given time, equipment can be replaced and/or additional equipment can be installed. The measure of capacity reported in this study is intended to approximate the level of output that could be processed on a sustained basis given the existing plant and equipment and assuming fish are available.

REAL VERSUS NOMINAL DOLLARS

Values and prices can be stated in real (i.e., constant) dollars or in nominal (i.e., current) dollars, the difference being that a nominal measure is the number of dollars whereas a real measure is the number of dollars adjusted for changes in the value of a dollar since a base period. For example, the nominal value of the Alaska red salmon harvest increased from $17.5 million in 1961 to $19.2 million in 1975, but since the U.S. Consumer Price Index (CPI) for all goods increased by 80 percent during this period, the real value of the 1975 harvest in terms of 1961 dollars was $10.6 million. In this example, the number of dollars received from the harvest (i.e., the nominal value) increased by 9.7 percent while the amount of goods and services that could be purchased with the dollars received for the harvest (the real value) decreased by 39.4 percent. Since intertemporal comparisons of nominal dollar measures are relatively meaningless during periods of inflation (i.e., during periods in which the CPI is increasing and, therefore, the value or purchasing power of the dollar is decreasing) and since the forecast period of 1980 through 2000 is expected to be characterized by inflation, projections of values and prices are presented in real dollars. But since many people are accustomed to thinking in terms of current or nominal dollars, the projections are also presented in nominal dollars and the real dollar projections use the current period (i.e., 1978) as the base year. The U.S. CPI for all goods and services was approximately 200 at the end of 1978; the real prices and value projections with 1978 as the base year can, therefore, be converted into real prices and values with 1967 as the base year by dividing by two.

Forecasting Traditional Commercial Fishing Industry Activity in the Absence of the OCS Development Associated with Lease Sale No. 46 and No. 55

The models used to forecast the development of the traditional commercial fishing industries of Kodiak, Seward, Cordova, and Yakutat in the absence of OCS activity pursuant to proposed lease sales No. 46 and No. 55 are the topic of the remainder of this chapter.

The fishery development forecasts or scenarios that are constructed are similar to the OCS petroleum development scenarios in that they are based upon estimated or hypothesized levels of resource abundance. A brief outline of the forecast methodology which is used precedes a detailed discussion of the bases of the resource abundance hypotheses and of how they are used to forecast harvesting and processing activity. The methodology is as follows:

- Forecasts of resource abundance provided by the Alaska Department of Fish and Game (ADF&G) or the North Pacific Fisheries Management Council (NPFMC) or based on historical catch data are used to forecast catch.

- The catch forecasts serve as bases for projecting the other indexes of harvesting and processing activity.

- The feasibility of the projections is evaluated in terms of the economic and demographic conditions, transportation systems, and local public services hypothesized in associated SESP reports or elsewhere in this report,

HARVESTING

Resource abundance is the principal determinant of harvesting and subsequent processing activity in all but a few of the traditional fisheries of Alaska. In a majority of these fisheries, quotas set by the Alaska Department of Fish and Game (ADF&G) or the North Pacific Fisheries Management Council (NPFMC) on the basis of its assessments of resource abundance are binding constraints, that is, in any one year-and fishery the catch would be larger if it were not for the quotas. The salmon, herring, halibut, king crab, Tanner crab, and shrimp fisheries of the Gulf of Alaska are typically in this group of fisheries. For a small number of relatively minor traditional fisheries, such as those for Dungeness crab, razor clams, and scallops, resource abundance is a major but perhaps not the principal determinant of fishery activity. The economic conditions are such that it is not profitable for fishermen to harvest the maximum amount the ADF&G or the NPFMC thinks is acceptable. For these fisheries the market constraints are binding, not the quotas based on resource abundance. The market constraints are, however, in part determined by resource abundance. Catch per unit effort and thus costs per unit harvested are related to resource abundance and the ex-vessel price is directly related to the quality of the fish which, in turn, is related to stock abundance. The quality of the catch is influenced by resource abundance because changes in abundance are often accompanied by changes in age and size structure of the stock.

The dependence of commercial fishing activity on resource abundance creates forecasting problems because the prediction of resource abundance, within reasonable confidence limits, presupposes detailed knowledge of a number of physical and biological processes operating in the marine environment. The need for detailed information can be seen in the prediction that a 0.8°C temperature anomaly in the southern Bering Sea can result in a 11,300 metric ton (24.9 million pound) change in herring production (Laevastu, 1978). Pioneering efforts in the short-term assessment of fisheries production are now taking place in the form of complex computer simulation models. Since the extension of these pioneering efforts to the Gulf of Alaska is beyond the scope of this study, such models have not been used to forecast resource abundance. The forecasts of stock abundance that are used are provided by the ADF&G and the NPFMC or are based on historical catch. The use of these forecasts of stock abundance as a basis for projecting the indexes of harvesting activity is discussed in the following sections.

Catch by Weight

Similar types of resource abundance forecasts are not available from the ADF&G and/or NPFMC for all the commercial fisheries of the Gulf of Alaska, therefore, it is not appropriate to apply the same method of forecasting catch to all the fisheries. The nature of the resource abundance forecasts and the ways they are used to project catch are discussed by species.

Salmon.

The ADF&G has stated short-term and long-term catch objectives by management area for the commercially important species of salmon. These objectives are based on historical catch data and on both public and private fishery development programs including enhancement and rehabilitation. The method used to forecast annual catch based on ADF&G's catch objectives is as follows:

- The catch for 1980 is set equal to the mean annual catch for 1973-1977.
- The annual catch is increased from 1980 through 1985 at the rate that will result in the 1985 catch being equal to the short-term objective. For example, if the mean catch for 1973-1977 is 1.0 million pounds and the short-term objective is 1.25 million pounds, the 1980 and the 1985 catch forecasts would be 1.0 and 1.25 million pounds respectively and the annual rate of growth during the period would be 4.5 percent.

- The annual catch is increased from 1985 through 2000 at the rate that will result in the year 2000 catch being equal to the long-term catch objective.

- If the short-term objective is less than the five year mean, the annual catch for 1980 through 1985 is set equal to the short-term objective.

- For the salmon fisheries which are of minor importance to commercial fishermen and for which there are no stated objectives, annual catch for the forecast period '(i.e., 1980-2000) is set equal to the five year mean.

- The resulting forecasts of annual catch by species are then allocated among gear types (e.g., purse seine, drift gillnet, etc.) on the basis of the historical allocations of catch by species by gear type.

The mean five year catch, the short-term and long-term catch objectives, the resulting rates of growth, and the allocation factors are summarized in Table 2.1.

Halibut.

The NPFMC and the International Pacific Halibut Commission (IPHC) have

TABLE 2.1

BASIS OF SALNON CATCH PROJECTIONS

Kodiak

	Kings	Reds	Pinks	Cohos	Chums
Average Annual Catch 1973-1977 (1,000 lbs)	9.2	2,565	19,258	158	4,316
Short Term Objective (1,000 lbs)	--	3,571	27,778	--	6,327
Long Term Objective (1,000 lbs)	--	5,952	31,746	--	6,790
Rate of Growth 1980-1985	0%	6.85%	7.60	0%	7.95%
Rate of Growth 1986-2000	0%	3.47%	0. 09%	0%	0. 48%
Catch Allocated to the					
Purse Seine Fleet	92.8%	75.0%	90. 0%	70.0%	94.2%
Beach Seine	0.0%	0.5%	1. 3%	20.0%	0.4%
Set Gillnet Fleet	7.2%	24. 5%	8,7%	10.0%	5.4%

Cook Inlet

	Kings	Reds	Pinks	Cohos	Chums
Average Annual Catch 1973-1977 (1 ,000 lbs)	260	8,206	4,424	1,250	6,279
Short Term Objective (1,000 lbs)	176	8,930	5,952	1,874	6,329
Long Term Objective (1,000 lbs)	1,540	8,930	9,127	2,249	6,329
Rate of Growth 1980-1985	--	1.7%	6.12%	8.45%	0.15%
Rate of Growth 1986-2000	15.55%	0.0%	2.89%	1.22%	0.00%
Catch Allocated to the					
Purse Seine Fleet	0.1%	2%	37%	1.5%	1 0%
Drift Gillnet Fleet	5.6%	55%	17%	35%	80%
Set Gillnet Fleet	94.3%	43%	46%	63.4%	1 0%

Continued on next page..,

TABLE 2.1'
(Continued)

Prince William Sound

	Kings	Reds	Pinks	Cohos	Chums
Average Catch 1973-1977 (1,000 lbs)	700	5,303	12,000	1,380	3,433
Short Term Objective (1 ,000 lbs)	700	4,170	13,000	1,500	3,620
Long Term Objective	700	5,360	21,000	1,500	5,420
Rate of Growth 1980-1985	0%	--	1. 75%	1. 70%	1 .05%
Rate of Growth 1986-2000	0%	1. 69%	3.45%	0. 00%	2.73%
Percentage Allocated to the					
Purse Seine Fleet	1%	6%	92%	3%	72%
Drift Gillnet Fleet	97%	92%	7%	97%	27%

Yakutat

	Kings	Reds	Pinks	Cohos	Chums
Average Catch 1973-1977 (1,000 lbs)	67	816	148	610	66
Short Term Objective (1,000 lbs)	67	1,257	353	683	88
Long Term Objective	67	2,094	373	1,036	132 "
Rate of Growth 1980-1985	0%	9.0%	19%	2.3%	6%
Rate of Growth 1986-2000	0%	3.4%	0.4%	2.82%	2,75%
Allocation in 1,000 lbs to the					
Set Gillnet Fleet	66.0%		100.0%	85.4%	100.0%
Troll Fleet	34. 0%		0.0%	14.6%	0,0%

Source: Alaska Sea Grant Program.

NOTE : Catch objectives are provided by the Alaska Department of Fish and Game.

jointly set both short-term and long-term catch objectives for the Gulf of Alaska. Since the halibut fleet is very mobile with each boat typically fishing many areas in the Gulf of Alaska, the NPFC/IPHC objectives for Area 3 are used to forecast catch. Area 3 includes the Gulf of Alaska (see Figure 2.1). The forecast method is as follows:

- The short-term catch objective is less than the five year mean because it is not believed that the past level of catch will permit the desired recovery. The annual catch for 1980 through 1985 is, therefore, set equal to the short-term objective.

- The annual catch is increased from 1985 through 2000 at the rate that results in the year 2000 catch being equal to the long-term catch objective.

- The catch forecasts for Area 3 are allocated to a community on the basis of the historical ratio of halibut landings in the community to Area 3 catch.

The numerical specifications of this forecast method are summarized in Table 2.2.

<u>Herring.</u>

Neither the ADF&G nor the NPFMC currently has catch objectives for the

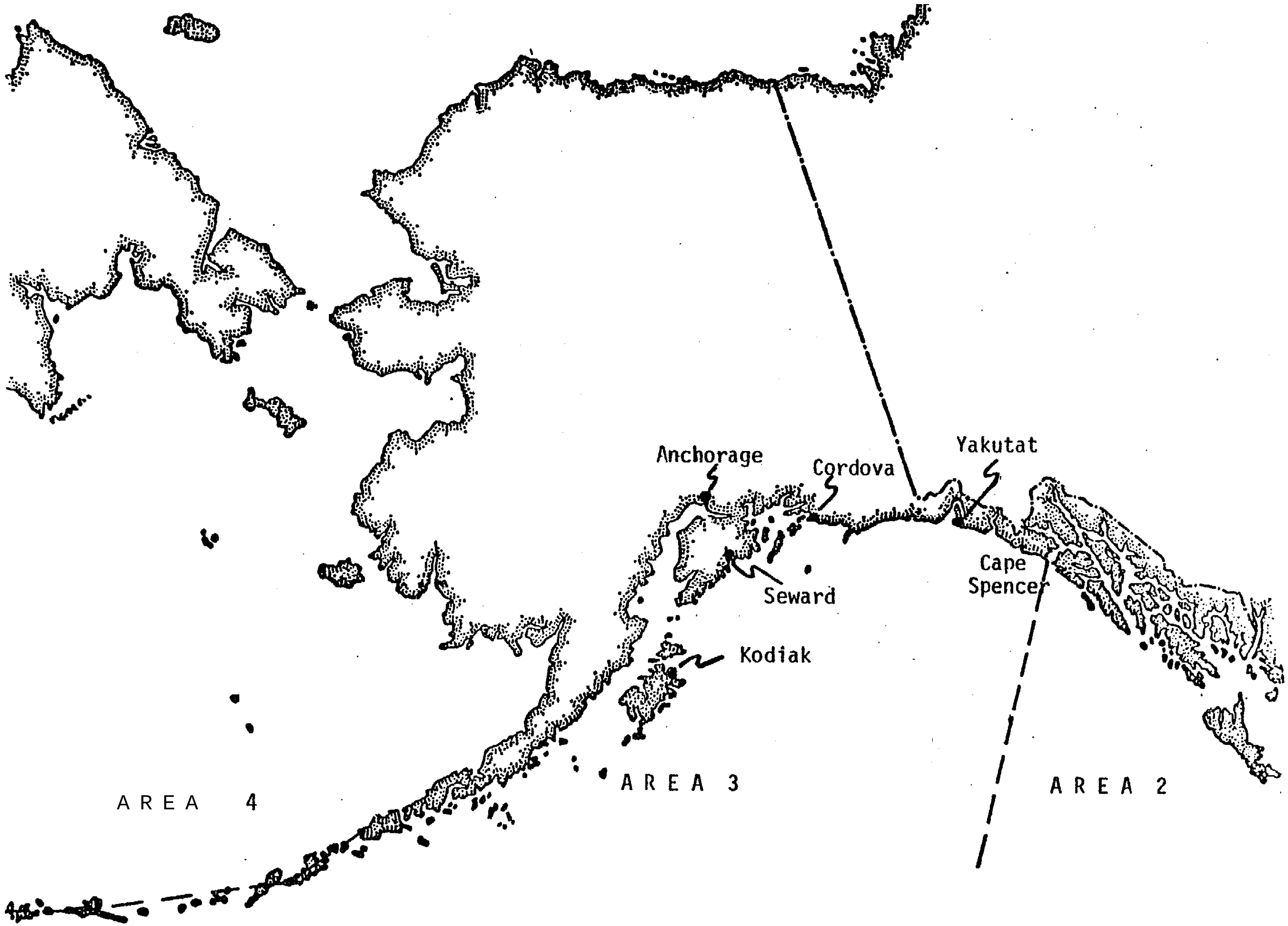


Figure 2.1 Internation Pacific Halibut Commission Management Areas

TABLE 2.2

BASIS OF HALIBUT CATCH PROJECTIONS

Average Annual Catch Area 3 1973-1977 (1,000 lbs)	13,648
Short Term Objectives (1,000 lbs)[1]	11,000
Long Term Objectives (1,000 lbs)[1]	20,000
Short Term Rate of Increase in Catch	--
Long Term Rate of Increase in Catch	3.85%

ALLOCATION OF CATCH BY COMMUNITY

Kodiak	40%
Seward	30%
Cordova	3%
Yakutat	1.5%

Source: Alaska Sea Grant Program.

[1]Catch objectives are provided by the International Pacific Halibut Commission and the North Pacific Fisheries Management Council.

Gulf of Alaska herring fisheries. The catch forecasts for these fisheries are, therefore, based on information provided by the ADF&G area biologists (see Table 2.3).

King Crab,

Short-term stock assessments provided by the NPFMC and/or ADF&G area shellfish biologist are used as the basis of the catch forecasts. The catch forecasts were held constant during the forecast period or increased at a constant rate during the first five years of the forecast period depending upon the information provided by each area shellfish biologist. The numerical specifications of the king crab catch forecasts are presented in Table 2.4.

Tanner Crab.

The stock abundance information that is available for Tanner crab and the methods of forecasting catch based on such information parallel those of the king crab fishery. The specifications of the Tanner crab catch forecasts appear in Table 2.5.

Dungeness Crab.

Neither the ADF&G nor the NPFMC has sufficient stock assessment data to estimate current or future resource abundance. In the absence of such information, historical catch data and the assessments of the local

TABLE 2.3

BASIS OF HERRING CATCH PROJECTIONS

	Estimated Sustainable Yield (1,000 Pounds)
Kodiak	4,000
Cook Inlet	6,436
Prince William Sound	
Roe Herring	10,000
Roe on Kelp	417

These estimates of the sustainable yield are based on the historical catch and information provided by the area finfish biologists.

TABLE 2.4

BASIS OF KING CRAB CATCH PROJECTIONS

Kodiak

Average Annual Catch 1973-1977 (1,000 lbs)	18,446
Short Term Objective (1,000 lbs)[1]	30,000
Long Term Objective (1,000 lbs)[1]	30,000
Short Term Rate of Increase in Catch	0%
Long Term Rate of Increase in Catch	0%

Cook Inlet

Average Annual Catch 1973-1977 (1,000 lbs)	3,674
Short Term Objective (1,000 lbs)[2]	4,211
Long Term Objective (1,000 lbs)[2]	4,211
Short Term Rate of Increase in Catch	2.77%
Long Term Rate of Increase in Catch	0%

Prince William Sound

Average Catch 1973-1977 (1,000 lbs)	90
Short Term Objective (1,000 lbs)[3]	100
Long Term Objective (1,000 lbs)[3]	100
Short Term Rate of Increase in Catch	0%
Long Term Rate of Increase in Catch	0%

Yakutat

Average Annual Catch 1973-1977 (1,000 lbs)	2
Short Term Objective (1,000 lbs)[4]	2.7
Long Term Objective (1,000 lbs)[4]	6.6
Short Term Rate of Increase in Catch	6.15%
Long Term Rate of Increase in Catch	6.15%

---

[1] NPFMC Fishery Management Plan for Alaska King Crab, 1977; also Martin Eaton, ADF&G Westward Region Area Shellfish Biologist.

[2] Fishery Management Plan for Alaska King Crab, 1977; also Tom Schroeder, ADF&G Area Management Biologist for Cook Inlet.

[3] Alan K. Kimker, ADF&G Shellfish Biologist for Prince William Sound.

[4] Based on Historical Catch.

TABLE 2.5

BASIS OF TANNER CRAB CATCH PROJECTIONS

Kodiak

Average Annual Catch 1973-1977 (1,000 lbs)	24,473
Short Term Objective (1,000 lbs)[1]	28,000
Long Term Objective (1,000 lbs)[1]	28,000
Short Term Rate of Increase in Catch	0%
Long Term Rate of Increase in Catch	0%

Cook Inlet

Average Annual Catch 1973-1977 (1,000 lbs)	6,541
Short Term Objective (1,000 lbs)[2]	5,313
Long Term Objective (1,000 lbs)[2]	5,313
Short Term Rate of Increase in Catch	0.0%
Long Term Rate of Increase in Catch	0.0%

Prince William Sound

Average Catch 1973-1977 (1,000 lbs)	7,241
Short Term Objective (1,000 lbs)[3]	5,000
Long Term Objective (1,000 lbs)[3]	5,000
Short Term Rate of Increase in Catch	0%
Long Term Rate of Increase in Catch	0%

Yakutat

Average Annual Catch 1973-1977 (1,000 lbs)	1,650
Short Term Objective (1,000 lbs)[4]	3,000
Long Term Objective (1,000 lbs)[4]	3,000
Short Term Rate Of Increase in Catch	12.55%
Long Term Rate Of Increase in Catch	0.0%

---

[1] NPFMC Fishery Management Plan for the Commercial Tanner Crab Fishery off the Coast of Alaska, 1978; also Martin Eaton, ADF&G Westward Region Area Shellfish Biologist.

[2] NPFMC Fishery Management Plan for the Commercial Tanner Crab Fishery off the Coast of Alaska, 1978; also Tom Schroeder, ADF&G Area Management Biologist for Cook Inlet.

[3] NPFMC Fishery Management Plan for the Commercial Tanner Crab Fishery off the Coast of Alaska, 1978; also Alan K. Kimker, ADF&G Shellfish Biologist for Prince William Sound,

[4] NPFMC Fishery Management Plan for the Commercial Tanner Crab Fishery off the Coast of Alaska, 1978.

shellfish biologists are used to forecast the Allowable Biological Catch (ABC) for each Dungeness crab fishery. However, since the Dungeness crab fisheries have typically been underutilized, that is, catch has often been below the ABC, market conditions and not resource abundance have been the binding constraint. To project catch in this fishery, it is therefore necessary to consider future market conditions. It is believed that favorable market conditions (e.g., increasing ex-vessel prices and the lack of growth of other crab stocks) will result in the Dungeness crab fisheries becoming fully utilized during the forecast period. In the past few years, annual catch has approached the ABC in Prince William Sound and Cook Inlet, therefore, the projected catch in these areas is held constant during the forecast period. In the Kodiak and Yakutat area, catch has been well below the ABC. In these areas, the 1980 and the 2000 catch forecasts are set equal to the five-year mean for 1973-1977 and the ABC respectively, and catch is projected to increase at a constant rate over the forecast period. The specifications of the Dungeness crab catch forecasts are in Table 2.6.

Shrimp.

It is very difficult to assess future stock abundance of shrimp in the Gulf of Alaska. In the Kodiak area which has dominated the Gulf shrimp fisheries, future stock abundance assessment is difficult because of the apparent dramatic decline in stock abundance in the past three years and the uncertainty as to the possibility and timing of a recovery. Stock abundance is difficult to assess in the Prince William Sound and Yakutat

TABLE 2.6

BASIS OF DUNGENESS CRAB CATCH PROJECTIONS

Kodiak

Average Annual Catch 1973-1977 (1,000 lbs)	713
Short Term Objective (1,000 lbs)[1]	923
Long Term Objective (1,000 lbs)[1]	2,000
Short Term Rate of Increase in Catch	5.3%
Long Term Rate of Increase in Catch	5.3%

Cook Inlet

Average Annual Catch 1973-1977 (1,000 lbs)	322
Short and Long Term Objectives (1,000 lbs)[2]	450
Rate of Increase in Catch	0%

(It is assumed that annual catch will equal 450,000 pounds from 1980-2000)

Prince William Sound

Average Annual Catch 1973-1977 (1,000 lbs)	642
Short and Long Term Objectives (1,000 lbs)[3]	1,250
Rate of Increase in Catch	0%

(It is assumed that annual catch will equal 1,250,000 pounds from 1980-2000)

Yakutat

Average Annual Catch 1973-1977 (1,000 lbs)	1,035
Short Term Objective (1,000 lbs)[4]	1,180
Long Term Objective (1,000 lbs)[4]	1,750
Short Term Rate of Increase in Catch	2.65%
Long Term Rate of Increase in Catch	2.65%

---

[1] Based on Historical Catch; also Martin Eaton, ADF&G Westward Region Area Shellfish Biologist.

[2] Based on Historical Catch; also Tom Schroeder, ADF&G Area Management Biologist for Cook Inlet.

[3] Based on Historical Catch; also Alan K. Kimker, ADF&G Shellfish Biologist for Prince William Sound.

[4] Based on Historical Catch.

areas for quite a different reason; in these areas, the shrimp resources have not been heavily fished for sustained periods, and it is therefore not known what levels of catch the existing resources can support. The Cook Inlet shrimp fishery is a mature fishery that has been and is expected to be relatively stable. The following catch projections are based on discussions with the area shellfish biologists:

- The annual Kodiak catch forecast for 1980 through 1989 is 4,540 metric tons (10 million pounds) and the forecast for 1990 through 2000 is 9,070 metric tons (20 million pounds).

- The Cook Inlet and Prince William Sound forecasts are held constant during the forecast period at 2,540 metric tons (5.6 million pounds) and 227 metric tons (500,000 pounds) respectively.

- No estimate is made for the Yakutat shrimp fishery which was inactive in all but one of the past ten years.

Razor Clams.

The razor clam fisheries in the Kodiak and Prince William Sound areas are today minor fisheries in comparison to other fisheries or in comparison to the past levels of activity in the razor clam fisheries. Decreases in resource abundance and adverse market conditions have caused the decline in these fisheries, however, the stocks appear to be increasing and the market conditions are improving. Therefore, a recovery of the fisheries is expected. Constant incremental increase in stock abundance and catch are forecasted,

Scallops.

The scallop resources of the Gulf of Alaska were heavily utilized from 1968 through 1975. The resulting decrease in stock abundance and unfavorable market conditions have all but eliminated the scallop fishery in the Gulf of Alaska. The scallop resources are not believed to be sufficient to support more than a few boats, therefore no catch forecasts have been made.

Catch By Value, Income

The measure of the value of catch or harvesting income being used in this report is the product of the catch by weight and the ex-vessel price; therefore projections of catch by value require forecasts of both the catch by weight and the ex-vessel price. The methods used to forecast the former were discussed in the previous section; the methods used to forecast ex-vessel prices are the subject of this section.

Ex-vessel prices are estimated by management area fishery using a two-stage process:

- Each statewide ex-vessel price is forecasted based on (1) an empirically determined relationship between ex-vessel prices and the determinants of demand and (2) the expected values of the determinants.

- Each management area ex-vessel price is projected based on the actual 1979 management area price and the projected increases in the statewide price.

The specifications of the statewide ex-vessel price models and the past and expected values of the determinants of demand are presented in Appendix 1. An example of how a forecast of a statewide price is used to forecast a management area price is as follows: if the statewide model for razor clams forecasts ex-vessel prices of $1.00 and $1.50, respectively, for 1979 and 1986 and if the actual 1979 ex-vessel price of razor clams is $0.90 in management area A, the 1986 ex-vessel price forecast for area A razor clams is $1.35 ($0.90 X $1.50/$1.00). This method of forecasting management area prices based on forecasts of statewide prices is valid if statewide prices and management area prices change proportionately; the regression results presented in Table 2.7 imply that they do.

There were two reasons for using statewide ex-vessel price models to forecast management area prices rather than directly forecasting area prices: (1) greater precision is usually achieved in forecasting with a longer time series, and longer time series are typically available for statewide prices than for management area prices and (2) the number of ex-vessel price models required was one fourth the number required had individual management area models been used,

TABLE 2.7

THE STATISTICAL RELATIONSHIP BETWEEN STATEWIDE AND PORT EX-VESSEL PRICES

Halibut

Kodiak ex-vessel price =	0.0276	+	0.855 P		
t-statistics	(0.21)		(5.17)	R^2 =	0.930
Seward Ex-vessel price =	0.0265	+	0.860 P		
t-statistics	(0.22)		(5.97)	R^2 =	0.947

Dungeness Crab

Kodiak ex-vessel price =	0.0187	+	0.785 P		
t-statistics =	(1.21)		(3.32)	R^2 =	0.647
Seward ex-vessel price =	0.0292	+	0.965 P		
t-statistics	(0.60)		(7.65)	R^2 =	0.921
Cordova ex-vessel price =	0.0045	+	0.979 P		
t-statistics	(0.22)		(18.49)	R^2 =	0.986
Yakutat ex-vessel price =	0.00621	+	0.986 P		
t-statistics	(0.37)		(22.74)	R^2 =	0.990

King Crab

Kodiak ex-vessel price =	-0.0018	+	1.128 P		
t-statistics	(-0.063)		(16.74)	R^2 "=	0.979
Seward ex-vessel price =	0.0216	+	1.153 P		
t-statistics	(-1.07)		(23.73)	R^2 =	0.990
Cordova ex-vessel price =	0.0705	+	0.927		
t-statistics	(1.40)		(7.61)	R^2 =	0.906

Yakutat prices were not available for enough years to allow meaningful comparison.

Tanner Crab

Kodiak ex-vessel price =	-0.0121	+	1.110 P		
t-statistics	(-1.07)		(14.64)	R^2 =	0.973
Seward ex-vessel price =	0.0073	+	0.975 P		
t-statistics	(0.39)		(7.80)	R^2 =	0.910
Cordova ex-vessel price =	0.0057	+	0.960 P		
t-statistics	(0.78)		(19.66)	R^2 =	0.985
Yakutat ex-vessel price =	0.0313	+	0.838 P		
t-statistics	(0.89)		(4.06)	R^2 =	0.846

P = the statewide average ex-vessel price for each fishery.

Regression analysis did not successfully explain the past changes in the statewide ex-vessel prices of herring, shrimp, or razor clams; therefore, an alternative forecasting method is required for these fisheries. The projections of statewide ex-vessel prices for these fisheries are based on the historical rates of increase in real ex-vessel prices, the expected rate of increase of the Consumer Price Index (CPI), and expected changes in market conditions. A brief explanation of the projected rate of increase in the real ex-vessel price for each fishery in which regression analysis is inappropriate and the reasons regression analysis was not successful are presented below.

The statewide price of herring is difficult to project using historical data because there are distinct markets and prices for herring products such as roe herring, roe on kelp, and bait, and because the relative importance of these products has dramatically changed in the last ten years as a market for Alaska roe products has been established and expanded. In 1961 the statewide ex-vessel price for herring was $0.01 per pound and in 1979 the ex-vessel price for roe herring, which now dominates the herring fisheries, was approximately $1.00 per pound. This phenomenal increase in the price of herring during the past 18 years was due to a change in product mix and improvements in marketing opportunities that are not expected to occur again. The large price increases have resulted in a significant increase in fishery activity which is expected to moderate future price increases. The real ex-vessel price of herring is thus projected to increase at one percent a year; therefore the nominal price will increase at the rate of increase of the CPI plus 1 percent.

During most of the period for which statewide ex-vessel price data are available, the shrimp fishery was expanding rapidly and prices were relatively stable. During the last three years, there has been a dramatic decline in the fishery and the prices have increased significantly. From 1961 through 1978, the nominal ex-vessel price of shrimp increased from $0.04 to $0.165 per pound. In this same period, the CPI increased from 89.6 to 195.4, therefore, the real price in 1961 dollars increased from $0.04 to $0.076. The 90 percent increase in the real price in 17 years gives an average annual rate of increase of approximately 4 percent. Rapid increases in supply, such as those that moderated price increases through the mid 1970s, are not expected during the forecast period. The real ex-vessel price for shrimp is therefore projected to increase at an annual rate of 5 percent throughout the forecast period.

It is difficult to forecast the ex-vessel price of razor clams because the growth that is expected to occur in that fishery is principally due to increased marketing opportunities for clams for human consumption, while the price during the past ten years has been principally determined by the demand for razor clams as bait for the Dungeness crab fishery. The increases in supply that are expected will tend to moderate price increases and the nominal ex-vessel price is expected to increase at the same rate as the CPI.

Number of Boats

In projecting the number of boats that will participate in a fishery, it is useful to distinguish between the fisheries in which entry is restricted by the Commercial Fisheries Entry Commission (CFEC) and those in which entry is not limited. The CFEC limits the number of boats that can operate in any one Gulf of Alaska herring roe or salmon fishery at any one time by requiring that a gear permit holder be on each boat and by limiting the number of permits issued for each fishery; and in practice, the number of boats participating in each fishery is therefore constrained. If the policies of the CFEC impose a binding constraint on the number of gear permit holders and boats that participate in a fishery, the CFEC'S policies alone determine the number of boats. The gear permits are transferable, and the high market values of permits indicate that the constraints are in fact binding. Therefore, to successfully forecast the number of boats in a fishery, one must know what the CFEC will do. Unfortunately, no one, including the CFEC, knows when, or if, or to what extent, it will increase the number of permits by issuing more permits or decrease the number of permits by initiating a buy-back program for a particular fishery. Due to the technical and political problems associated with changing the number of permits, the CFEC is not expected to radically change the number of gear permits. Another reason for expecting the number of permits to be held relatively constant is that the principal objective of the CFEC is to assure that the fisheries are economically viable; that is, that they provide a fair return to participants in the fishery. But once entry is limited and as long as the market value of permits is greater than zero, the market mechanism tends to assure fair rates of return. If the rate of return is exceptionally high in one fishery, the price of a permit in that fishery will increase, the cost of participating in that fishery will increase, and the rate of return will decrease until it equals the expected rate of return in other fisheries. Similarly, if the rate of return is exceptionally low in one fishery, the price of the permit will decrease, the cost of participation will decrease, and the rate of return will increase until it equals the expected rate of return in other fisheries. Due to this automatic adjustment mechanism, it is not necessary for the CFEC to adjust the number of gear permits to maintain fair rates of return.

The expectation that the CFEC will not dramatically change the number of permits is also reflected in the high market values of permits; if it were generally believed within the industry that additional permits would soon be readily available, the permits would not be selling for tens of thousands of dollars. It should also be noted that the harvesting capacity of the existing number of boats in each fishery exceeds the projected catch for the forecast period, so it will not be necessary to increase the number of permits to allow full utilization of the fishery resources.

For the fisheries in which entry is not limited by the CFEC, the number of boats is projected based on the historical relationship between catch and the number of boats and on projected catch. The specification of these relationships for each fishery is summarized in Appendix 1.

Number of Fishermen

The number of fishermen is used as the measure of harvesting employment. For each fishery, the employment forecast is the product of the projected number of boats and the average crew size. The latter is held constant for the forecast period since crew sizes are expected to remain constant.

When the forecasts of the number of boats or fishermen are summed to project the number participating in a management area's fisheries, double counting of both boats and fishermen occurs since each is counted once for each fishery in which it participates. For example, a fisherman who participates in the purse seine salmon fishery, the purse seine herring fishery, and the razor clam fishery would be counted three times. The same would be true of a boat which participated in these , fisheries. Although this problem cannot readily be eliminated given the available data, it can be reduced by adjusting for the double counting which occurs within the shellfish fisheries and within the salmon fisheries. The method of adjustment is as follows. The number of boats participating in each shellfish fishery and the number of boats participating in the shellfish fishery as a whole, are available from the ADF&G. The same data are available for the salmon fisheries. The ratio of the sum of the boats in each shellfish (or salmon) fishery to the total number of boats in all shellfish (or salmon) fisheries provides a measure of the double counting which occurs in the shellfish (or salmon) fishery.

The ratio indicates the degree to which the double counting of boats occurs in a fishery; for example, if in 1977 the ratio for the shellfish fishery is 1.5, this indicates that the sum of boats overstates the actual total by 50 percent. Using such ratios to adjust the forecasts of total boats and total fishermen participating in a management area's fisheries reduces but does not eliminate double counting. There are two reasons for this: (1) the ratio correctly identified the degree to which double counting of boats occurs within the fishery, but since fishermen are more mobile than boats, the ratio tends to understate the actual double counting of fishermen, and (2) no correction is made for the double counting which occurs due to the mobility of men and boats among the shellfish, salmon and other fisheries. A more appropriate adjustment mechanism is not, however, readily available.

Number of Landings

Forecasts of the number of landings provide a measure of fishing boat traffic and harbor use. The forecasts are based on the historical relationship between the number of landings, catch, and the number of boats, and on forecasts of catch and the number of boats. The specifications of the relationships are summarized by fishery in Appendix 1.

PROCESSING

Processing plant activity is measured in terms of the quantity of inputs used and in terms of the income of processing plant employees. The following sections discuss the methods used to project these measures of activity.

Input Requirements

The requirement for a particular input such as labor, electric power, or water can change due to a change in any or all of the following:

- the quantity of fish processed
- the product mix
- the technology
- the price of one input relative to the prices of other inputs.

The potential effect on input requirements of each type of change and a method of dealing with the uncertainty they present for input requirements are presented in this section.

For a particular area, the quantity of fish processed equals the quantity of fish landed if fish in the round are neither imported nor exported. Unfortunately this condition is not met in any of the management areas being studied, and the data required to determine the relationship between catch and processing within each area are not available. If, however, the relationship between catch and processing is relatively stable, the quantities harvested and processed increase at the same rate. Due to the lack of time series data on interregional movements of fish in the round and due to the rapid changes that are possible in such movements, there is substantial uncertainty concerning how the relationship between the quantities harvested and processed will change. An additional source of uncertainty as to the quantity of fish that will be processed is the groundfish industry. This industry has not developed sufficiently to determine the quantity of groundfish that will be processed in each area.

Another source of uncertainty is the relationship between the quantity of fish processed and the per-unit of product requirement for a particular input. If there are economies of scale the per-unit input requirement decreases as output increases, and therefore input requirements increase less rapidly than output. Conversely, if the production process is characterized by diseconomies of scale, input requirements increase more rapidly than output. The level of output can also affect the per-unit input requirement of a particular input if the desirable input mix changes with output. For example, a relatively capital-intensive method of production may only be feasible at high levels of output. The nature of the production function in the fish processing industry is not sufficiently well understood to determine how the per-unit requirement for each input is related to output.

The product mix, that is the species that are processed, and the product form of each species that is produced affect the input requirements. For example, relatively more labor and electric power are required to produce frozen salmon than to produce canned salmon, and relatively more water is required to process shrimp than to process crab. The data required to account for the changes in input requirements that will result from changes in product mix in terms of species processed are not available; however, there are discernible impacts due to changes in product mix with respect to product form. Frozen products have steadily increased in importance relative to canned products. This is true for most finfish and shellfish species. This change is expected to continue; therefore, everything else being constant, the requirements for labor and electric power are expected to increase more rapidly than the quantity processed.

The effect of technical progress on the requirement of a particular input is ambiguous. If technical progress is characterized by proportional increases in the productivity of all inputs, the input requirements per unit of output will be reduced for all inputs. However, if it is characterized by a more rapid increase in the productivity of one input, the requirement for that input may increase as it is substituted for what have become relatively less productive inputs. The effect on input requirements therefore depends on both the rate and type of technical progress that will occur, and neither can be forecasted with much certainty.

Changes in relative input prices tend to change the input mix that processing plants use. For example, if the price of labor increases relative to the price of physical capital, processors will tend to substitute capital for labor, and everything else being constant, the labor requirement will decrease and the requirements for more automated processing equipment and electric power will increase. The change in input requirements that will occur due to changes in relative input prices will depend on both the extent to which relative prices change and the responsiveness of processors to such changes. Although few definitive statements can be made about either, it appears that the relative price of e"lectric power will continue to increase and that the increase will be substantial enough that processors will tend to substitute other inputs for electric power. For example, more expensive but more efficient freezer units will be used.

The preceding discussion of the factors that will determine input requirements indicates that there are a variety of reasons that input requirements cannot be forecasted with a high degree of certainty. To account for the uncertainty associated with both the rate of development of the groundfish industry and the factors that determine processing input requirements per unit of harvest, four sets of input requirement forecasts are presented. A set of forecasts is presented for both the traditional fisheries and all the fisheries with and without a 2 percent annual decrease in per-unit input requirements. The forecasts for the traditional fisheries are based on the projected changes in management area catch for the traditional fisheries and the current level of input use. For example, if the total traditional catch is projected to increase by 50 percent by 1988, input requirements are projected to increase by 50 percent assuming per-unit requirements do not change, or by 20 percent assuming a 2 percent annual decrease in per-unit requirements. The 1988 input requirements would be 120 percent of the current (i.e., 1977) requirements in the latter case, since 0.98^{11} equals 0.80, and the product of 0.80 and 150 percent is 120 percent. The projected requirements for all fish-cries are the sum of the requirements for the traditional fisheries 'plus the requirements for the groundfish fisheries; the methods used to project the latter are discussed in a separate section. The assumed decrease in per-unit input requirements can be thought of as an increase in efficiency.

The sets of forecasts that do not allow for increased efficiency tend to set an upper bound on input requirements since the requirements are not expected to increase as rapidly as catch. Technical progress, economies of scale, economies of a more uniform rate of production, increasing input prices, and the gradual substitution of capital for labor will tend to reduce processing input requirements per unit of catch. Therefore, the sets of forecasts that allow for increasing efficiency are perhaps more realistic. A 2 percent rate of increase in efficiency is consistent with the 2.2 percent rate of increase in real income per capita used by the SESP and the long-term historical rate of increase in efficiency for the U.S.

Income

The income of processing plants, defined to equal their payrolls, is the product of employment measured in units of labor services and the average wage rate. Therefore, to forecast income, it is necessary to project the average wage rate and employment. The method used to project the latter was discussed in the previous section. The method used to project the wage rate is based on the historical relationship between the rates of increase in the CPI and the average hourly food processing wage in Alaska, and the projected rate of increase in the CPI. Between 1961 and 1977, the average hourly wage tended to increase 1.184 times faster than the CPI. Based on the assumption that this relationship will continue during the forecast period and based on the Studies Program’s optimistic assumption that the CPI will increase at an annual rate of 5.5 percent, the average nominal wage rate will increase by approximately 6.5 percent a year.

The Nature of the Forecasts

The forecasting methodology described in this chapter does not generate projections of harvesting and/or processing activity which exhibit the cyclical fluctuations which have historically been characteristic of the commercial fisheries. In this section, the reasons for not attempting to project cycles and the nature of the forecasts are clarified.

There are three reasons cycles are not forecasted; they are as follow:

- For many species, the length and amplitude of the cycles are not constant over time, and the determinants of cycles are not sufficiently well understood and/or predictable to allow one to successfully project cycles.

- A major objective of the ADF&G, with respect to salmon, is to reduce the cyclical fluctuation in the commercial fisheries.

- The accuracy of the forecasts is not sufficient that forecasts of cyclical deviations would be meaningful.

The accuracy problem in fishery forecasting is one that deserves additional attention. One example of the potential magnitude of the forecasting error is provided by the comparison of the ADF&G 1978 preseason estimate of the Bristol Bay pink salmon return of 3.2 million fish and the actual return of 13.8 million. The preseason forecasts are typically more successful than this one was, and perhaps a better measure of the magnitude of error that can normally be expected is provided by "The Preliminary

Forecasts and Projections for 1979 Salmon Fisheries." In this publication, the point estimate of the statewide salmon harvest is 72 million fish and the range about this estimate is 50 to 100 million fish, that is, there is approximately a 40 percent range about the point estimate within which the actual harvest can fall without surprising anyone. Another example of the potential error associated with fishery forecasts is provided by the experience of the Kodiak shrimp fishery. Between 1969 and 1977, the shrimp catch ranged from 14,200 metric tons (31.5 million pounds) to 37,300 metric tons (82.2 million pounds) and averaged 24,900 metric tons (54.9 million pounds); then in 1978 it fell to 10,300 metric tons (22.8 million pounds) and is now expected to decline even further. Had long-range catch forecasts been made in the mid 1970s, they would have tended to overstate the catch in the late 1970s and early 1980s by a factor of three or four. This experience and others provide sufficient proof that unforeseen changes in the physical, biological, market, and/or governmental environments of the fisheries can cause a rapid decline in a booming fishery, and they can just as readily create new fisheries or turn marginal fisheries into very productive ones.

The inability to forecast cyclical changes in activity can be minimized by thinking in terms of expected or probabilistic levels of fishery activity; for example, if the 1985 salmon catch forecast for a management area is 20,000 metric tons, the implication is that in the mid 1980s, the catch will on average be 20,000 metric tons. The inability to identify secular trends that are or will be developing is a more fundamental problem for which there is no simple solution. As a result of this problem, the forecasts presented in the following chapter indicate the levels of commercial fishing industry activity that are expected given the past and present performance of the industry.

Methods Used to Project Harvesting and Processing Activity for the Groundfish Industries

At this early stage in the development of the Alaska groundfish industry, it is not known how or at what rate the industry will develop. Questions as to the size and type of vessels that will dominate the industry, the importance of onboard versus onshore processing, the number of processing lines per fish processing plant, the average productivity per vessel, and the processing labor requirements have yet to be answered. In the absence of such information, the forecasts of the development of this fishery are by necessity based on a set of assumptions. These assumptions are as follow:

- The allowable biological catch (ABC) for the various groundfish species in the Bering Sea and the Gulf of Alaska will remain at the levels presented in the North Pacific Fisheries Management Council's management plans for the Bering Sea (1979) and the Gulf of Alaska (1978).
- The domestic fisheries will have completely replaced foreign fisheries by the year 2000.
- Domestic catch by species or species group will exhibit constant annual rates of growth from the actual catch in 1978 to the ABC in 2000.
- Catch per boat equals 1,600 metric tons (3,257,000 pounds) in 1978 and will increase at an annual rate of 5 percent.

- The average number of landings per boat will be 50 per year.
- The average crew size, including the captain, will be five.
- The processing plant input of whole fish per man year of processing employment will increase at an annual rate of 3 percent from the current level of 91 metric tons (201,000 pounds).
- Landings per processing plant will average 43,500 metric tons (96 million pounds).
- The average processing plant will occupy 2,690 square meters (29,000 square feet) of interior space on 0.81 to 1.62 hectars (two to four acres) of land, and use 2.2 million kilowatt hours of electricity and 218 million liters (57.6 million gallons) of water per year.
- The Alaska groundfish catch will be processed onshore in Alaska.

The basis of each assumption is presented below. The data required to forecast the ABC for each species are not available. Some data suggest that the ABC for pollock may tend to increase and that the ABC's for other species may also tend to change, but the magnitude of the change or, in some cases, the direction of change is not known; the current ABC's thus provide the best available forecasts.

The domestic groundfish fishery has begun to develop but it is too early to know with a high degree of certainty how rapidly the domestic fishery will develop. There are, however, several reasons for believing that the domestic groundfish fishery will replace the foreign fishery in the next 20 to 25 years; they are as follow : a goal of the Alaska Bottomfish Development Program is, "To develop within a period of approximately 20 years the domestic utilization of Alaska bottomfish resources to the fullest optimum yield." (PDBI, 1979, p. 4); the Arthur D. Little report to the Office of the Governor states that, "Full development of Alaska's bottomfish industry will require 15 to 20 years" (Little, 1978, p. 39); and many of the vessels that have been built for the Alaska shellfish fleets in the past few years have been designed to allow them to enter the groundfish fishery as it becomes more profitable and as the shellfish seasons become shorter. The history of the development of other fisheries and the current impediments to the development of the Alaska groundfish industry suggest that the annual increases in catch will at first be rather small but will become continuously larger as the initial impediments are removed. A growth path resulting from a constant annual rate of growth exhibits this characteristic. The current impediments to development which must be removed for the Alaska groundfish industry to develop and which will be removed as it develops include: the absence of both marketing arrangements between harvesters and processors and well established marketing channels, inadequate harvesting and processing knowledge, the high profitability of alternative traditional fisheries, and the uncertainty of the relative profitability of alternative methods of harvesting and processing.

Current estimates of catch per boat range from less than 1,600 metric tons to over 2,400 metric tons. However, vessel productivity will tend to increase for the following reason: as the fishery develops, (1) vessels designed specifically for groundfish will comprise an increasing proportion of the fleet, (2) average boat size will tend to increase, (3) the knowledge of resource location and harvesting methods will increase, and (4) more efficient harvesting methods wil l be developed. The estimate of the current catch per boat is based on information provided by Petersburg Fisheries; the catch per boat of 4,680 metric tons forecasted for the year 2000 approximates an estimate by Stokes (1978).

The number of landings per boat per year is based on one landing per five days for 250 days a year; this allows for down time due to bad weather, repairs, and holidays. The estimate of one landing per five days is based on data provided by Petersburg Fisheries.

The average crew size will be in part determined by the degree to which onboard processing occurs and the average catch per trawl; as either increases, the crew size tends to increase. Mechanization will tend to hold the crew size at a constant level despite increases in vessel size. The estimated crew size of five allows for only a minor degree of onboard processing such as, perhaps, gutting. The current crew size is typically four to five.

The assumption of limited onboard processing and the resulting average crew size of five is based in part on the reluctance of fishermen to have even limited onboard processing. Jon Black of New England Fish Company (NEFCO), which operates a groundfish processing line in Kodiak, has indicated that he had great difficulty convincing fishermen to use an onboard gutter because the fishermen thought that the gutters are too slow. NEFCO has convinced fishermen to do onboard gutting by refusing to accept ungutted cod. Petersburg Fisheries has encouraged onboard gutting by offering a higher price for gutted cod. The processors' preference for gutted fish is due to the higher product quality that onboard gutting provides; by gutting the fish shortly after they are caught, the enzymes in the digestive tract are removed before they can cause deterioration of the rest of the fish. A brief analysis of the cost effectiveness of onboard gutting also indicates that it is in the fishermen's interest to perform onboard gutting. The analysis is as follows: if the ex-vessel prices of gutted cod and ungutted cod are $0.20 and $0.15 respectively per pound and if the weight of gutted cod is 85 percent of the weight of ungutted cod, the ex-vessel price of gutted cod in terms of pounds caught (in round weight comparison) is $0.17 per pound (85 percent of the gutted price of $0.20). Ifan extra crewman is required to man the gutter and a crew share is 8 percent of the value of landings, the cost of the extra crewman is $0.0136 per pound of gutted fish (8 percent of $0.17). The resultant price differential is $0.02 per pound ($0.17-$0.15) and there is, therefore, a net profit to the boat owner of $0.0064 ($0.0200-$0.01 36) per pound, assuming that the use of the gutter does not interfere with the harvesting productivity of the boat and assuming that the gutter is provided free of charge by the processor. Of the two Alaska plants currently processing groundfish, one provides gutters and one does not. The $0.0064 profit per pound would amount to an annual profit of over $66,000 for a boat that harvests 4,680 metric tons per year, the average harvest per boat expected by 2000.

An analysis of the ability of a single gutting machine to keep pace with the harvesting capabilities of a fishing vessel also indicates that onboard gutting is feasible, however, the margin of feasibility is smaller. The Baader cod. gutter has a capacity of approximately 30 fish per minute, Using an average gutted weight of 1.5 pounds per fish and an 85 percent recovery factor, approximately 52.94 pounds of catch can be gutted a minute (30 fish x 1.50 pounds/0.85) or assuming less than optimal conditions perhaps 2,647 pounds (50 minutes x 52.94 pounds per minute) can be gutted an hour. The question is how well does this hourly output match the hourly catch of what is expected to be the typical trawler. Using the catch per boat expected in the year 2000 of 4,680 metric tons and an average of 250 fishing days per year, the average daily catch is 18.72 metric tons (41,270 pounds); a gutter with a sustainable capacity of 2,647 pounds per hour could, therefore, handle an average day's catch in approximately 15.6 hours, a period which is often not a long working day on a fishing boat.

The ireplication is that although an onboard gutter may not be able to keep pace with the trawling gear during the hours in which catch is high, it has a comparable capacity for the period of the fishing trip as a whole. It should also be mentioned that by the time the average trawler is catching 41,270 pounds a day, the average onboard gutter will no doubt have a larger capacity than the currently available Baader cod gutter that is used in this example.

A summary of the results of the preceding analysis would be that onboard gutting is currently profitable and technically feasible on even relatively small trawlers, given the ex-vessel price differential for gutted fish and fish in the round and given the onboard gutting equipment that is available. Also, it is essential to provide high quality in some groundfish species such as cod. Therefore, at least limited processing is expected to occur onboard, but due to onboard space limitations, more complete onboard processing will tend to be confined to the trawlers in excess of 45.7 meters (150 feet). The figures used in the preceding analysis were provided by industry sources.

The estimate of the current processing labor requirement per metric ton of whole fish is based on information provided by Petersburg Fisheries and New England Fish Company. Allowing for a 3 percent annual increase in the productivity of labor results in a productivity figure for the year 2000 that approximates the productivity figure cited in a June, 1978, groundfish research report of the Second Session of the Tenth Legislature of the state of Alaska.

The assumed levels of andings and utilization of building space, land, electricity, and water per processing plant are based on a plant with four fillet lines and accompanying roe and minced fish processing equipment. Stokes (1978) indicates that such a plant operating two eight-hour shifts a day can process 278 metric tons (480,000 pounds) of whole fish per day; and allowing for weekends, holidays, maintenance periods, and some irregularities in deliveries, such a plant would process 43,600 metric tons (96 million pounds) of fish a year (i.e., 218 metric tons per day, 200 days per year). Assuming a 10-day cold storage holding reserve, the plant would occupy approximately 2,690 square meters (29,000 square feet) of interior space situated on 0.81 to 1.62 hectars (2-4 acres) of land. The assumed levels of water and electricity usage by such a processing plant are based on the assumed level of production and the water and electricity requirements identified in the previously mentioned 1978 groundfish research report of the Alaska Legislature.

In the absence of a well-developed trend toward either onboard or onshore processing, it is assumed that all processing will occur onshore in Alaska; this assumption will generate upper limit forecasts of the groundfish processing input requirements for individual communities and for the state as a whole since some processing will occur onboard and some of the onshore processing will occur out of Alaska. Processing pollock onshore has proved to be economically feasible in the case of Icicle Seafoods (Martin, 1978); however, Jaeger (1977) indicates that an onshore processor would have to offer a 76 percent price premium to compete with offshore processors due to the additional costs associated with de'ivering fish to an onshore processor as opposed to a processor located on the fishing grounds. It is not clear whether onshore processing is cost effective if such a premium is paid. The development plans of a number of onshore processors suggest, however, that they think it will be. But it is not known whether the industry will be dominated by the existing processors or by new entrants to fish processing with different perspectives as to the relative profitability of various methods of processing.

The 1978 catch and the ABC's by species or species group by area and the corresponding annual rates of growth are summarized in Table 2.8 and the corresponding annual catch forecasts are presented in Table 2.9. The following comments concerning the forecasts of groundfish industry activity (see Table 2.10) that are generated by the catch forecasts (see Table 2.9) and the assumed relationships between catch and the other measures of industry activity help explain the meaning of the forecasts. The forecast of the number of boats is in fact a forecast of full-time equivalent boats since the assumed level of catch per boat and number of landings per boat are those that may be expected for a boat that participates in the groundfish fishery twelve months per year. Particularly in the early stages of the development of the fishery, many boats will participate in the fishery on a part-time basis; therefore, the number of boats in the fishery will exceed the forecast of full-time equivalents. The same is true for the forecast of fishermen; the forecast is of fishermen . years and will therefore understate the number of fishermen who participate in the fishery during any one year. The forecast of the number of fish processing plants is based on the forecasted catch and an assumed level of output per plant; the characteristics of the plant on which the estimate of plant productivity is based are described above. If the characteristics of plants differ from those of the plant on which the estimate of productivity is based, the forecast will not be correct. For example, if the processing sector is characterized by a large number of plants with one to two groundfish lines, the forecasts will understate the number of processing plants by a factor of two to four; conversely, if there is more concentration and specialization in groundfish processing

TABLE 2.8

BASIS OF GROUNDFISH CATCH
FORECASTS

	1978 Catch (MT)	2000 ABC (MT)	Annual Rate of Growth
Bering Sea			
Pollock	491	1,000,000	41.4%
Sablefish	1	85,000	47.3%
Cod	473	58,700	24.5%
Other Groundfish	99	476,300	47.0%
All Groundfish	1,064	1,540,000	39.2%
Gulf of Alaska			
Pollock	17	164,700	51.8%
Sablefish	1	12,500	53.5%
Cod	44	33,300	35.2%
Other Groundfish		145,900	42.6%
All Groundfish	127	356,400	43.8%
Southeast Alaska			
Pollock	570	4,100	9.4%
Sablefish	1,337	4,900	6.1%
Cod	103	1,500	12.9%
Other Groundfish	377	21,700	20.2%
All Groundfish	2,387	32,200	12.6%
Alaska			
Pollock	1,078	1,168,800	
Sablefish	1,338	22,400	
Cod	620	93,500	
Other Groundfish	535	643,900	
All Groundfish	3,572	1,928,600	

Sources: 1978 catch; ADF&G. Agenda #4a, 11/30-12/1/78.
ABC's; NPFMC, Fishery Management Plan for the Gulf of Alaska Groundfish Fishery During 1978, April 21, 1978. Fishery Management Plan and Final Environmental Impact Statement for the Groundfish Fishery in the Bering Sea/Aleutian Island Area, March 23, 1978.

TABLE 2.9a
DOMESTIC PROJECTED GROUNDFISH HARVEST
FOR ALASKA
1980-2000

YEAR	WEIGHT (Metric Tons) POLLOCK	COD	SABLEFISH	OTHER	TOTAL	REAL VALUE ($ 1000) POLLOCK	COD	SABLEFISH	OTHER	TOTAL
1980	1703	945	1509	879	5335	242	288	1995	215	2740
1981	2193	1170	1603	1141	6634	304	347	2062	271	2984
1982	2868	1451	1703	1494	8344	387	420	2136	346	3289
1983	3803	1803	1812	1975	10618	500	508	2212	445	3665
1984	5106	2244	1929	?635	13665	654	616	2295	579	4145
1985	692R	2797	2056	3547	17778	866	749	2386	760	4761
1986	9487	3493	2197	4818	23363	1156	912	2487	1007	556?
1987	13089	4370	2355	6598	30986	1556	1113	2599	1344	6612
1988	18172	5476	2534	9107	41435	2108	1361	2729	1811	8008
1989	25361	6873	2742	12661	55813	2870	1667	2881	2456	9874
1990	35541	8640	2991	17719	75659	3928	2046	3070	3357	12401
1991	49978	10880	3297	24946	103125	5392	2516	3304	4614	15826
1992	70477	13724	3686	35307	141218	7431	3101	3609	6382	20523
1993	99612	17340	4195	50203	1'94146	10261	3828	4013	8866	26968
1994	141058	21945	4882	71675	267798	14208	4737	4567	12376	35888
1995	200070	27821	5834	102692	370417	19704	5871	5335	17337	48247
1996	284157	35330	7181	147580	513548	27377	7294	6424	24374	65469
1997	404064	44944	"9123	212645	713361	38353	9141	8041	34601	90136
1998	575179	57273	11962	307082	992512	53077	11325	10250	48578	123231
1999	819551	73113	16155	444306	1382755	74039	14154	13552	68810	170555
2000	1168800	93500	22400	643909	1928600	103440	17732	18408	97690	237270

TABLE 2.9b
DOMESTIC PROJECTED GROUNDFISH HARVEST
FOR THE BERING SEA
1980-2000

YEAR	WEIGHT (Metric Tons) POLLOCK	COD	SABLEFISH	OTHER	TOTAL	REAL VALUE ($ 1000) POLLOCK	COD	SABLEFISH	OTHER	TOTAL
1980	982	733	2	214	2062	140	224	3	52	418
1981	1388	913	3	315	2870	192	271	4	75	542
1982	1962	1136	.5	463	3996	265	329	6	107	707
1983	2774	1415	7	680	5562	365	399	8	153	925
1984	3922.	1762	10	1000	7743	503	484	12	220-	1218
1985	5545	2193	15	1470	10779	693	587	17	315	1613
1986	7840	2730	22	2161	15005	956	713	25	452	2145
1987	11085	3399	33	3177	20888	1317	866	36	647	2867
1988	15672	4232	48	4671	29078	1818	1052	52	929	3850
1989	22159	5269	71	6867	40479	2508	1278	74	1332	5192
1990	31329	6560	104	10096	56350	3462	1554	107	1913	7036
1991	44295	8168	153	14843	78443	4779	1888	154	2745	9567
1992	62626	10169	226	21821	109199	6603	2298	221	3944	13067
1993	88545	12660	333	32082	152013	9121	2795	318	5666	17900
1994	125189	15762	490	4716(-I	211614	12610	3402	458	8144	24614
1995	177000	19624	722	69344	294583	17432	4141	660	1170’7	33940
1996	250253	24432	1063	101949	410081	24110	5044	951	16830	46943
1997	353821	30417	1565	149884	570864	33584	6187	1380	24389	65539
1998	500252	37870	2305	220359	794686	46163	7488	1975	34859	90486
1999	707285	47148	3395	323971	1106262	63897	9127	2848	50173	126045
2000	1000000	58700	5000	476300	1540000	88501	11132	4109	72262	176004

TABLE 2.9c
DOMESTIC PROJECTED GROUNDFISH HARVEST
FOR THE GULF OF ALASKA
1980-2000

	WEIGHT (Metric Tons)					REAL VALUE ($ 1000)				
YEAR	POLLOCK	COD	SABLEFISH	OTHER	TOTAL	POLLOCK	COD	SABLEFISH	OTHER	TOTAL
1980	39	80	2	120	250	6	25	3	29	63
1981	59	109	4	171	360	8	32	5	41	86
1982	90	147	6	244	517	12	42	7	57	118
1983	137	199	9	348	743	18	56	10	79	163
1984	208	268	13	497	1069	27	74	16	109	225
1985	315	363	20	709	1537	39	97	23	152	312
1986	479	490	31	1011	2210	58	128	35	211	433
1987	726	663	47	1447	3177	86	169	52	294	601
1988	1102	896	73	2057	4567	128	223	78	409	838
1989	1673	1210	112	2934	6567	189	294	117	569	1170
1990	2540	1636	172	4185	9442	281	387	176	793	1637
1991	3854	2211	264	5969	13575	416	511	264	1104	2295
1992	5850	2989	405	8515	19518	617	675	396	1539	3228
1993	8879	4040	621	12145	28062	915	892	594	2145	4546
1994	13475	5461	954	17324	40346	1357	1179	892	2991	6420
1995	20452	7381	1465	24710	58009	2014	1558	1340	4172	9083
1996	31040	9977	2249	“3’5246	83403	2990	2060	2012	5821	12884
1997	47110	13485	3453	50274	119914	4472	2743	3044	8180	18439
1998	71500	18227	5302	71710	172409	6598	3604	4543	11344	26090
1999	108518	24637	8141	1022FI7	247884	9804	4769	6829	15841	37243
2000	164700	33300	12500	145900	356400	14576	6315	10272	22135	53299

TABLE 2.9d
DOMESTIC PROJECTED GROUNDFISH HARVEST
FOR SOUTHEAST ALASKA
1980-2000

YEAR	WEIGHT (Metric Tons)					REAL VALUE ($ 1000)				
	POLLOCK	COD	SABLEFISH	OTHER	TOTAL	POLLOCK	COD	SABLEFISH	OTHER	TOTAL
1980	682	131	1505	545	3024	97	40	1989	133	2259
1981	746	148	1596	655	3404	103	44	2053	156	2356
1982	816	168	1693	788	3831	110	49	2123	182	2464
1983	893	189	1796	947	4312	117	53	2193	213	2577
1984	976	214	1905	1139	4853	125	59	2267	250	2701
1985	1068	242	2021	1369	5463	133	65	2345	293	2837
1986	1168	273	2144	1646	6148	142	71	2427	344	2984
1987	1278	308	2274	1979	6920	152	78	2510	403	3144
1988	1398	348	2413	2379	7789	162	86	2599	473	3320
1989	1529	393	2560	2860	8767	173	95	2690	555	3513
1990	1672	444	2715	3439	9868	185	105	2786	652	3728
1991	1829	501	2880	4134	11107	197	116	2886	765	3964
1992	2001	566	3055	4971	12501	211	128	2992	898	4229
1993	2188	640	3241	5976	14070	225	141	3101	1055	4523
1994	2394	723	3438	7185	15837	241	156	3216	1241	4854
1995	2618	816	3648	8638	17825	2513	172	3336	1458	5224
1994	2864	922	3869	10386	20063	276	190	3462	1715	5643
1997	3133	1041	4105	12487	22582	297	212	3618	2032	6159
1998	3427	1176	4354	15012	25417	316	233	3731	2375	6655
1999	3748	1328	4619	18049	28608	339	257	3875	2795	7266
2000	4100	1500	490(-)	7170(-)	32700	363	284	4027	3292	7966

TABLE 2.10a
ALASKA
GROUNDFISH INDUSTRY
1980-2000

YEAR	CATCH Metric Tens	REAL VALUES ($1000)	BOATS	LANDINGS	FISHERMEN	PROCESSING PLANTS	PROCESSING EMPLOYMENT	LAND hectares	ELECTRICITY million KWH	WATER million liters
1980	5336	?740	3.02	151.2	15.12	0.122	55.27	0.149	0.269	26.68
1981	6634	2984	3.58	179.1	17.91	0.152	66.71	0.185	0.335	33.17
1982	8344	3289	4.29	214.5	21.45	0.191	81.46	0.233	0.421	41.72
1983	10618	3665	5.20	260.0	26.00	0.244	100.65	0.296	0.536	53.09
1984	13665	4145	6.37	318.7	31.87	0.313	125.76	0.381	0.690	68.33
1985	17778	4761	7.90	394.8	39.48	0.408	158.85	0.495	0.897	88.89
1986	23363	5562	9.88	494.2	49.42	0.536	202.67	0.651	14179	116.82
1987	30986	6612	12.48	624.2	62.42	0.711	260.97	0.863	1.563	154.93
1988	41435	8008	15.90	794.9	79.49	0.950	338.81	1.155	2.091	207.17
1989	55813	9874	20.40	1(-)19.8	101*9FJ	1.280	443.(')8	1.555	2.816	279.07
1990	75659	12401	26.33	1316.6	131.66	1.735	583.14	2.108	3.818	378.30
1991	103125	15826	34.18	1709.0	170.90	2.365	771.68	2.874	5.204	515.63
1992	141218	20523	44.58	2228.9	222.89	3.239	1025,95	3.935	7.126	706.09
1993	194146	26968	58.37	2918.4	291.84	4.453	1369.39	5.410	9.796	970.73
1994	267798	35888	76.68	3833.8	383.38	6.142	1833.87	7.463	13.513	1338.99
1995	370417	48247	101.01	5050.4	505.04	8.496	2462.73	10.322	18.691	1852.08
1996	513548	65469	133.37	6668.4	666.84	11.779	3314.89	14.311	25.913	2567.74
1997	713361	90136	176.44	8821.9	882.19	16.361	4470.54	19.879	35.995	3566.80
1998	99?512	123231	233.79	11689.6	1168.96	22.764	6038.79	27.658	50.081	4962.56
1999	1382755	1.70555	310O21	15510.3	1551.03	31.715	8168.12	38.533	69.772	6913.77
2000	1928600	237270	412.06	20602.9	?060.29	44.234	11060.68	53.744	97,315	9643.00

TABLE 2.10b
BERING SEA
GROUNDFISH INDUSTRY
1980-2000

YEAR	CATCH Metric Tons	REAL VALUES ($1000)	BOATS	LANDINGS	FISHERMEN	PROCESSING PLANTS	PROCESSING EMPLOYMENT	LAND hectares	ELECTRICITY million KWH	WATER million liters
1980	2062	418	1.17	58.4	5.84	0.047	21.36	0.057	O*1O4	10.31
1981	2870	542	1.55	77.5	7*75	0.066	28.87	0.080	0.145	14.35
1982	3996	707	2.05	102.7	10.27	0.092	39.01	0.111	0.202	19.98
1983	5562	925	2.72	136.2	13.62	0.128	52.73	0.155	0.281	27.81
1984	7743	1218	3.61	180.6	18.06	0.178	71,26	0.216	0.391	38.72
1985	10779	1613	4.79	239.4	23.94	0.247	?6.31	0.300	0.544	53.90
1986	15005	2145	6.35	317.4	31.74	0.344	130.17	0.418	0.757	75.(-)3
1987	20888	2867	8.42	420.8	42.08	0.479	175.93	0.582	1.054	104.44
1988	29078	3850	11.16	557.9	55.79	0.667	237.77	0.810	1.467	145.39
1989	40479	5192	14*79	739.6	73.96	0.928	321.35	1.128	2.043	202.40
1990	56350	7036	19.61	980.6	98.06	1.292	434.32	1.570	2.843	281.75
1991	78443	9567	26.00	130(-).0	130.00	1.799	586.99	2.186	3.958	392.22
1992	109199	13067	34*47	1723.5	172.35	2.505	793*34	3.043	5.510	546.00
1993	152(-)13	17900	45,70	2285.0	228.50	3.487	1072.22	4.236	7.670	760.07
1994	2116]4	24614	60.59	3029.5	302.95	4.854	1449.13	5.897	10.678	1058.07
1995	294583	33940	80.33	4016.4	401.64	6.756	1958.54	8.209	14.864	1472.91
1996	410081	46943	106.50	5324.9	532.49	9.406	?647.03	11.428	20.692	2050.41
1997	570864	65539	141.19	7059.7	705.97	13.093	3577.54	15.908	28.805	2/354.32
1998	794686	90486	187.19	9359.6	935*96	18.2?7	4835.14	22.145	40.099	3973.43
1999	11062(2	126045	248.18	12408.9	1240.89	25.373	6534*84	30.828	55.821	5531.31
2(“)()0	15400(10	176004	329.03	16451.5	1645.15	35.321	8832.03	42.915	77.706	7700.00

TABLE 2.10c
GULF OF ALASKA
GROUNDFISH INDUSTRY
1980-2000

YEAR	CATCH Metric Tons	REAL VALUES ($1000)	BOATS	LANDINGS	FISHERMEN	PROCESSING PLANTS	PROCESSING EMPLOYMENT	LAND hectares	ELECTRICITY million KWH	WATER million liters
1980	250	63	0.14	7.1	0.71	0.006	2.59	0.007	0.013	1.25
1981	3bo	86	0.19	9.7	0.97	0.008	3.62	0.010	0.018	1.80
1982	517	118	0.27	13.3	1.33	0.012	5.05	0.014	0.026	2.59
1983	743	163	0.36	18.2	1.82	0.017	7.05	0.021	0.038	3.72
1984	1069	225	0.50	24.9	2.49	0.025	9.84	0.030	0.054	5.34
1985	1537	312	0.68	34.1	3.41	0.035	13.73	0.043	0.078	7.68
1986	2210	433	O*93	46.7	4.67	0.051	19.17	0.062	0.111	11.05
1987	3177	601	1.28	64.0	6040	0.073	26.76	0.089	0.160	15.88
1988	4567	838	1.75	87.6	8,76	0.105	37.35	0.127	0.230	22.84
1989	656-7	1170	2.40	120.0	12.00	0.151	52.13	0.183	0.331	32.83
1990	9442	1637	3.29	164.3	16.43	0.217	72.77	0.263	0.476	47.21
1991	13575	2295	4.50	225.0	22.50	0.311	101.58	0.378	0.685	67.87
1992	19518	3228	6.16	308.1	30.81	0.448	141.80	0.544	0.985	97.59
1993	28062	4546	8.44	421.8	42.18	0.644	197.93	0.782	1.416	140.31
1994	40346	6420	11.55	577.6	57.76	0.925	276.29	1.124	2.036	201.73
1995	58009	9083	15.82	790.9	79.09	1.330	385.67	1.617	2.977	290.04
1996	83403	12884	21.66	1083.0	1(-)/3.30	1.913	538.36	2.324	4.208	417.02
1997	119914	18439	29.66	1482.9	148.29	2.750	751.49	3.342	6.051	599.57
1998	17?409	26090	40.61	2030.6	203.06	3.954	1049.00	4.805	8.700	862.05
1999	247884	37243	55.61	2780.5	27/7.05	5.685	1464.29	6.908	12.508	1239.42
2000	356400	53299	76.15	3807.4	380.74	8.174	2043.98	9.932	17.983	1782.00

TABLE 2.10d
SOUTHEAST ALASKA
GROUNDFISH 1NDUSTR%
1980-2000

YEAR	CATCH Metric Tons	REAL VALUES ($1000)	BOATS	LANDINGS	FISHERMEN	PROCESSING PLANTS	PROCESSING EMPLOYMENT	LAND hectares	ELECTRICITY million KWH	WATER million liters
1980	3024	225?	1*7L	85.7	8.57	0.069	31.32	0.084	0.153	15.12
1981	3404	2356	1.84	91*9	9.19	0.078	34.23	0.095	0.172	17.02
1982	3831	2464	1*97	9805	9.85	0.088	37.40	0.107	0.193	19.15
1983	4312	2577	2.11	105.6	10.56	0.099	40.87	0.120	0.218	21.56
1984	4853	2701	2.26	113.2	11.32	0.111	44.67	0.135	0.245	24.27
1985	5463	2837	2.43	121.3	12,13	0.125	48.81	0.152	0.276	27.31
1986	6148	2984	2.60	130.0	13.00	0.141	53.34	0.171	0.310	30.74
1987	6920	3144	2.79	139.4	13*94	0.159	58.28	0.193	0.349	34.60
1988	7789	3320	2.99	149*4	14.94	0.179	63.69	0.217	0.393	38.95
1989	8767	3513	3.20	160.2	16.02	0.201	69.60	0.244	0.442	43.84
1990	9868	3728	3,43	171.7	17.17	0.226	76.06	0.275	0,498	49.34
1991	11107	3964	3.68	184.1	18.41	0.255	83.11	0.310	0.560	55.53
1992	12501	4229	3.95	197.3	19.73	0.287	90.82	0.348	0.631	62.51
1993	14070	4523	4.23	211.5	21.15	0.323	99.25	0.392	0.710	70.35
1994	15/337	4854	4.53	226.7	22.67	0.363	108.45	0.441	0.799	79.19
1995	17825	5224	4.86	243.0	24.30	0.409	118.51	0.497	0.899	89.13
1996	20063	5643	5.21	260.5	26.05	0.460	179.51	0.559	1.012	100.32
1997	22582	6]59	5.59	279.3	27.93	0.518	141.52	0.629	1.139	112.91
1998	25417	6655	5.99	299.4	29.94	0.583	154.65	0.708	1.283-	127.09
1999	28608	7266	6.42	320.9	32.09	0.656	168.99	0.797	1.444	143.04
2000	32200	7966	6.88	344.0	34.40	0.739	184.67	0.897	1.625	161.00

and plants have more than four lines, the forecasts will overstate the number of plants. There are efficiencies associated with plants of four or more lines, but there is a tendency in the industry for existing processors to expand into a new fishery once it begins to develop and other fisheries begin to contract. The former will tend to result in fewer but larger plants but the latter will have the opposite effect. As the industry begins to develop, the latter may result in the forecasts understating the number of plants, but in the long run, efficiency may become the dominant factor in determining plant size. The forecast of the number of plants is also based on the assumption that two shifts of eight hours each are run 200 days per year. If fewer shifts are run per year, the forecast will tend to understate the actual number of plants. The forecasts of processing input requirements for labor, water, electricity and land are based on estimates of the input requirements per unit of whole fish and are therefore somewhat independent of plant size. The processing labor forecast is in terms of man years.

The two questions that remain to be answered are: (1) is the growth forecasted for the groundfish industry possible in terms of the availability of inputs and (2) where will the development occur? The answer to the first question appears to be yes, the inputs will be available for the following reasons: the increases in input requirements are at first relatively modest; there is currently excess capacity in both the harvesting and processing sections, the NPFMC's estimates of current domestic harvesting and processing capacity exceed the annual catch forecasts through the 1980's; and the large increases in input requirements will occur only after the continued development of the industry is well assured and can thus be planned for.

Within the limits set by the location of the fishery resources, the answer to the question concerning the location of the groundfish industry will be determined by the type of boats that dominate the industry. The foreign fleets have consisted primarily of large catcher processors and/or mother ships serviced by large fishing vessels. With the exception of the actual harvesting and onboard processing, the foreign groundfish industry has been located in the home ports of these vessels and those who man them. If a similar fleet is developed in the domestic groundfish industry, it may not be centered in Alaska. However, the domestic trawl fleet is expected to be quite different from the foreign high seas fleet that it will replace. The domestic fleet is expected to consist of a large number of relatively small trawlers and/or multi-purpose vessels from 22.9 to 53.3 meters (75 to 175 feet) in length which will deliver the bulk of the groundfish catch to shore-based processing centers within perhaps 240 kilometers (150 miles) of the fishing grounds. The size of the present and proposed domestic boats limits their capacity to process and preserve fish and therefore tends to determine the ability of a given processing center to service particular fishing grounds. The location of groundfish processing centers will therefore depend on the location of the fishing grounds, however, it will also depend on the current location of traditional fishery processing centers; this is due to both the economies associated with locating a new processing plant where the infrastructure for fish processing already exists and the propensity of existing processing plants to enter new fisheries as their profitability relative to existing fisheries increases and as declines in other fisheries result in excess capacity.

On the basis of the preceding analysis, it is assumed that the distance of a port to a fishing ground will determine the proportion of the harvest of each area that will be landed in each port. The distances used to determine the allocation of landings among ports are 80, 160 and 240 kilometers (50, 100, and 150 miles). In the case of overlapping areas, the allocation between ports is assumed to be proportional to the distances to the two ports. For example, it would be assumed that from the area within the 80 kilometer ring of port A and the 240 kilometer ring of port B, three-fourths of the catch would be landed in A and one-fourth would be landed in B since B is three times as far from the area.

There are two reasons for assuming that the proportion of catch that will be landed in a port is inversely related to its distance to the area; given that the ex-vessel price is the same in each port, it is more profitable for a vessel to land fish at the nearer port since it is less costly in terms of operating costs and time to land fish at the nearer port; and since the range of a vessel from a port is determined in part by its size, only large vessels can provide fish from distant grounds, but any boats can provide fish from grounds in the immediate area.

Based on this set of assumptions as to where fish will be landed and based on the distribution of the groundfish resources as measured by the mean annual Japanese catch in the Gulf of Alaska by species or species group and area, the percentages of catch by species to be landed in each community are as summarized in Table 2.11. The allocation of other groundfish is based on the mean Japanese trawl catch by area of all groundfish. Japanese catch data is used to measure relative resource abundance by area because only Japanese data is sufficiently widespread through the Gulf and reported in sufficiently fine resolution to be of use in this model.

The assumptions underlying the construction and implementation of this catch-landings allocation model are several and varied. They are as follow:

- Japanese catch data averaged over the ten-year period of 1964-1974 are representative of the actual catch and of the population biomass present in the statistical area.
- The above mean yields are relatively unbiased estimators of future or potential yield.
- American vessels and fishing strategies will be at least as efficient as Japanese vessels and strategies, and the catch-per-unit-effort values in each of the statistical regions reported as being fished by the Japanese will be sufficient to support profitable and continued U.S. operations.

TABLE 2.11

PROJECTED ALLOCATION OF GROUNDFISH CATCH BY COMMUNITY

SPECIES	COMMUNITY			
	Kodiak	Seward	Cordova	Yakutat
Pollock	0.35	0.18	0.06	0.10
Pacific Cod	0,32	0.22	0.10	0.09
Sablefish	0.18	0.24	0.15	0.31
Other	0.25	0.22	0.11	0.24

The allocation figures indicate the percentage of the Gulf of Alaska catch of each species that is expected to be landed in each community. For example, it is expected that 35 percent of the pollock harvested in the Gulf will be landed in Kodiak, The data on which these allocations is based are presented in Figures 2.2 through 2.5 and Table 2.12.

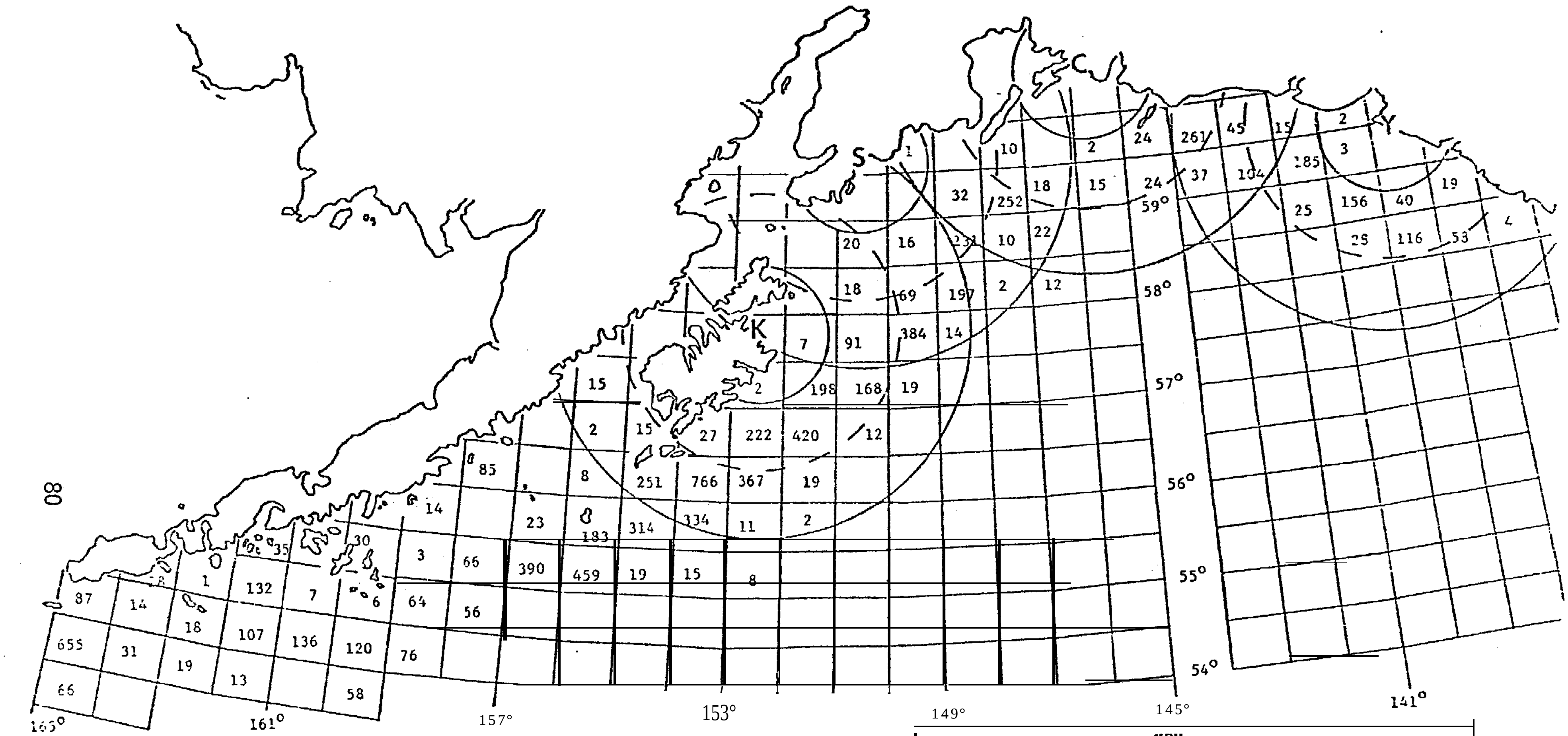


Figure 2.2a Mean annual catch (ret) of walleye pollock by the Japanese trawl fishery, 1964-1974.

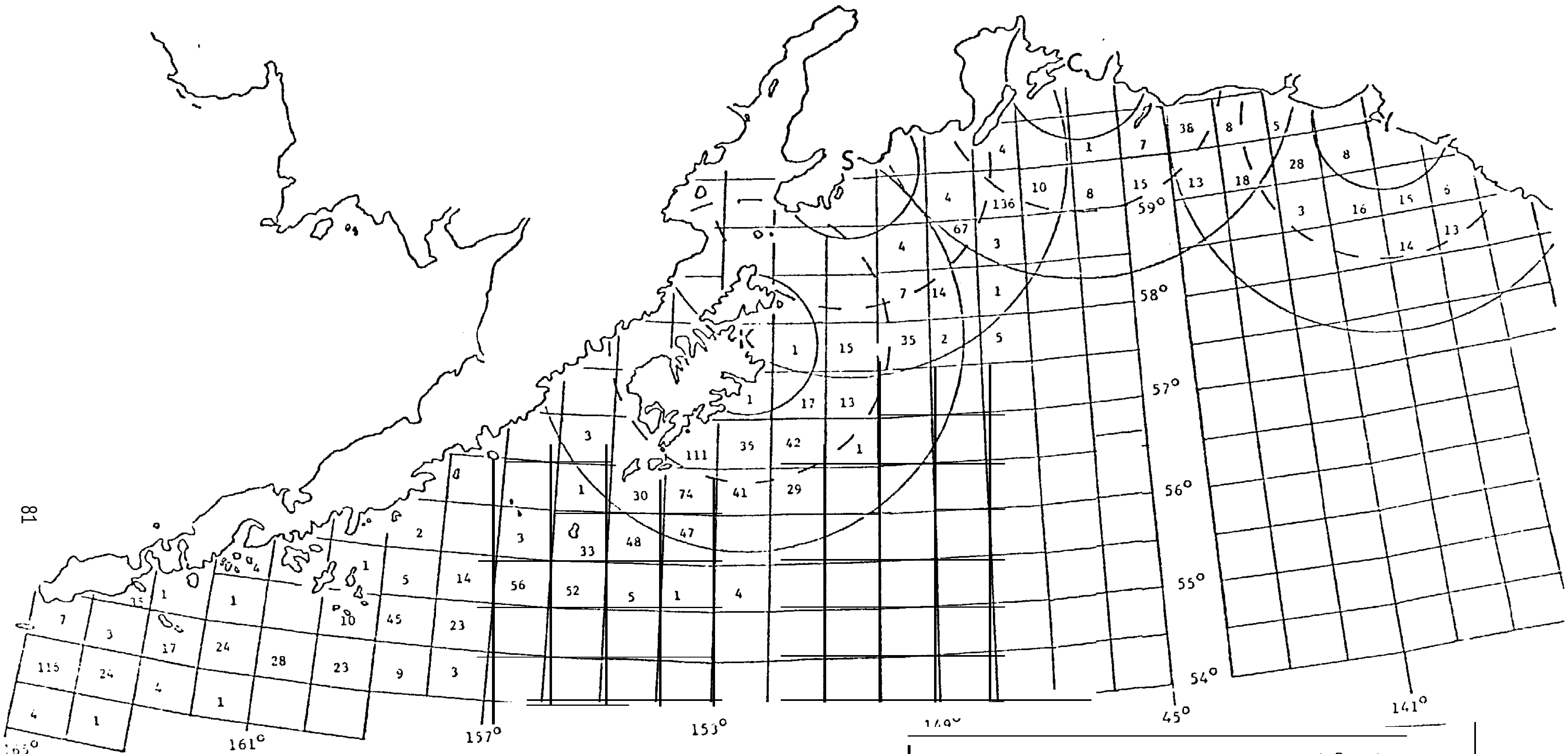
Source: Compiled by Frank Orth and Associates from Ronholt, et.al., 1978.

KEY

Processing Ports
K - Kodiak
S - Seward
C - Cordova
Y - Yakutat

Vessel **Range**
50 Miles
100 Miles
150 Miles

* **Determined by** vessel **size and on-board** handling equipment, **preservation** qualities of individual species, and catch delivery schedules.



Processing Ports

K - Kodiak
S - Seward
C - Cordova
Y - Yakutat

Vessel Range

50 Miles
100 Miles
150 Miles

* Determined by vessel size and on-board handling ..., preservation qualities of individual species, and catch-delivery schedules.

Figure 2.2b Mean annual catch (mt) of Pacific cod by the Japanese trawl fishery, 1964-1974.

Source: Compiled by Frank Orth & Associates from Ronholt, et.al., 1978.

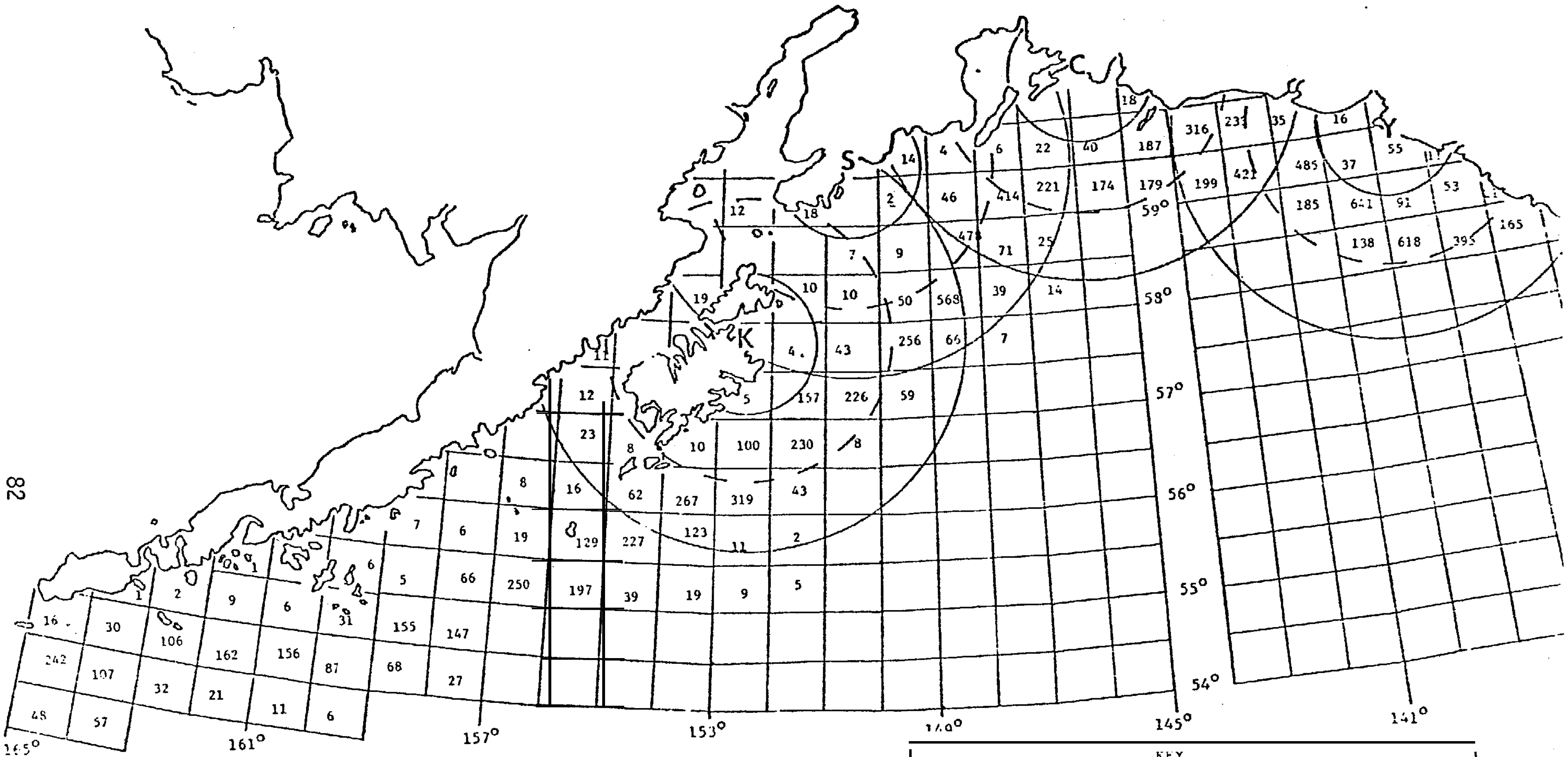


Figure 2.2c Mean annual catch (mt) of sablefish (blackcod) by the Japanese trawl fishery, 1964-1974.

Source: Compiled by Frank Orth & Associates from Ronholt, et.al., 1978.

KEY

Processing Ports	Vessel Range
K - Kodiak	50 Miles
S - Seward	100 Miles
C - Cordova	150 Miles
Y - Yakutat	

* Determined by vessel size and on-board handling equipment preservation qualities of individual species, and catch-delivery schedules.

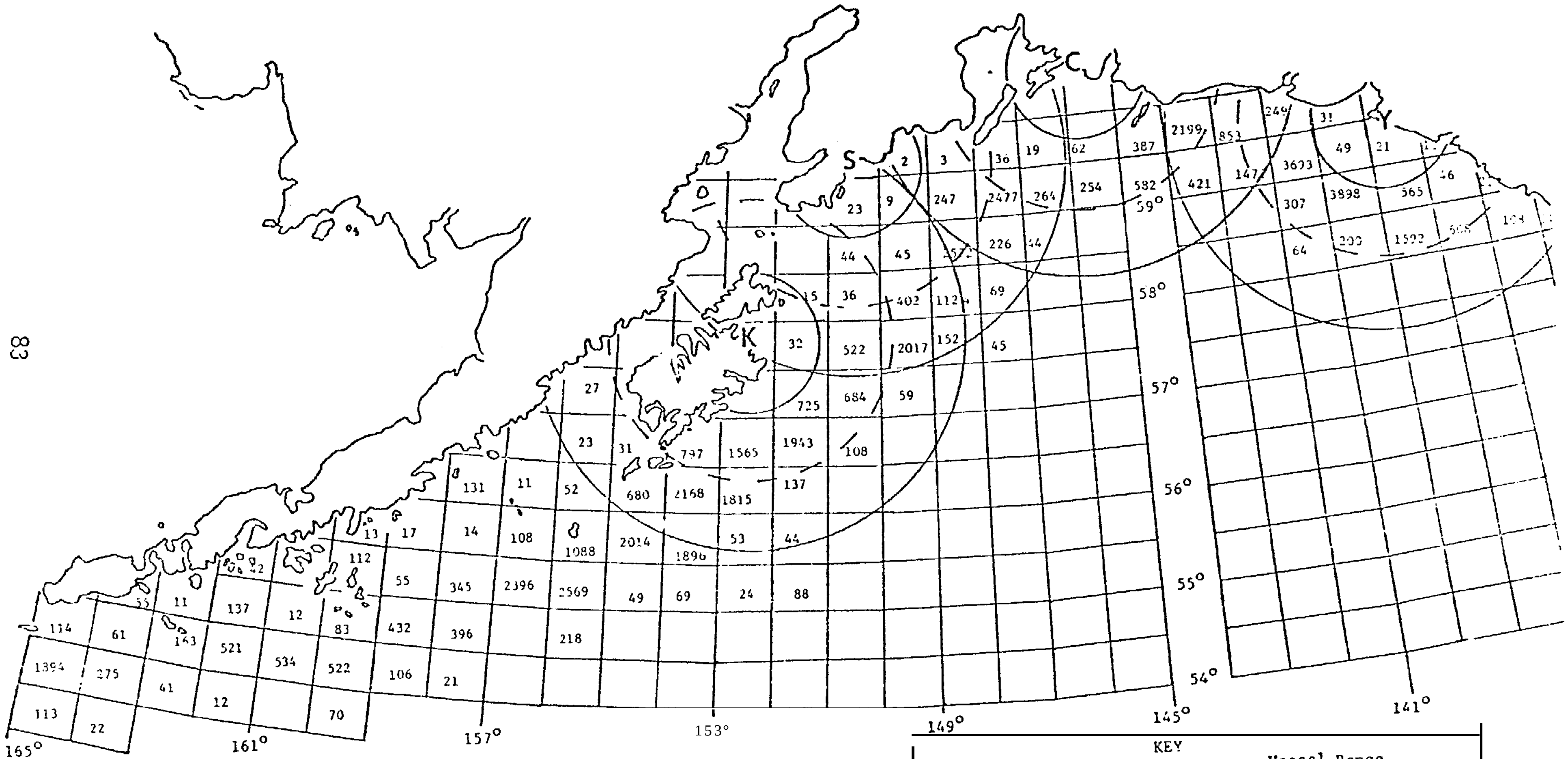


Figure 2.2d Mean annual trawl fishery catch (ret) by Japan, 1964-1974.

Source: Compiled by Frank Orth & Associates from Ronholt, et.al., 1978.

KEY

Processing Ports
K - Kodiak
S - Seward
C - Cordova
Y - Yakutat

Vessel Range
50 Miles
100 Miles
150 Miles

* Determined by vessel size and on-board handling equipment, preservation qualities of individual species, and catch-delivery schedules.

TABLE 2.12

THE DISTRIBUTION OF GROUNDFISH RESOURCES IN THE GULF OF ALASKA

Pacific Cod

Fishing Port	Catch (Metric tons) RO-50	R50-100	R100-150	RO-100	RO-150	Proportion of total Northern Gulf of Alaska catch RO-50 total	R50-100 total	R100-150 total	RO-100 total	RO-150 total	Total catch in NGOA (mt
Kodiak	8.8	240.9	232.0	249.7	481.7	0.0058	0.1579	0.1520	0.1636	0.3157	
Seward	0.0	129.6	205.4	129.6	335.0	0.0000	0.0850	0.1340	0.0850	0.2190	1526
Cordova	0.5	80.0	69.0	80.5	149.5	0.0003	0.0524	0.0452	0.0528	0.0980	
Yakutat	17.0	90.0	34.2	107.0	1.41.2	0.0111	0.0590	0.0224	0.0701	0.0925	

Walleye Pollock

Fishing Port	RO-50	R50-100	R100-150	RO-100	RO-150	RO-50 total	R50-100 total	R100-150 total	RO-100 total	RO-150 total	Total catch in NGOA (mt
Kodiak	87.3	1151.2	1833.4	1238.5	3071.9	0.0010	0.1313	0.2092	0.1413	0.3505	
Seward	4.6	499.4	1071.0	504.0	1575.0	0.0006	0.057	0.1222	0.0576	0.1798	8765
Cordova	1.0	288.7	237.8	289.7	527.5	0.000.1	0.0329	0.271	0.0331	0.0602	
Yakutat	55.0	599.0	195.9	654.0	849.9	0.0063	0.0683	0.0224	0.0746	0.0970	

TABLE 2.12 (continued)

THE DISTRIBUTION OF GROUNDFISH RESOURCES IN THE GULF OF ALASKA

Sablefish

Fishing Port	Catch (Metric tons) R0-50	R50-100	R100-150	R0-100	R0-150	Proportion of total Northern Gulf of Alaska catch R0-50 total	R50-100 total	R100-150 total	R0-100 total	R0-150 total	Total catch in NGOA (mt
Kodiak	89.8	827.2	1175.0	917.0	2092.0	0.0078	0.0722	0.1025	0.0800	0.1825	
Seward	31.6"	808.4	1797.2	840.0	2637.2	0.0028	0.0706	0.1568	0.0734	0.2302	11460
Cordova	58.0	892.9	760.3	950.9	1711.2	0.0051	0.0779	0.0663	0.0830	0.1493	
Yakutat	314.0	2390.6	844.7	2704.6	3549.3	0.0274	0,2086	0.0737	0.2360	0.3097	

Mean Annual Trawl Fishery

Fishing Port	R0-50	R50-100	R100-150	R0-100	R0-150	R0-50 total	R50-100 total	R100-150 total	R0-100 total	R0-150 total	Total catch in NGOA (mt
Kodiak	314.0	6707.4	6223.4	7021.4	13244.8	0.0060	0.1281	0.1189	0.1341	0.2530	
Seward	45.0	5344.4	6233.8	5389.4	11623.2	0.0008	0.1020	0.1190	0.1028	0.2218	52362
Cordova	82.5	2836.5	2855.5	2919.0	5774.5	0.0016	0.0542	0.0545	0.0558	0.1103	
Yakutat	1115.0	9046.1	2410.1	10161.1	12571.2	0.0213	0.1728	0.0460	0.1941	0.2401	

- Each of the ports of interest has the potential of providing the necessary support for the number of trawling vessels engaged in the local fishery.
- Relatively small fishing vessels will initially predominate in the Gulf groundfish fishery with the advent of larger trawling/processing vessels being some years away.

Major criticisms of this model might certainly involve the adequacy of any of the above assumptions. A major problem facing this model is that a U.S. trawl fishery might well avoid large areas of the Gulf as being unprofitable, concentrating on regions of greatest concentration only. This concentration of fishing effort would have the effect of partitioning the groundfish catch to only one or two of the four processing centers. It appears, however, that this problem might only be present during particular seasons, the remainder of the year involving a more even distribution of the particular species over the Gulf. It remains the writers' assertion that this model is an adequate estimator of the partitioning of several major groundfish species among the ports of central Alaska.

The element of the groundfish industry forecast methodology yet to be explained is that used to forecast prices. The method used is similar to that used for the traditional fisheries. The rate of change in the average nominal price of groundfish is forecasted based on the historical relationship between the price and its determinants and on the expected values of the latter. The forecasted rate of change in the price is applied to an approximation of the actual 1979 ex-vessel prices by species to project prices by species. The projected statewide ex-vessel prices were used in each community since there is no basis for determining the extent to which interregional price differentials will occur. The 1979 prices and the projected rates of increase on which the price forecasts are based are summarized in Table 2.13 and the specifications of the ex-vessel price model are presented in an appendix.

TABLE 2.13

BASIS OF GROUNDFISH EX-VESSEL PRICE FORECASTS

1979 Prices[1]
($'s per pound)

Pollock	Cod	Sablefish[2]	Other
0.07	0.15	0.65	0.12

Forcasted Percentage Increases in Nominal Prices from 1979

Year	Percentage Increase	Year	Percentage Increase	Year	Percentage Increase
1980	2.67	1987	24,70	1994	53.73
1981	5.41	1988	28.38	1995	58.57
1982	8.40	1989	32.15	1996	63.66
1983	11.37	1990	36.16	1997	70,11
1984	14.51	1991	40.24	1998	74.47
1985	17.80	1992	44.58	1999	80.20
1986	21.22	1993	49.02	2000	86.24

[1]Source: Petersburg Fisheries

[2]The current price of sablefish ranges from $0.52 to $0.84 per pound depending on the size of the fish.

III. PROJECTIONS OF THE COMMERCIAL FISHING INDUSTRIES OF KODIAK, SEWARD, CORDOVA, AND YAKUTAT IN THE ABSENCE OF OCS ACTIVITY , PURSUANT TO LEASE SALE NO. 46 AND/OR NO. 55

This chapter is divided into four subchapters, one for each of the four study area communities. Each subchapter includes: (1) a brief introduction to the commercial fishing industry of the community, (2) the non-OCS case projections generated using the methodology discussed in the preceding chapter and (3) an assessment of the feasibility of the projections in terms of the projections of population, employment, physical systems, and transportation systems presented in other Studies Program reports and in terms of the expected characteristics of the market and governmental environments that are not incorporated in the projection models. Only selected historical data are presented in this chapter; the majority of the data on which the projections are based is relegated to an appendix.

The Kodiak Commercial Fishing Industry

The City of Kodiak is located on the northeast corner of Kodiak Island. Its economic base is dominated by the activities of the Kodiak commercial fishing industry. The fisheries which have contributed to making Kodiak one of the nation's top three commercial fishing ports in terms of landings in the past several years include the salmon, "halibut, herring, groundfish, king crab, Tanner crab, Dungeness crab, shrimp, razor clam, and scallop fisheries. The absolute and relative importance of each Kodiak management area fishery in terms of pounds harvested are summarized in Table 3.1.

TABLE 3.1
KODIAK COMMERCIAL FISHERIES IN PERSPECTIVE 1969-1977

CATCH BY FISHERY
(1000 pounds)

YEAR	SALMON	HAL I BUT	HERRING	KING CRAB	TANNER CRAB	DUNGENESS CRAB	SHRIMP	RAZOR CLAM	SCALLOPS	SHELL-FISH	TOTAL
1969	58780	6338	2255	12796	6828	5835	41353	12	1000	75666	143042
1970	56416	8697	685	12070	7708	5741	62181	132	1418	98167	164038
1971	31184	9217	569	12364	7423	1461	82154	190	841	104433	145458
1972	19620	8640	475	16337	11909	2060	58352	152	1039	89855	118640
1973	5904	6591	1735	14716	31607	2001	71959	165	936	121383	135835
1974	16121	3742	1756	22979	25475	750	48778	198	148	98328	120662
1975	14144	4209	16	24101	17545	640	46759	6	294	89344	107845
1976	55255	4414	9	17424	23410	82	51210	0	75	92532	152721
1977	40114	4665	695	13175	20720	113	31543	0	0	65853	111966

PERCENTAGE OF CATCH BY FISHERY

YEAR	SALMON	IALIBUT	HERRING	KING CRAB	TANNER CRAB	DUNGENESS CRAB	SHRIMP	RAZOR CLAM	SCALLOPS	SHELL-FISH
1969	41.093	4*431	1.576	8.946	4.773	4.079	28.910	0.008	0.699	52.898
1970	34.392	5.302	0.418	7.358	4.699	3.500	37.906	0.080	0.864	5'9.844
1971	21.438	6.337	08391	8.500	5.1(-)3	1.004	56.480	0.131	0.578	71.796
197?	16.537	7.283	0.400	130770	10.038	1.736	49.184	0.128	0.876	75.738
1973	4.346	4.852	1.277	10.834	23.269	1*473	52.975	0.121	0.689	89.361
1974	13.360	3.101	1.455	19.044	21.113	0.622	40.4?5	0.164	0.123	81.490
1975	13.115	3.903	0.015	22.348	16.269	0.593	43.358	0.006	0.273	82.845
1976	36.180	2.890	0.006	11.409	15.329	0.054	33.532	0	00049	60.589
1977	35.827	4.166	0.621	11.76"7	18.506	0.101	28.172	0	0	58.815

CATCH OF FISHERIES STUDIED AS A PERCENTAGE OF EACH GROUP OF FISHERIES

YEAR	SHELLFISH	MISCELLANEOUS FISH	ALL FISH
1969	39.636	99.867	94.516
1970	90.916	90.369	94.520
1971	1OO.C)O(-J	91.186	99.962
1972	99.993	90.476	99.953
1973	100.000	88.656	99.837
1974	100.000	71.064	99.407
1975	100.000	10.811	99.879
1976	99.642	1.731	99.449
1977	9'4.541	52.099	99.160

Source: ADF&G Catch and Production Reports and Salmon and Shellfish Catch Reports

The importance of the Kodiak commercial fishing industry to the local economy can be measured in a number of ways. It can be measured in absolute terms such as the income of Kodiak fishermen or the number of commercial fishermen residing in Kodiak (see Tables 3.2 and 3.3) or it can be measured in relative terms; for example, in 1976, approximately one out of every six Kodiak residents had a commercial fishing license. Alaska Department of Labor statistics indicate that from 1970 through 1977, fish processing employment ranged from 29 to 38 percent of annual Kodiak Island employment, and that the income directly associated with this employment ranged from 22 to 31 percent of Kodiak Island income (see Table 3.4). The labor statistics used in this measure of the importance of the commercial fishing industry have two sources of downward bias. They include only employment and income that is covered by unemployment insurance and therefore exclude most fishermen, and they do not indicate the employment and income that is generated by other industries which are dependent on the employment and income of the fishing industry. Economic base analysis provides a measure of the total employment that is dependent on an industry.

The economic base of a community includes those industries which bring dollars into a local economy as opposed to the industries that circulate the dollars that the basic sector industries attract to a community.

When the basic sector of the Kodiak Island economy is defined to include manufacturing and the federal government, approximately 47 percent of the 1977 employment is in the basic sector and over 80 percent of the basic sector employment or over 70 percent of the basic sector income is

TABLE 3.2

ESTIMATED GROSS EARNINGS OF KODIAK FISHERMEN 1969 - 1976

YEAR	NUMBER OF GEAR OPERATORS	ESTIMATED GROSS EARNINGS
1969	502	$10,912,000
1970	511	11,825,000
1971	420	9,135,000
1972	521	12,120,000
1973	526	23,427,000
1974	531	24,554,000
1975	526	18,529,000
1976	629	38,817,000

Source: Alaska Commercial Fisheries Entry Commission, Distribution of Income from Alaska Fisheries, July, 1978.

TABLE 3.3

NUMBER OF KODIAK RESIDENTS* HOLDING A COMMERCIAL FISHERMAN'S LICENSE
1969 - 1976

1969	632	1973	819
1970	787	1974	902
1971	791	1975	846
1972	756	1976	1,120

*A Kodiak resident is anyone who uses a Kodiak address when applying for a license.

Source: Commercial Fisheries Entry Commission, Commercial License File.

TABLE 3.4

KODIAK FISH PROCESSING EMPLOYMENT AND INCOME. IN PERSPECTIVE 1970-1977

Average Quarterly Employment and Income

	TOTAL			F&KP*			F&KP%ofT**	
YEAR	EMPLOY-MENT	INCOME	NUMBER OF FIRMS	EMPLOY-MENT	INCOME	NUMBER OF FIRMS	EMPLOY-MENT	INCOME
1970	2469	4937	222	726	1278	23	29.41	25.87
1971	2619	5627	232	737	1437	26	28.16	25.53
1972	2878	7345	431	842	1628	31	29.27	22.16
1973	3576	9655	479	1383	2806	31	38.67	29.07
1974	3641	11291	507.	1220	3135	31	33.51	27.76
1975	3777	12970	56a	1109	3142	32	29.35	24.23
1976	4426	17144	624	1513	4629	23	34.18	27.00
1977	4104	15843	341	1555	4834	31	37.89	30.51

Employment by Quarter

	TOTAL EMPLOYMENT BY QUARTER				F&KP* EMPLOYMENT BY QUARTER			
YEAR	1st	2nd	3rd	4th	1st	2nd	3rd	4th
1970	2091	2538	2970	2277	469	707	1228	501
1971	2292	2719	2872	2592	600	678	1074	598
1972	2280	2866	3611	2754	398	942	1338	791
1973	3090	3626	4060	3527	1184	1414	1651	1282
1974	3263	3522	4134	3646	1142	1179	1411	1149
1975	2829	3708	4546	4026	675	1006	1549	1204
1976	3838	4323	5256	4287	1049	1371	1995	1637
1977	3921	3721	4660	4116	1332	1266	2100	1522

Income by Quarter

	TOTAL INCOME BY QUARTER				F&KP* INCOME BY QUARTER			
YEAR	1st	2nd	3rd	4th	1st	2nd	3rd	4th
1970	3984	4756	6190	4820	661	1106	2327	1016
1971	459.9	5454	6541	5915	983	1298	2373	1093
1972	5468	6572	9850	7490	648	1516	2851	1496
1973	7093	9261	12110	10156	1860	2862	3709	2794
1974	8511	10007	14388	12259	2308	2870	4170	3191
1975	9060	11718	15850	15251	2294	2383	459?	3287
1976	12597	15789	21074	19115	2920	4196	6688	4712
1977	15074	13754	18984	15559	3649	3938	7530	4220

*Food and Kindred Products

**Food and Kindred Products as a percentage of the total.

Source: Alaska Department of Labor, Statistical Quarterly, 1970 - 1977.

attributable to fish processing (see Tables 3.5 and 3.6). The implication is that 80 or 70 percent of local employment or income, respectively, is generated directly or indirectly by the processing sector of the fishing industry, and that if the employment and income of fishermen were included, the measure of dependence on the commercial fishing industry would be greater. Although these are rough approximations of the relative importance of the Kodiak commercial fishing industry in the local economy, they are sufficient to demonstrate that the industry is the mainstay of the Kodiak economy. The following brief description of the projected growth of this industry indicates that the Kodiak commercial fishing industry will be the source of increasing economic activity.

During the next twenty years, the continued growth of the industry is expected to result primarily from increased domestic utilization of the groundfish resources in the Western Gulf of Alaska. Improved salmon management, enhancement, and rehabilitation programs, sustained large crab harvests, and increased halibut landings are expected to assure continued development of the traditional fisheries as a whole, but such development is expected tobe a more modest source of industry growth. Between 1980 and 2000, total catch is expected to increase by 260 percent by weight and by 113 Percent in real value. The more rapid increase in weight is explained from the change in harvest mix that is expected; the relatively low valued groundfish species will account for an increasing proportion of total catch. Processing activity is also expected to increase from current levels, however, due to increases in processing

TABLE 3.5
NUMBER OF EMPLOYEES BY INDUSTRY
(AVERAGE FOR ENTIRE YEAR FROM MONTHLY DATA)

	YEAR			
	1971	1973	1975	1977
Mining	I/D*	I/D*	-0-	-0-
Construction	61	131	269	212
Manufacturing	768	1,421	1,175	1,627
(food and kindred products)	738	1,383	1,109	1,570
Transportation, Communications, and Utilities	267	223	219	203
Wholesale and Retail Trade	343	394	483	563
Finance, Insurance, and Real Estate	64	I/D*	91	99
Services	241	268	366	395
Federal Government	351	263	269	250
State and Local Government	500	560	600	637
Agriculture, Forestry, and Fisheries	I/D*	252	307	I/D*
(fishing, hunting, and trapping)	.-	--	287	I/D*
(fisheries)	17	I/D*	--	--
**TOTAL:	2,595	3,260	3,472	3,986

*Incomplete data due to confidentiality regulations

**Excluding Mining and Agriculture, Forestry and Fisheries in allyears,and Finance, Insurance, and Real Estate in 1973.

Source: Alaska Department of Labor, Statistical quarterly, 1971-1977

TABLE 3.6
YEARLY PAYROLL BY INDUSTRY

	-----Millions of Dollars -------			
	1971	1973	1975	1977
Mining	I/D*	I/D*	-0-	-0-
Construction	0.962	2.457	6.936	5.778
Manufacturing	6.046	11.733	1"3.836	2(7.8673
(food and kindred products)	5.747	11.405	12.568	19.337
Transportation, Communications, and Utilities	2.17	2.549	3.022	4.216
Wholesale and Retail Trade	2.456	3.208	4.995	6.907
Finance, Insurance, and Real Estate	0.496	I/D*	1.026	1.301
Services	1.420	1.843	2.937	3.914
Federal Government	2.916	3.804	4.897	5.672
State and Local Government	5.520	5.673	8.773	11.307
Agriculture, Forestry, and Fisheries	I/D*	6.875	5.426	I/D*
(fishing, Hunting, and Trapping)	--	--	5.414	I/D*
(fisheries)	0.406	IID*	--	--

*Incomplete data due to confidentiality regulations

Source: Alaska Department of Labor, Statistical Quarterly, 1971-1977 efficiency, processing employment and real income are expected to increase less rapidly. It is projected that processing employment and income will exceed current levels by 10 percent and 35 percent, respectively. Without allowing for increased efficiency, the increases would be approximately 50 percent and 80 percent.

Although the development of a domestic groundfish industry in Alaska is expected to be the principal source of growth for the Kodiak commercial fishing industry, it is not expected to result in as dramatic growth as it may elsewhere in the state. There are two reasons for this: (1) the Kodiak commercial fishing industry is one of the largest in the country, therefore a reactively large increase in catch in absolute terms is required to produce a given percentage increase, and (2) the groundfish resources are principally located in the Bering Sea, so the groundfish industry is not expected to be predominantly centered in Kodiak. The projections of harvesting activity by fishery on which the preceding summary is based and the projections of processing activity are presented in the following sections.

HARVESTING

Projections of harvesting activity and limited historical data are presented by species or species group in this section. The detailed historical data, which are referred to in this section and which serve as a basis for the projections, are presented in tabular form in Appendix C. The models used in making these projections are discussed in Chapter II.

Salmon

In Kodiak there are three distinct salmon fisheries, defined by gear type; they are the purse seine, beach seine, and set gill net fisheries. The purse seine fishery is, however, the dominant fishery; it accounts for approximately 75 percent of the red salmon harvest, 90 percent of the pink harvest, 95 percent of the chum harvest, and over 90 percent of the relatively minor king and coho harvests. Other pertinent differences among the salmon fisheries are summarized in Table 3.7.

TABLE 3.7

CHARACTERISTICS OF THE KODIAK SALMON FISHERIES

	Purse Seine	Beach Seine	Set Gill Net
Season	June-Sept.	July-August	July-August
Typical Boat Size[1]	26-55 feet	under 25 feet	under 25 feet
Crew Size	5	2	2
Fishing Grounds	near shore	very near shore	very near shore

[1]A foot equals 0.305 meters,

In recent years, there have been pink and chum catches that rival or surpass the record catches of the last 45 years. These recent successes, together with continually improving management, enhancement, and rehabilitation programs, suggest that the Kodiak salmon resources and harvesting activity will tend to increase. Catch is projected to increase from 12,000 metric tons (26.3 million pounds) in 1980 to 20,000 metric tons (44.7 million pounds) in 2000. This 70 percent increase in catch by weight is expected to result in a 273 percent increase in catch by value, since real ex-vessel salmon prices are projected to increase by 120 percent. Increases in the numbers of boats and fishermen participating in the Kodiak salmon fisheries are not necessary since the salmon boats and crews are currently underutilized, and increases are not expected due to the limited entry program which exists in the salmon fisheries. The projections of harvesting activity and the resulting percentage increases during the forecast period are presented in Tables 3.8 and 3.9. Table 3.10 includes projections of catch by species.

Herring

There are potentially four distinct herring fisheries in Kodiak; they are the roe herring, bait fish, food fish, and industrial fish fisheries. The industrial fish fishery was dominant during the first half of the 1900s, the roe herring fishery has been dominant since the late 1960s, and a bait fishery existed in the intervening years and survives today. The leading role currently being played by the roe herring fishery is explained by market conditions, not resources abundance. The ex-vessel price for roe herring has been significantly higher than those in other herring fisheries, therefore, activity is centered in the roe fishery even though the harvest guidelines are 2,177 metric tons (2,400 short tons) for roe herring and 11,430 metric tons (12,600 short tons) for other herring. Market conditions are expected to favor the roe fishery and discourage fuller utilization of the other herring resources. For this reason, the projections are keyed on the roe fishery.

The pertinent characteristics of the Kodiak roe fishery include the following:

TABLE 3.8

PROJECTED HARVESTING ACTIVITY
KODIAK SALMON FISHERY 1980-2000

Year	CATCH: WEIGHT: POUNDS (1,000)	CATCH: WEIGHT: METRIC TONS	CATCH: VALUE $1,000): Nominal	CATCH: VALUE $1,000): Real[1]	EX-VESSEL PRICE ($/Pound): Nominal	EX-VESSEL PRICE ($/Pound): Real[1]	NUMBER OF: Boats	NUMBER OF: Landings	NUMBER OF: Fishermen
1980	26307	11933	15424	13858	O*59	0.53	535	6962	2156
1981	28290	12832	18862	16063	0.67	0.57	535	7238	2156
1982	30423	13800	22891	13478	0.75	0.61	535	7523	2156
1983	32718	14841	27499	21041	0.84	0.64	535	7817	2156
1984	35187	15961	33139	24034	(-).94	0.68	535	8118	2156
1985	37844	17166	39367	27063	1.04	0.72	535	8423	2156
1986	38247	17349	44021	28684	1.15	0.75	535	8471	2156
1987	38658	17535	49002	30265	1.27	0.78	535	8519	2156
1988	39076	17725	54427	31863	1039	0.82	535	8567	2156
1989	39501	17918	60208	33410	1.52	0.85	535	8614	2156
1990	39933	18114	66675	35070	1.67	0.88	535	8661	2156
1991	40373	18313	73756	34772	1.83	0891	535	8709	2156
1992	40820	18516	81137	38343	1.99	0.94	535	8756	2156
1993	41275	18722	89079	39902	2.16	0.97	535	8802	2156
1994	41738	18932	97904	41568	2.35	1.00	535	8849	2156
1995	42209	19146	107458	43246	2.55	1.02	535	8895	2156
1996	42689	19363	117763	44923	2.76	1.05	535	8940	2156
1997	43177	19585	128959	46629	2.99	1.08	535	8985	2156
1998	43674	19810	141082	48353	3.23	I*11	535	9029	2156
1999	44180	20040	153936	50008	3.48	1.13	535	9(373	2156
2000	44696	20274	168186	51789	3.76	1.16	535	9115	2156

Source: Alaska Sea Grant Program.

[1] The real values and prices are in terms of 1978 dollars.

TABLE 3.9

PROJECTED PERCENTAGE CHANGE FROM 1980,
KODIAK SALMON FISHERY

	CATCH		EX-VESSEL PRICE		NUMBEP OF		
Year	Weight	Rea 1 Value	Nominal	Real	Boats	Landinas	Fishermen
1980	0	0	0	0	o	0	0
1981	7.536	15.915	13.720	7.792	0	3.962	0
1982	15.644	33.338	2?3.333	15.301	0	8.059	0
1983	24.367	51.834	43.357	22.085	o	12.276	0
1984	33.754	73.435	60.635	29.667	0	16.594	0
1985	43.853	95.288	77.427	35*755	o	20.985	0
1986	45.388	106.987	96.304	42.369	0	21.670	0
1987	46.950	118.400	116.197	48.622	0	22.355	0
1988	48.538	129.931	137.563	54.796	0	23.040	0
1989	50.154	141.091.	159.967	60.563	0	23.723	0
1990	51.796	153.072	1840779	66.718	0	24.404	0
1991	53.467	165.353	?11.593	72.906	0	25.083	0
1992	55.166	176.690	239.020	78.318	0	25.758	0
1993	56.896	187.937	268.102	83.521	0	26.429	0
1994	58.655	199.964	300.082	89.066	o	27.095	0
1995	60.446	212.070	334.220	94.501	0	27.754	0
1996	62.269	224.170	370.517	99.773	0	28.407	0
1.997	64.125	236.483	4(39.424	105.(316	0	29.052	0
1998	66.015	248.923	450.969	110,176	0	29.687	0
1999	67.940	260.865	494.276	114.878	0	30,311	0
2000	69.900	273.718	541.801	119.964	0	30.923	0

Source: Alaska Sea Grant Program.

TABLE 3.10

PROJECTED KODIAK SALMON CATCH BY SPECIES, 1980-2000
(1 ,000 Pounds)

Year	Kina	Red	Pink	Chum	Silver	Tota 1
1980	9	2565	19258	4316	159	26307
1981	9	2741	20722	4659	159	28.290
1982	9	2928	22296	5030	159	30423
1983	9	3129	23991	5429	159	32718
1984	9	3343	25814	5861	159	35187
1985	9	3572	27776	6327	159	37844
1986	9	3695	28028	6357	158	38247
1987	9	3823	28280	6388	158	38658
1988	9	3956	28535	6419	158	39076
1989	9	4093	28792	6449	158	3950 1
1990	9	4235	29051	6480	158	39933
1991	9	4382	29312	6511	158	40373
1992	9	4534	29576	6543	158	40820
0 1993	9	4691	29842	6574	158	41275
1994	9	4854	30111	6606	158	41738
1995	9	5023	30382	6637	158	42209
1996	9	5197	30655	6669	158	42689
1997	9	5377	30931	6701	158	43177
1998	9	5564	31209	6733	158	43674
1999	9	5757	31490	6766	158	44180
2000	9	5957	31774	6798	158	44696

Source: Alaska Sea Grant Program.

- Salmon purse seine boats and fishermen dominate the fishery.
- The herring seiners are typically 7.9 to 16.8 meters (26 to 55 feet) in length and have a crew of five.
- Due to the need to harvest the herring when the roe is at the correct stage of development, the season occurs during a brief period in May and/or June.
- The seiners operate in near-shore areas.

Due in part to the difficulty associated with harvesting when the roe is of a marketable quality, the harvests have been well below the harvest guideline of 2,177 metric tons (2,400 short tons); the 1979 harvest, however, is expected to approach the guideline. The improved harvest in 1979 is explained by the increased fishing effort which is, in turn, explained by favorable ex-vessel prices. Despite what may continue to be acceptable prices, the difficulty of harvesting herring at the right time is expected to, on average, hold the catch at 1,814 metric tons (2,000 short tons) or about 362 metric tons (400 short tons) below the guideline harvest. Although the harvest is not projected to increase between 1980 and 2000, the real value of the harvest is expected to increase by 21 percent. The projection of fishing activity and the resulting percentage increases in activity are presented in Tables 3.11 and 3.12.

Halibut

The Kodiak halibut fishery consists of two distinct fleets: a large boat

TABLE 3.11

PROJECTED HARVESTING ACTIVITY
KODIAK HERRING FISHERY 1980-2000

	CATCH								
	WEIGHT		VALUE ($1,000)		EX-VESSEL PRICE ($/Pound)		NUMBER OF		
Year	POUNDS (1,000)	METRIC TONS	Nominal	Real[1]	Nominal	Real	Boats	Landings	Fishermen
1980	4000	1814	4(-)47	3636	1.01	0.91	80	240	240
1981	4000	1814	4310	3671	1.08	0.92	80	240	240
1982	/$()()()	1814	4590	3705	1.15	0.93	80	240	240
1983	4000	1814	4889	-3740	1.22	0.94	80	24o	240
1984	4000	1814	5206	3776	1.30	0.94	80	240	240
1985	4000	1814	5545	3812	1.39	0.95	80	240	240
1986	4000	1814	5905	3848	1.48	0.96	80	240	240
1987	4000	1814	6289	3884	1.57	0.97	80	240	240
1988	4000	1814	6698	3921	1.67	0.98	80	240	240
1989	4000	1814	7133	3958	1.78	0.99	80	240	240
1990	4000	1814	7597	3996	1.90	1.00	80	240	24C
1991	400(3	1814	8091	4034	2.02	1.01	90	240	240
1992	4000	1814	8616	4072	2.15	1002	80	240	240
1993	4000	1814	9177	4110	2.29	1.03	80	240	240
1994	4000	1814	9773	4149	2.44	1.(-)4	80	240	240
1995	4000	1814	10408	4189	2.60	1.05	80	240	240
1996	4000	1814	11085	4228	2.77	1.06	80	240	24C
1997	4000	1814	11805	4269	2.95	1*O7	80	240	240
1998	4000	1814	12573	4309	3.14	1.08	80	240	24(I
1999	4000	1814	13390	4350	3.35	1.09	80	240	240
2000	4000	1814	14260	4391	3.57	1.10	R(-I	240	240

Source: Alaska Sea Grant Program.

[1] The real values and prices are in terms of 1978 dollars.

TABLE 3.12

PROJECTED PERCENTAGE CHANGE FROM 1980,
KODIAK HERRING FISHERY

Year	CATCH		EX-VESSEL PRICE		NUMBER OF		
	Weight	Real Value	Nominal	Real	Boats	Landings	Fishermen
1980	0	0	0	0	0	0	0
1981	0	0.948	6.500	0.948	0	0	0
1982	0	1.905	13.422	1.905	0	0	0
1983	0	2.871	20.795	2.871	0	0	0
1984	0	3.846	28.647	3.846	0	0	0
1985	0	4.830	37.009	4.830	0	0	0
1986	0	5.824	45.914	5.824	0	0	0
1987	0	6.827	55.399	6.827	0	0	0
1988	0	7.839	65.500	7.839	0	0	0
1989	0	8.862	76.257	8.862	0	0	0
1990	0	9.893	87.714	9.893	0	0	0
1991	0	10.935	99.915	10.935	0	0	0
1992	0	11.987	112.910	11.987	0	0	0
1993	0	13.048	126.749	13.048	0	0	0
1994	0	14.120	141.487	14.120	0	0	0
1995	0	15.201	157.184	15.201	0	0	0
1996	0	16.293	173.901	16.293	0	0	0
1997	0	17.396	191.705	17.396	0	0	0
1998	0	18.508	210.665	18.508	0	0	0
1999	0	19.632	230.859	19.632	0	0	0
2000	0	20.766	252.364	20.766	0	0	0

Source: Alaska Sea Grant Program.

fleet which is capable of fishing far offshore areas and lands the majority of the catch, and a small boat fleet which fishes inshore areas and includes many boats that are principally participants in the salmon or other fisheries. The boats of the large boat fleet are usually over 15.2 meters (50 feet) in length and would include a large number of non-Kodiak boats since this fleet is very mobile and fishes throughout the Gulf of Alaska and/or the Bering Sea. In the small boat fleet, boat lengths range from under 7.6 meters to 21.3 meters (25 feet to 70 feet), but are predominantly less than 10.7 meters (35 feet). The casual or supplemental nature of the participation of the small boat fleet is indicated by the fact that the average number of landings per year per boat has been less than four. Four both fleets, the season is during three to four separate fishing periods between May and September.

A characteristic of the halibut fisheries that is of particular importance with respect to conflicts with other vessels is the type of gear used. Halibut fishermen use long line gear which can exceed three miles in length. The long line with hooks set at fixed intervals has an anchored buoy at each end and is left unattended for several hours. Despite the expansive area covered by this gear, only the buoyed ends are exposed to normal marine traffic since the remainder of the gear is deep enough that a vessel can usually pass over it safely. The exception would be vessels that are pulling trawls or seismographic equipment and other vessels with lines or equipment which extends well below the surface.

Although Kodiak is among the top two ports in terms of landings, the halibut fishery is by no means the dominant fishery in Kodiak. This situation is expected to continue. Kodiak halibut landings are expected to be held below current levels through the mid-1980s as the International Pacific Halibut Commission (IPHC) maintains relatively low quotas in the Gulf of Alaska in an attempt to rebuild the halibut resources in that area. The management efforts are expected to be successful and the landings are projected to increase during the forecast period by 83 percent and 130 percent in terms of weight and real value, respectively. The high ex-vessel price for halibut and the excess harvesting and processing capacity that exist will tend to maintain resource abundance and the resulting quotas as the binding constraint on the fishery.

The projected levels of harvesting activity and the resulting percentage increases during the forecast period are summarized in Tables 3.13 and 3.14. The projections of catch are for both the small and large boat fleets; but since the boats and fishermen of the small boat fleet are primarily participants in other fisheries, the projected numbers of landings, boats, and fishermen, are for the large boat fleet alone.

Two additional comments are warranted by recent or possible changes in the halibut fishery. The first, the gradual phasing out of Canadian boats in the Gulf of Alaska, will tend to have on"ly a minor effect on the distribution of Area 3 halibut landings since the presence of Canadian boats does not appear to have affected the historical ratio of landings in a community to Area 3 catch. The second change is more critical and cannot be readily incorporated in the projections. The incidental catch of halibut by trawlers has long been an unresolved problem. Foreign trawlers have caught large quantities of halibut as incidental catch

TABLE 3.13

PROJECTED HARVESTING ACTIVITY
KODIAK HALIBUT F SHERY 1980-2000

Year	CATCH: WEIGHT: POUNDS (1,000)	CATCH: WEIGHT: METRIC TONS	CATCH: VALUE ($1,000): Nominal	CATCH: VALUE ($1,000): Real[1]	EX-VESSEL PRICE ($/Pound): Nominal	EX-VESSEL PRICE ($/Pound): Real			
1980	4400	1996	8465	7605	1.92	1.73	119	476	714
1981	4400	1996	9130	7775	2.07	1.77	119	476	714
1982	4400	1996	9839	7942	2.24	1.81	119	476	714
1983	4400	1996	10577	8093	2.40	1.84	119	476	714
1984	4400	1996	11359	8238	2.58	1.87	119	476	714
1985	4569	2073	12650	8696	2.77	1.90	123	494	741
1986	4745	2152	14069	9167	2.96	1.93	128	513	770
1987	4928	2235	15625	9650	3.17	1.96	133	533	799
1988	5118	2321	17341	10152	3.39	1.98	138	553	830
1989	5315	2411	19227	10669	3.62	2.01	144	575	862
1990	5519	2504	21295	11201	3.86	2.03	149	597	895
1991	5732	2600	23570	11756	4.11	2.05	155	620	929
1992	5953	2700	26069	12320	4.38	2.07	161	644	965
1993	6182	2804	28801	12901	4.66	2.09	167	668	1002
1994	6420	2912	31813	13507	4.96	2.10	174	694	1041
1995	6667	3024	35120	14134	5.27	2.12	180	721	1081
1996	6924	3141	38721	14771	5.59	2.13	187	748	1123
1997	7196	3261	42794	15441	5.94	2.15	194	777	1166
1998	7467	3387	47046	16124	6.30	2.16	202	807	1211
1999	7754	3517	51794	16826	6.68	2.17	210	838	1257
2000	8053	3653	56795	17489	7.05	2.17	218	871	1306

Source: Alaska Sea Grant Program.

[1]The real values and prices are in terms of 1978 dollars.

TABLE 3.14

PROJECTED PERCENTAGE CHANGE FROM 1980,
KODIAK HALIBUT FISHERY

Year	CATCH		EX-VESSEL PRICE		NUMBER OF		
	Weight	Real Value	Nominal	Real	Boats	Landings	Fishermen
1980	0	0	0	0	o	0	o
1981	0	2.232	7.855	2.232	0	0	0
1982	0	4.428	16.231	4.428	0	0	0
1983	0	6.414	24.955	6.414	o	0	0
1984	0	8.316	34.184	8.316	0	0	0
1985	3.850	14*343	43.901	10.104	3.850	3.850	3.850
1986	7.848	20.538	54*109	11.767	7.848	7.848	7.848
1987	12.000	26.886	64.802	13.291	12.000	12.000	12.()(30
1988	16.312	33.482	76.123	14.761	16.312	16.312	16.312
1989	20.790	40.283	88.037	16.137	20.790	20.790	20.790
1990	25.441	47.277	100.550	17.4(3R	25.441	25.441	25.441
1991	3(-).270	54.571	113.825	18.654	30.27(3	30.270	30.270
1992	35.286	61.986	127.643	19.736	35.286	35.286	35.286
1993	40.494	69.631	142.175	?0.739	40.494	40.494	40.494
1994	45.903	77.598	157.578	21.723	45.903	45.903	45.9.03
1995	51.521	85.843	173.818	22.652	51.521	51.521	51.521
1996	57.354	94.213	190.696	23.424	57.354	57.354	57.354
1997	63.412	103.027	208.718	24.242	63.412	63.412	63,412
1998	69.704	112.008	227.496	24.928	69.704	69.704	69.704
1999	7 6 . 2 3 7	121.236	247.180	25.533	76.237	76.237	76.237
2000	83.022	129.951	266.590	25.641	83.022	83.022	83.022

Source: Alaska Sea Grant Program.

while targeting on groundfish and have been required to throw the halibut back into the water. This is not an ideal solution since much of the incidental catch does not survive, but it decreases the incentive for foreign trawlers to accidently catch halibut. As the domestic groundfish industry develops and the incidental catch becomes predominantly domestic, the IPHC and NPFMC will no doubt be forced to find a better solution to the problem of incidental halibut catch. One possibility is that the costs associated with limiting the incidental catch will be found to exceed the benefits, and it will be decided that the long line halibut fishery is not viable in light of multi-fishery management objectives. The management entities have not really confronted these issues, and it is therefore not known how the problems will be resolved. In the absence of such knowledge, the issue is noted but not incorporated in the halibut fishery projections.

Groundfish

The Kodiak groundfish fishery is similar to the halibut fishery in that it consists of two distinct fleets. They are a small boat long line fleet, and a large boat trawl fleet. The small boat fleet fishes inshore areas and is comprised of boats from under 7.6 meters to 16.8 meters (25 feet to 55 feet) in length which primarily participate in other fisheries, The large boat or trawl fleet consists of boats predominately over 19.8 meters (65 feet) in length that are capable of fishing more distant offshore areas. The majority of the catch of both fleets is used as bait by king and Tanner crab fishermen. As the domestic groundfish industry develops, the catch will increasingly be marketed as a food fish, the number and size of the boats in the trawl fleet will increase, and the catch of the small boat fleet will be relatively insignificant.

Kodiak is identified in the "State of Alaska Program for Development of the Bottomfish Industry" as one of five ideal communities for bottomfish development in Alaska. The projections of Kodiak groundfish harvesting activity summarized in Tables 3.15 through 3.18 reflect the important role Kodiak is expected to have in the groundfish industry of the Gulf of Alaska. By the year 2000, groundfish fleets are projected to account for 63 percent of the Kodiak catch by all fisheries in terms of weight and 9 percent of the total catch in terms of value. The extreme difference in importance in terms of weight and value occurs because groundfish are a very low-valued fish while the traditional fisheries in Kodiak are dominated by higher valued species such as king crab, salmon, and Tanner crab. The projections of the numbers of boats, landings, and fishermen are for the large boat trawl fleet and the projections for boats and fishermen are based on estimates of how many full-time groundfish boats and therefore fishermen would be required to harvest a projected quantity of fish. If the groundfish fleet which develops does not consist primarily of such boats, the number of boats and fishermen who will participate in the fishery is understated. But to the extent that the part-time groundfish boats and fishermen participate in other fisheries, they are accounted for elsewhere.

TABLE 3.15

PROJECTED HARVESTING ACTIVITY
KODIAK GROUNDFISH FISHERY 1980-2000

Year	CATCH: WEIGHT: POUNDS (1,000)	CATCH: WEIGHT: METRIC TONS	CATCH: VALUE ($1,000): Nominal	CATCH: VALUE ($1,000): Real[1]	EX-VESSEL PRICE ($/Pound): Nominal	EX-VESSEL PRICE ($/Pound): Real	NUMBER OF: Boats	NUMBER OF: Landings	NUMBER OF: Fishermen
1980	154	70	20	18	0.13	0.11	0	2	0
1981	218	99	28	24	0.13	0.11	0	3	0
1982	310	141	41	33	0.13	0.11	0	4	0
1983	441	200	60	46	0.14	0.10	0	5	1
1984	629	285	87	63	0.14	0.10	0	7	1
1985	898	407	127	84	0.14	0.10	0	10	1
1986	1285	583	185	120	0.14	0.09	0	13	1
1987	1842	835	271	167	0.15	0.09	0	18	2
1988	2645	1200	397	232	0.15	0.09	0	25	2
1989	3806	1727	583	324	0.15	0.09	1	34	3
1990	5488	2490	860	452	0.16	0.08	1	46	5
1991	7929	3596	1269	633	0.16	0.08	1	64	6
1992	11476	5205	1879	888	0.16	0.08	2	88	9
1993	16641	7548	2788	1249	0.17	0.08	2	121	12
1994	24177	10966	4147	1761	0.17	0.07	3	167	17
1995	35188	15961	6181	2487	0.18	0.07	5	232	23
1996	51307	23273	9236	3523	0.18	0.07	6	322	32
1997	74943	33994	13927	5036	0.19	0.07	9	447	45
1998	109656	49740	20764	7117	0.19	0.06	12	622	62
1999	160720	72902	31235	10147	0.19	0.06	17	867	87
2000	235950	107026	47107	14505	0.20	0.06	24	1210	121

Source: Alaska Sea Grant Program.

[1] The real values and prices are in terms of 1978 dollars.

TABLE 3.16

PROJECTED PERCENTAGE CHANGE FROM 1980,
KODIAK GROUNDFISH FISHERY

	CATCH		EX-VESSEL PRICE		NUMBER OF		
Year	Weight	Real Value	Nominal	Real	Boats	Landings	Fishermen
1980	0	0	0	0	0	0	0
1981	41.745	36.903	1.897	-3.416	35.086	35.086	35.086
1982	101.284	88.042	3.980	-6.579	82.794	82.794	82.794
1983	186.365	158*493	5.995	-9.733	147*779	147.779	147*779
1984	308.176	256.272	8.130	-12.716	236.454	236.454	236.454
1985	482.907	392.208	10.360	-15.560	357.671	357.671	357.671
1986	734.029	581.429	12.656	-18.297	523.666	523.666	523.666
1987	1095.635	844.953	14.968	‘20.966	751.384	751.384	751.384
1988	1617.327	1213.912	17.418	-23.491	1064,334	1064.334	1064.334
1989	2371.407	1730.313	19.909	-25.940	1495*177	1495.177	14954177
1990	3463.448	2457.106	22.575	-28.241	2089.367	2089.367	2089.366
1991	5047.870	3478.329	25.265	-30.489	2910.263	2910.263	2910.2”63
1992	7350.916	4922.484	28.156	-32.592	4046.320	4046.320	4046.320
1993	10704.601	69610749	319095	-34.641	56210215	5621.215	5621.215
1994	15596.939	9857.120	34.231	-36.566	7808.132	7808.132	7808.132
1995	22746.342	13967.480	37.463	-38.426	10849.926	10849.926	10849.926
1996	33211.986	19825.161	4(-)./377	-40.186	15087.637	15087.638	15087.638
1997	48557.709	28378.718	45.432	-41.471	21000.842	21000.842	21000.841
1998	71095.691	40146.184	48.189	-43.471	29264.811	29264.812	29264.811
1999	104249.200	57284.543	52.091	-45.007	40831.610	40831.608	40831.608
2000	153093.051	81932.360	56.241	-46.452	57045.187	57045.185	57045.184

Source: Alaska Sea Grant Proaram-

TABLE 3.17

KODIAK GROUNDFISH PROJECTED CATCH BY SPECIES 1980-2000

YEAR	WEIGHT (Metric tons)					REAL VALUE[1] $1,000)				
	POLLOCK	PACIFIC COD	SABLEFISH	OTHER	TOTAL	POLLOCK	PACIFIC COD	SABLEFISH	OTHER	TOTAL
1980	14	26	0	30	70	2	8	1	7	18
1981	21	35	1	43	99	3	10	1	10	24
1982	32	47	1	61	141	4	14	1	14	33
1983	48	64	2	87	200	6	18	2	20	46
1984	73	86	2	124	285	9	24	3	27	63
1985	110	116	4	177	4(37	14	31	4	38	87
1986	168	157	6	253	583	20	41	6	53	120
1987	254	212	9	361	835	30	54	9	73	167
1988	386	287	13	514	1200	45	71	14	102	232
1989	586	387	20	733	1727	66	94	21	142	324
1990	889	524	31	1046	2490	98	124	32	198	452
1991	1349	708	47	1492	3596	146	164	48	276	633
1992	2047	957	73	2129	5205	216	216	71	385	888
1993	3107	1293	112	3034	7548	320	285	107	536	1.249
1994	4716	1747	172	4331	10966	475	377	161	748	1761
1995	7158	2362	264	6177	15961	705	498	241	1C43	2487
1996	10864	3193	405	8811	23273	1047	659	362	1455	3523
1997	16489	4315	622	12569	33994	1565	878	548	2045	5036
1998	25025	5833	954	17928	4974(-1	2309	1153	818	2836	7117
1999	37981	7884	1465	25572	72902	3431	1526	1229	3960	10147
2000	57645	10656	2250	36475	107026	5102	2021	1849	5534	14505

[1]Value in terms of 1978 dollars.

TABLE 3.18

PROJECTIONS OF KODIAK GROUNDFISH HARVESTING ACTIVITY
AS A PERCENTAGE OF TOTAL KODIAK HARVESTING ACTIVITY

Year	CATCH		NUMBER OF		
	Weight	Value	Boats	Fishermen	Landings
1980	0.15	0.02	0.00	0.00	0.02
1981	0.21	0.03	0.01	0.01	0.03
1982	0.29	0.04	0.01	0.01	0.03
1983	0.40	0.06	0.01	0.01	0.04
1984	0.55	0.07	0.01	0.02	0.06
1985	0.77	0.10	0.02	0.02	0.08
1986	1.09	0.13	0.02	0.03	0.11
1987	1.55	0.17	0.03	0.04	0.14
1988	2.20	0.23	0.04	0.05	0.20
1989	3.12	0.32	0.06	0.07	0.27
1990	4.08	0.42	0.08	0.10	0.36
1991	5.76	0.57	0.11	0.13	0.49
1992	8.08	0.77	0.15	0.18	0.67
1993	11.25	1.05	0.21	0.25	0.91
1994	15.47	1.44	0.28	0.34	1.25
1995	20.93	1.97	0.39	0.46	1.71
1996	27.72	2.70	0.54	0.64	2.34
1997	35.76	3.73	0.74	0.87	3.20
1998	44.72	5.06	1.02	1.20	4.38
1999	54.08	6.91	1.41	1.65	5.96
2000	63.20	9.38	1.94	2.27	8.09

Source: Alas a Sea Grant Program.

King Crab

The Kodiak king crab fishery is a relatively mature fishery with fairly well defined resources that are expected to allow an average annual harvest of 13,600 metric tons (30 million pounds). The king crab fleet consists of boats from under 7.6 meters (25 feet) to over 38.1 meters (125 feet) in length, but the majority of the harvest is landed by the larger boats. Recently, the king crab season has been from September through January. During the remainder of the year, king crab boats and fishermen participate in king crab fisheries in other areas, in other crab fisheries, or to a lesser extent in non-crab fisheries.

The king crab harvest is expected to equal the sustainable yield by 1980 and on average be maintained at that level throughout the forecast period. The favorable market conditions that are expected to continue are projected to increase the real value of the king crab catch by over 30 percent between 1980 and 2000, and should result in stock abundance and the associated quotas determining annual catch. The projections are summarized in Tables 3.19 and 3.20.

The pot gear used in the king crab and other crab fisheries is fixed gear that is left unattended; therefore, it is subject to losses to marine traffic including trawlers. The gear consists of a pot that is placed on the ocean floor and connected to a buoy which marks its location. The pots are placed at varying intervals along a course that may be determined by the contour of the sea floor. If a buoy is ripped from a pot, the pot is very difficult to locate and recover. The exposed part

X

TABLE 3.19

PROJECTED HARVESTING ACTIVITY
KODIAK KING CRAB FISHERY 1980-2000

	CATCH								
	WEIGHT		VALUE ($1,000)		EX-VESSEL PRICE ($/Pound)		NUMBER OF		
Year	POUNDS (1,000)	METRIC TONS	Nominal	Real'	Nominal	Real	Boats	Landings	Fishermen
1980	30000	13608	32727	29403	1.09	0.98	201	1565	603
1981	30000	13608	35478	30213	1.18	1.01	201	1565	603
1982	30000	13608	38394	30992	1.28	1.03	201	1565	603
1983	3[)000”	13608	41441	31708	1.38	1.06	201	1565	603
1984	300(-)0	13608	44646	32379	1.49	1.08	201	1565	603
1985	30000	13608	48005	33000	1.60	1.10	201	1565	603
1986	30000	13608	51683	33676	1.72	1.1?	201	1565	603
1987	30000	13608	55530	34297	1.85	1.14	201	1565	603
1988	30000	13608	59539	34856	1.98	1.16	201	1565	603
1989	30000	13608	63797	35402	2.13	1.18	201	1S65	603
1990	30000	13608	68217	35881	2.27	1.20	201	1565	603
1991	30000	13608	72890	36340	2.43	1.21	201	1565	603
1992	30000	13608	77754	36744	2.59	1.22	201	1565	603
1993	30000	13608	82837	37106	2.76	1.24	201	1565	603
1994	30000	13608	88195	37446	2.94	1.25	201	1565	603
1995	30000	13608	93835	37764	3.13	1.26	201	1565	603
1996	30000	13608	99694	38030	3.32	1.27	201	1565	603
1997	30000	13608	105913	38296	3.53	1.28	201	1565	603
1998	30000	13608	112384	38517	3.75	1.28	201	1565	603
1999	30000	13608	119159	38710	3.97	1.29	201	1565	603
2000	30000	13608	126292	38889	4.21	1.30	201	1565	603

Source: Alaska Sea Grant Program.

'The real values and' prices are in terms of 1978 dollars.

TABLE 3.20

PROJECTED PERCENTAGE CHANGE FROM 1980,
KODIAK KING CRAB FISHERY

	CATCH		EX-VESSEL PRICE		NUMBEP OF		
Year	Weight	Rea 1 Value	Nominal	Real	Boats	Landinqs	Fishermen
1980	0	0	0	0	0	0	0
1981	0	2.755	8.407	2.755	0	0	0
1982	0	5*405	17.318	5.405	0	0	0
1983	0	7.838	26.628	7.838	0	0	0
1984	o	10.121	36.420	10.121	0	0	0
1985	0	12.233	46.684	12.233	0	0	0
1986	0	14.533	57.923	14.533	0	0	0
1987	0	16.644	69.679	16.644	0	0	0
1988	()	18.545	81.929	18.545	0	0	0
1989	0	20.400	94.940	20.400	0	0	0
1990	0	22.030	108.444	22.030	0	0	0
1991	0	23.592	122.725	23.592	0	0	0
1992	0	24.967	137.588	24.967	0	0	0
1993	0	26.195	153.119	26.195	0	0	0
1994	0	27.354	169.492	27.354	0	0	0
1995	0	28.434	186.726	28.434	0	0	0
1996	0	29.339	204.627	29.339	0	0	0
1997	0	30.243	223.629	30.243	0	0	0
1998	0	3(3.997	243.403	30.997	0	0	0
1999	0	31.652	264*104	31.652	0	0	0
2000	0	32.259	285.901	32.259	0	0	0

Source: Alaska Sea Grant Proqram.

of the gear, the buoy, provides a very small target for marine traffic, but since the buoys are often difficult to spot visually or with radar and the pots often are placed in heavy concentrations, gear losses to marine traffic are not infrequent. A typical crab fisherman loses several pots per year, but often the cause of each loss is not known.

Tanner Crab

The history of the Kodiak Tanner crab fishery indicates how rapidly a fishery can develop and, therefore, how hazardous it can be to make long-term fishery forecasts. The fishery began in 1967 with a meager catch of 50.1 metric tons (111,000 pounds) but by 1973, the catch had grown to 14,444 metric tons (31.8 million pounds). This explosive growth was stimulated by changing market conditions that made fuller utilization of the Tanner crab resources profitable. The decline in the abundance of king crab resulted in a shorter king crab season which provided an incentive to king crab fishermen and boats to also participate in the Tanner crab fishery; and the decrease in supply of king crab helped to increase the price of Tanner crab and make participation in the fishery more attractive.

In recent years, the Kodiak Tanner crab season has begun in January as the king crab fishery is ending and has extended into April or May. Many crab fishermen and boats participate in both fisheries; the characteristics of the fleets are therefore similar. The Tanner crab boats range in size from less than 10.7 meters (35 feet) to over 38.1 meters (125 feet), but are typically between 15.2 and 35.1 meters (50 and 115 feet) in length, have a crew of three, and are capable of fishing far offshore.

Although the Tanner crab fishery is younger than the king crab fishery, it is also a relatively mature fishery with resources and markets that are well developed and defined and which, in the absence of unforeseen major changes in the biological or market environments, are expected to result in an average annual harvest of 12,700 metric tons (28 million pounds) during the forecast period. The market conditions are expected to be sufficiently favorable to maintain resource abundance as the binding constraint on fishery activity, despite the projected " 3 percent decline in the real ex-vessel price. The projections are summarized in Tables 3.21 and 3.22.

Dungeness Crab

The Kodiak Dungeness crab fishery is principally participated in by boats and fishermen that are primarily participants in other fisheries; and although the Dungeness crab fleet has included large king crab and shrimp boats, it has tended to have a larger concentration of boats under 16.8 meters (55 feet) than have the other shellfish fleets. The average crew size is two and one half and the season extends from May through December.

Typically, the development of the Kodiak Dungeness crab fishery has been constrained by market conditions, not resource abundance. The principal

TABLE 3.21

PROJECTED HARVESTING ACTIVITY
KODIAK TANNER CRAB FISHERY 1980-2000

Year	CATCH: WEIGHT: POUNDS (1,000)	CATCH: WEIGHT: METRIC TONS	CATCH: VALUE ($1,000): Nominal	CATCH: VALUE ($1,000): Real[1]	EX-VESSEL PRICE ($/Pound): Nominal	EX-VESSEL PRICE ($/Pound): Real	NUMBER OF: Boats	NUMBER OF: Landings	NUMBER OF: Fishermen
1980	28000	12701	16976	15252	0.61	0.54	126	1191	378
1981	28000	12701	17587	14977	0.63	0.53	126	1191	378
1982	28000	12701	18239	14722	0.65	0.53	126	1191	378
1983	28000	12701	18938	14490	0.68	0.52	126	1191	378
1984	28000	12701	19688	14279	0.70	0.51	126	1191	378
1985	28000	12701	20491	14086	0.73	0.50	126	1191	378
1986	28000	12701	21353	13913	0.76	0.50	126	1191	378
1987	28000	12701	22277	13759	0.80	0.49	126	1191	378
1988	28000	12701	23268	13622	0.83	0.49	126	1191	378
1989	28000	12701	24335	13504	0.87	0.48	126	1191	378
1990	28000	12701	25480	13402	0.91	0.48	126	1191	378
1991	28000	12701	26709	13316	0.95	0.48	126	1191	378
1992	28000	12701	28032	13247	1.00	0.47	126	1191	378
1993	28000	12701	29454	13194	1.05	0.47	126	1191	378
1994	28000	12701	30984	13155	1.11	0.47	126	1191	378
1995	28000	12701	32628	13131	1.17	0.47	126	1191	378
1996	28000	12701	34400	13122	1.23	0.47	126	1191	378
1997	28000	12701	36305	13127	1.30	0.47	126	1191	378
1998	28000	12701	38357	13146	1.37	0.47	126	1191	378
1999	28000	12701	40566	13178	1.45	0.47	126	1191	378
2000	28000	12701	42945	13224	1.53	0.47	126	1191	378

Source: Alaska Sea Grant Program.

[1] The real values and prices are in terms of 1978 dollars

TABLE 3.22

PROJECTED PERCENTAGE CHANGE FROM 1980,
KODIAK TANNER CPAB FISHERY

	CATCH		EX-VESSEL PRICE		NUMBER OF		
Year	Weight	Real Value	Nominal	Real	Boats	Landinas	Fishermen
1980	0	0	0	0	0	0	0
1981	0	-1.803	“3*598	-1.803	0	0	0
1982	0	-3.472	7.438	-3.472	0	0	0
1983	0	-4.994	11.560	-4.994	0	0	0
1984	0	-6.382	15.977	-6.382	0	0	0
1985	0	-7.644	20.706	-7.644	0	0	0
1986	0	-8.777	25.782.	-8.777	0	0	0
1987	0	-9.789	31.228	-9.789	0	0	0
1988	0	-10.687	37.067	-10.687	0	0	0
1989	0	-11.464	43.349	-11.464	0	0	0
1990	0	-12.130	50.095	-12.130	0	0	0
1991	0	-12.693	57*335	-12.693	0	0	0
1992	0	-13.146	65.12”7	-13.146	0	0	0
1993	0	-13.496	73.50-?	-13.496	0	0	“cl
1994	0	-13*748	82.517	-13.748	0	0	0
1995	0	-13.905	92.204	-13.905	0	0	0
1996	0	-13.963	102.63Q	-13.963	0	0	0
1997	0	-13.932	113.863	-13.932	0	0	0
1998	()	-13.809	125.947	-13.809	0	0	0
1999	0	-13.595	138.965	-130595	0	0	0
2000	0	-13.?98	152.976	-13.298	0	0	0

Source: Alaska Sea Grant Program.

barriers to a recovery of the Kodiak Dungeness crab fishery have been the relative strengths of other fisheries. There are two principal factors which determine the desirability of operating a vessel in this fishery. One is the ex-vessel price of Dungeness crab; this has historically been determined by Oregon, Washington, and California Dungeness crab harvest levels since that area is the main source of supply. The other factor is the strength of the other Kodiak fisheries; king crab vessels tend to enter the Dungeness crab fishery during lulls in the king crab season, and similarly, shrimp vessels enter the Dungeness crab fishery when area closures prevent them from fishing for shrimp.

Based on the expectations that the competing shellfish fisheries will not exhibit growth during the forecast period and that the demand for crab will continue to increase, the market conditions that have constrained the Dungeness crab fishery are expected to be gradually eliminated; catch is projected to approach the allowable biological catch of 908 metric tons (2 million pounds}. The projections are presented in Tables 3.23 and 3.24.

Shrimp

The Kodiak shrimp fishery has declined rapidly in the past few years, and it is not known when or if a recovery will occur. Based on information provided by Martin Eaton, the ADF&G Westward Region Shellfish Biologist, it is assumed that catch will average 4,535 metric tons (10 million pounds) during the first 10 years of the forecast period and average 9,072 metric tons (20 million pounds) for the remainder of the period

TABLE 3.23

PROJECTED HARVESTING ACTIVITY
KODIAK DUNGENESS CRAB FISHERY 1980-2000

	CATCH								
	WEIGHT		VALUE ($1,000)		EX-VESSEL PRICE ($/Pound)		NUMBER OF		
Year	POUNDS (1,000)	METRIC TONS	Nominal	Real[1]	Nominal	Real	Boats	Landings	Fishermen
1980	713	323	576	517	0.81	0.73	14	91	35
1981	751	341	651	555	0.87	0.74	15	99	37
1982	791	359	736	594	0.93	0.75	15	108	38
1983	832	378	830	635	1.00	0.76	16	116	40
1984	876	398	935	678	1.07	0.77	17	124	42
1985	923	419	1053	724	1.14	0.78	17	132	44
1986	972	441	1186	773	1.22	0.80	18	139	45
1987	1023	464	1335	824	1.30	0.81	19	147	47
1988	1077	489	1500	878	1.39	0.82	19	154	48
1989	1134	515	1685	935	1.49	0.82	20	162	50
1990	1194	542	1890	994	1.58	0.83	21	169	51
1991	1258	570	2120	1057	1.69	0.84	21	176	53
1992	1324	601	2375	1122	1.79	0.85	22	184	55
1993	1394	632	2658	1190	1.91	0.85	22	191	56
1994	1468	666	2973	1262	2.03	0.86	23	198	58
1995	1546	701	3325	1336	2.15	0.87	24	206	59
1996	1628	739	3715	1417	2.28	0.87	24	213	61
1997	1714	777	4150	1501	2.42	0.88	25	220	62
1998	1805	819	4632	1588	2.57	0.88	25	228	64
1999	1900	862	5168	1679	2.72	0.88	26	236	65
2000	2001	908	5765	1775	2.88	0.89	27	243	67

Source: Alaska Sea Grant Program.

[1]The real values and prices are in terms of 1978 dollars.

TABLE 3.24

PROJECTED PERCENTAGE CHANGE FROM 1980,
KODIAK DUNGENESS CRAB FISHERY

	CATCH		EX-VESSEL PRICE		NUMBER OF		
Year	Weight	Real Value	Nominal	Real	Boats	Landings	Fishermen
1980	0	0	0	0	0	0	0
1981	5.295	7.216	7.425	1.824	5.418	9.473	5.418
1982	10.870	14.849	15.297	3.589	10.681	18'.708	10*681
1983	16.741	22.790	23.508	5.181	15.801	27,729	15.801
1984	22.922	31.129	32.153	6.676	20.791	36.557	20.791
1985	29.431	39.883	41.250	8.075	25.664	45.214	25.664
1986	36.2$5	49.389	51.143	9.616	30.431	53.722	30.431
1987	43.501	59.323	61.507	11.026	35.104	62.101	35.104
1988	51.099	69.728	72.389	12.329	39.694	70.372	39.694
1989	59.100	80.723	83.915	13.591	44.214	78.557	44.214
1990	67.524	92.183	95.958	14.720	48.673	86.674	48.673
1991	76.395	104,290	108.708	15.814	53.084	94.745	53.084
1992	85.735	116.895	122.017	16.777	57*457	102.790	57*457
1993	95.569	130.091	135.983	17.652	61.803	110,828	61.803
1994	1(-)5 .'925	144.008	1s0.744	180.494	66.132	118.881	66.132
1995	116.828	158.651	166.309	19.288	70.457	126.968	7(3.457
1996	128.309	1730873	182.530	19.957	74.787	135.110	74.787
1997	140.398	190.032	199.782	20.646	79.134	143.328	79.134
1998	153.120	206.862	217.796	21.228	83.509	151.643	83.509
1999	166.531	224.486	236.702	21.744	87.922	160.075	87.922
2000	180.643	243.085	256.694	22.249	92.385	168.647	92.385

Source: Alaska Sea Grant Program.

(see Tables 3.25 and 3.26). Favorable market conditions and the depressed stock are expected to assure that the latter remains the binding constraint on catch.

The three distinct shrimp fleets include otter trawlers, beam trawlers, and pot boats. The otter trawlers which dominate the fishery have an average crew size of three and are typically 19.8 to 25.9 meters (65 to 85 feet) in length. Only a few beam trawlers or pot boats participate in the Kodiak shrimp fishery. The average crew size for either type vessel is two and the typical boat is less than 16.8 meters (55 feet) in length. The decline in resource abundance and the resulting area and seasonal closures have turned what was a year-round fishery in the early 1970s into a June through February fishery in 1978. As a result of the dramatic decline in this fishery, many of the shrimp trawlers have prepared to enter the Kodiak groundfish fishery.

Razor Clam

Market conditions have resulted in the Kodiak razor clam resources being underutilized in recent years; however, improved market conditions combined with a recovery of the razor clam resources are expected to result in substantial growth in the fishery by the year 2000. The weight and real value of the average annual harvest are projected to increase by over 500 percent during the forecast period. Despite this dramatic growth, the razor clam fishery will remain almost insignificant in comparison to the other Kodiak fisheries. The razor clam fishery projections are presented in Tables 3.27 and 3.28.

TABLE 3.25

PROJECTED HARVESTING ACTIVITY
KODIAK SHRIMP FISHERY 1980-2000

Year	CATCH: WEIGHT: POUNDS (1,000)	CATCH: WEIGHT: METRIC TONS	CATCH: VALUE ($1,000)[1]: Nominal	CATCH: VALUE ($1,000)[1]: Real	EX-VESSEL PRICE[1] ($/Pound): Nominal	EX-VESSEL PRICE[1] ($/Pound): Real	NUMBER OF: Boats	NUMBER OF: Landings	NUMBER OF: Fishermen
1980	10000	4536	2492	2239	0.25	0.22	11	195	31
1981	10000	4536	2761	2351	0.28	0.24	11	195	31
1982	10000	4536	3058	2469	0.31	0.25	11	195	31
1983	10000	4536	3388	2592	0.34	0.26	11	195	31
1984	10000	4536	3753	2722	0.38	0.27	11	195	31
1985	10000	4536	4158	2858	0.42	0.29	11	195	31
1986	10000	4536	4605	3001	0.46	0.30	11	195	31
1987	10000	4536	5102	3151	0.51	0.32	11	195	31
1988	10000	4536	5651	3309	0.57	0.33	11	195	31
1989	10000	4536	6260	3474	0.63	0.35	11	195	31
1990	20000	9072	13870	7295	0.69	0.36	23	389	61
1991	20000	9072	15364	7660	0.77	0.38	23	389	61
1992	20000	9072	17020	8043	0.85	0.40	23	389	61
1993	20000	9072	18854	8445	0.94	0.42	23	389	61
1994	20000	9072	20885	8867	1.04	0.44	23	389	61
1995	20000	9072	23136	9311	1.16	0.47	23	3139	61
1996	20000	9072	25628	9776	1.28	0.49	23	389	61
1997	20000	9072	28390	10265	1.42	0,51	23	3139	61
1998	20000	9072	31449	10778	1.57	0.54	23	389	61
1999	20000	9072	34938	11317	1.74	0.57	23	389	61
2000	20000	9072	38591	11883	1.93	0.59	23	389	61

Source: Alaska Sea Grant Program.

[1]The real values and prices are in terms of 1978 dollars.

TABLE 3.26

PROJECTED PERCENTAGE CHANGE FROM 1980,
KODIAK SHRIMP FISHERY

	CATCH		EX-VESSEL PRICE		NUMBER OF		
Year	Weight	Real Value	Nominal	Real	Boats	Landings	Fishermen
1980	0	0	0	0	0	0	0
1981	0	5.00	10.77	5.00	0	0	0
1982	0	10.25	22.71	10.25	0	0	0
1983	0	15.76	35.93	15.76	0	0	0
1984	0	21.55	50.58	21.55	0	0	0
1985	0	27.63	66.80	27.63	0	0	0
1986	0	34.01	84.78	34.01	0	0	0
1987	0	40.71	104.69	40.71	0	0	0
1988	0	47.75	126.74	47.75	0	0	0
1989	0	55.13	151.17	55.13	0	0	0
1990	100.00	225.79	178.24	62.89	100.00	100.00	100.00
1991	100.00	242.07	208.22	71.03	100.00	100.00	100.00
1992	100.00	259.17	241.43	79.59	100.00	100.00	100.00
1993	100.00	277.13	278.22	88.56	100.00	100.00	100.00
1994	100.00	295.99	318.97	97.99	100.00	100.00	100.00
1995	100.00	315.79	364.12	107.89	100.00	100.00	100.00
1996	100.00	336.57	414.12	118.29	100.00	100.00	100.00
1997	100.00	353.40	469.52	129.20	100.00	100.00	100.00
1998	100.00	381.32	530.89	140.66	100.00	100.00	100.00
1999	100.00	405.39	598.87	152.69	100.00	100.00	100.00
2000	100.00	430.66	674.17	165.33	100.00	100.00	100.00

Source: Alaska Sea Grant Program.

TABLE 3.27

PROJECTED HARVESTING ACTIVITY
KODIAK RAZOR CLAM FISHERY 1980-2000

	CATCH				EX-VESSEL PRICE		NUMBER OF		
	WEIGHT		VALUE ($1,000)		($/Pound)				
Year	POUNDS (1,000)	METRIC TONS	Nominal	Real[1]	Nominal	Real[1]	Boats	Landings	Fishermen
1980	108	49	120	108	1011	1.00	6	53	174
1981	135	61	159	135	1.17	1*OO	7	71	2(')7
1982	163	74	202	163	1.24	1000	8	81	237
1983	190	86	248	190	1.31	1.00	9	90	263
1984	217	98	299	217	1.38	1.00	10	98	286
1985	245	111	356	245	1.45	1.00	11	105	307
1986	272	123	417	272	1.53	1.00	11	111	325
1987	299	136	484	299	1.62	1.00	12	117	340
1988	326	148	557	326	1.71	1.00	12	121	353
1989	354	161	638	354	1.80	1*OO	13	125	365
1990	381	173	724	381	1.90	1.00	13	128	374
1991	408	185	818	408	2.01	1.00	13	131	382
1992	435	197	920	435	2.12	1.00	13	133	388
1993	463	210	1034	463	2.23	1*OO	14	135	393
1994	490	222	1154	490	2.36	1.00	14	136	396
1995	517	235	1285	517	2.48	1000	14	137	398
1996	544	247	1426	544	2.62	1*OO	14	137	399
1997	572	259	1582	572	2.77	1000	14	137	399
1998	599	272	1748	599	2.92	1.00	14	137	399
1999	626	284	1927	626	3.08	1*OO	14	136	397
2000	653	296	2121	653	3.25	1.00	14	135	394

Source: Alaska Sea Grant Program.

[1]The real values and prices are in terms of 1978 dollars.

TABLE 3.28

PROJECTED PERCENTAGE CHANGE FROM 1980,
KODIAK RAZOR CLAM FISHERY

Year	CATCH		EX-VESSEL PRICE		NUMBER OF		
	Weight	Real Value	Nominal	Real	Boats	Landings	Fishermen
1980	0	0	0	0	0	0	0
1981	25.000	25.000	50500	0	16.667	33.462	18.966
1982	50.926	50.926	11.3.03	0	33.333	52.830	36.207
1983	75.926	75.926	17.424	0	50.000	69.811	51.149
1984	100.926	100.926	23.882	0	66.667	84.906	64.368
1985	126.852	126.852	30.696	0	83.333	98.113	76.437
1986	151.852	151.852	37.884	0	R3.333	109.434	86.782
1987	176. 852	176.852	45.468	0	100.000	120.755	95.402
1988	201 .852	2'010 852	53*469	0	1000000	128.302	102.874
1989	227.778	227.778	61.909	0	116*667	135.849	109.770
1990	252.778	252.778	70.814	0	116.667	141.509	114*943
1991	277.778	277.778	80.209	0	116.667	147.170	119.540
1992	302.778	302.778	90.121	0	116.667	150.943	122*989
1993	328.704	328.704	100.577	0	133.333	154.717	125.862
1994	353.7 [)4	353.704	11106(-)9	0	133.333	156.604	127.586
1995	378.704	378.7(-)4	123.24'1	0	133.333	158.491	128.736
1996	403.704	403.7(-)4	135.526	0	133*333	158.491	129.310
1997	429.630	429.630	148.480	0	133.333	158.491	129.310
1998	454.630	454.630	162.147	0	133.333	158.491	129.310
1999	479.630	479.630	1"76.565	0	133.333	156.604	128.161
2000	504.630	504.630	191.776	0	133.333	154.717	126.437

Source: Alaska Sea Grant Program.

Summation of Harvesting Activity Projections

This section consists of the presentation and analysis of the projections of harvesting activity of the Kodiak commercial fishing industry as a whole. The tables presented in this section include summations of projected harvesting activity and projections of the relative importance of each fishery.

Total catch is projected to increase from 47,000 metric tons (103.7 million pounds) in 1980 to 169,000 metric tons (373 million pounds) in 2000, and its real value is projected to increase from $72.6 million to $155 million (see Table 3.29). The resulting percentage increases by weight and real value respectively are 260 and 130 percent (see Table 3.30). The weight is projected to increase more rapidly than the value due to a decrease in the industry-wide real ex-vessel price that is expected to occur as lower-valued groundfish become a larger proportion of the total harvest, and the higher valued traditional species become a smaller proportion of catch (see Table 3.33).

If the groundfish fisheries are excluded, total catch is expected to increase from 46,960 metric tons (103.5 million pounds) to 62,300 metric tons (137.4 million pounds) or in terms of real value from $72.6 million to $140 million (see Table 3.31). The corresponding percentage increases are 32.7 percent by weight and 92.9 percent by real value (see Table 3.32). For the traditional fisheries, the value of the annual catch is projected to increase more rapidly than its weight because the real ex-vessel prices of the dominant traditional species are projected to increase.

TABLE 3.29

PROJECTED HARVESTING ACTIVITY
KODIAK ALL FISHERIES 1980-2000

Year	CATCH: WEIGHT: POUNDS (1,000)	CATCH: WEIGHT: METRIC TONS	CATCH: VALUE ($1,000): Nominal	CATCH: VALUE ($1,000): Real[1]	EX-VESSEL PRICE ($/Pound): Nominal	EX-VESSEL PRICE ($/Pound): Real	NUMBER OF: Boats	NUMBER OF: Landings	NUMBER OF: Fishermen
1980	103682	47030	80847	72637	0.78	0.70	1092	10774	4329
1981	105794	47988	88966	75765	0.84	0.72	1094	11077	4364
1982	108086	49028	97990	79099	0.91	0.73	1096	11382	4396
1983	110581	50159	107871	82536	0.98	0.75	1097	11694	4424
1984	113309	51397	119113	86386	1.05	0.76	1099	12013	4449
1985	116479	52834	131751	90571	1.13	0.78	1105	12354	4500
1986	117521	53307	143424	93455	1.22	0.80	1111	12438	4548
1987	118750	53865	155914	96297	1.31	0.81	1118	12524	4595
1988	120242	54542	169378	99159	1.41	0.82	1124	12610	4641
1989	122111	55389	183866	102029	1.51	0.84	1131	12700	4687
1990	134517	61016	206609	108672	1.54	0.81	1149	12987	4763
1991	137699	62460	224597	111975	1.63	0.81	1155	13085	4809
1992	142008	64414	243804	115214	1.72	0.81	1162	13189	4854
1993	147955	67112	264682	118560	1.79	0.80	1171	13303	4901
1994	156292	70894	287829	122207	1.84	0.78	1179	13430	4949
1995	168127	76262	313377	126117	1.86	0.75	1187	13575	4999
1996	185091	83957	341668	130335	1.85	0.70	1197	13745	5052
1997	209596	95072	373736	135135	1.78	0.64	1207	13952	5109
1998	245201	111222	410035	140531	1.67	0.57	1218	14208	5173
1999	297181	134800	452012	146841	1.52	0.49	1232	14535	5244
2000	373352	169351	502062	154598	1.34	0.41	1247	14960	5325

Source: Alaska Sea Grant Program.

[1]The real values and prices are in terms of 1978 dollars.

TABLE 3.30

PROJECTED PERCENTAGE CHANGE FROM 1980,
KODIAK ALL FISHERIES

Year	CATCH Weight	CATCH Real Value	EX-VESSEL PRICE Nominal	EX-VESSEL PRICE Real	NUMBER OF Boats	NUMBER OF Landings	NUMBER OF Fishermen
1980	0	0	0	0	0	0	0
1981	2.04	4.31	7.85	2*22	0.16	2.81	0.81
1982	4.25	8.90	16.27	4.46	0.32	5.64	1.54
1983	6.65	13.63	25.10	6.54	0.48	8.54	2.19
1984	9.28	18.93	34.81	8.82	0.64	11.49	2.76
1985	12.34	24.69	45.06	10.99	1.22	14.66	3*93
1986	13.35	28.66	56.51	13*51	1.72	15'.44	5.05
1987	14.53	32.57	68.38	15.75	2.33	16.24	6.13
1988	15.97	36.51	80.65	17.71	2.87	17.04	7.19
1989	17.77	40.46	93.10	19.27	3.52	17.87	8.26
1990	29.74	49.61	96.98	15.32	5.16	20.54	10.01
1991	32.81	54*16	109.18	16.07	5.78	21.44	11.07
1992	36.96	58.62	120.18	15.81	6.42	22.41	12.12
1993	42.7(I	63. ?2	129.42	14.38	7.20	23.47	13.21
1994	50.74	6$3.24	136.18	11.61	7.92	2.4.65	14.31
1995	62.16	73.63	139.04	7.07	8.71	26.00	15.46
1996	78.52	79.43	136.73	0.51	9.56	27.58	16.69
1997	102.15	86.04	128.68	-7.97	10.51	29.49	18.01
1998	136.49	93.47	114.46	-18.19	11.57	31.87	19.49
1999	186.63	102.16	95.06	-29.47	1?.78	34.90	21.12
2000	260.09	112.84	72.46	-40.89	14.21	38.84	23.00

Source: Alaska Sea Grant Program.

TABLE 3.31

PROJECTED HARVESTING ACTIVITY
KODIAK TRADITIONAL FISHERIES 1980-2000

Year	CATCH: WEIGHT: POUNDS (1,000)	CATCH: WEIGHT: METRIC TONS	CATCH: VALUE ($1.000): Nominal	CATCH: VALUE ($1.000): Real[1]	EX-VESSEL PRICE ($/Pound): Nominal	EX-VESSEL PRICE ($/Pound): Real	NUMBER OF: Boats	NUMBER OF: Landings	NUMBER OF: Fishermen
1980	103528	46960	80827	72619	0.78	(-).70	1092	10772	4329
1981	105575	47889	88937	75740	0.84	0.72	1094	11075	4364
1982	1(?777(5	48887	97949	79066	0.91	0.73	1096	11378	4396
1983	110140	49959	107811	8?49(')	0.98	0.75	1097	11689	4424
1984	112680	51111	119026	86323	1.06	0.77	1099	120(?6	4448
1985	115581	5?42'7	131625	90484	1.14	0.78	1105	12344	4499
1986	116237	52725	143239	93335	1.?3	0.80	1111	124?5	4547
1987	116909	53029	155644	96130	1.33	0.82	1117	1?506	4593
1988	11759-7	53342	168981	98927	1.44	0.84	1123	12586	4638
1989	118304	53663	183282	101705	1.55	0.86	1130	12666	4684
1990	129028	58527	205749	108220	1.59	0.84	1148	12940	4758
1991	129770	58863	223328	111343	1.72	0.86	1154	13021	4802
1992	130532	59209	241925	114326	1.85	0.88	1161	13101	4845
1993	131314	59564	261894	117311	1.99	0.89	1168	13182	4889
1994	132116	59927	283682	120446	2.15	0.91	1175	13262	4932
1995	132939	60301	307196	123630	2.31	O*93	1183	13343	4976
1996	133784	60684	332432	126811	?.48	0.95	1190	13424	5020
1997	134653	61078	359809	130099	?.67	0.97	1198	13505	5065
1998	135545	61483	389271	133414	2.87	0.98	1206	13587	5111
1999	136461	61898	420777	136694	3.08	1.00	1214	13668	5157
2000	137403	62326	454955	140092	3.31	1.02	1223	13749	5204

Source: Alaska Sea Grant Program.

[1] The real values and prices are in terms of 1978 dollars.

TABLE 3.32

PROJECTED PERCENTAGE CHANGE FROM 1980,
KODIAK TRADITIONAL FISHERIES

Year	CATCH Weight	CATCH Real Value	EX-VESSEL PRICE Nominal	EX-VESSEL PRICE Real	NUMBER OF Boats	NUMBER OF Landings	NUMBER OF Fishermen
1980	0	0	0	0	0	0	0
1981	1.98	4.3(3	7.9(-)	2.28	0.16	2.81	“ 0.81
1982	4.10	8.88	16.41	4*59	0.32	5.63	1.54
1983	6.39	13*59	25.38	6.77	0.48	8.51	2.18
1984	8.84	18.97	35.30	9.22	0.63	11*45	2.75
1985	11.64	24.60	45.87	11.61	1.20	14.60	3.91
1986	12.28	28.53	57.84	14.47	1.70	15.34	5,02
1987	12.92	32.38	70.52	]7,22	2.30	16.10	6.09
1988	13.59	36.23	84.05	19.93	2.83	16.83	7.14
1989	14.27	40.05	98.44	22.56	3.47	17.58	8.19
1990	24.63	49.02	104.25	19.57	5.08	20.13	9.91
1991	25.35	53.32	120.43	22.32	5.66	20.88	10.92
1992	26.08	57*43	137.39	24.86	6.26	21.62	11.92
1993	26.84	61.54	155.46	27.36	6.98	22.37	12.93
1994	27.61	65.86	175.03	29.97	7.62	23.12	13.93
1995	28.41	70. ?4	195.98	32,58	8.29	23.87	14.93
1996	?9.22	74.63	218.27	35.13	8.98	24.62	15.95
1997	30.06	79.15	242.26	37.74	9.69	25.37	1?).99
1998	30.93	83.72	267.85	40.32	10.43	26.13	18.06
1999	31.81	88.23	294.95	42.81	11.20	26.88	19.12
2000	3? .7?	92.91	324.11	45.35	12.00	?7.64	20.21

Source: Alaska Sea Grant Program.

TABLE 3.33

PERCENTAGE OF CATCH BY WEIGHT BY KODIAK
FISHERY INCLUDING GROUNDFISH, 1980-2000

Year	Salmon	Halibut	Herring	King Crab	Tanner Crab	Dungeness Crab	Shrimp	Razor Clams	Groundfish
1980	25.373	4.244	3.858	28.935	27.006	0.688	9.645	0.104	0.149
1981	26.740	4.159	3.731	28.357	26.467	0.710	9.452	0.128	0.206
1982	28.147	4.071	3.701	27.756	25.905	0.731	9.252	0.151	0.287
1983	29.587	3.979	3.617	27.129	25.321	0.753	9.043	0.172	0.399
1984	31.054	3.883	3.530	26.476	24.711	0.773	8.825	0.192	0.555
1985	32.490	3.923	3.434	25.756	24.039	0.792	8.585	0.210	0.771
1986	32.545	4.038	3.404	25.527	23.826	0.827	8.509	0.231	1.093
1987	32.554	4.150	3.368	25.263	23.579	0.862	8.421	0.252	1.551
1988	32.498	4.256	3.327	24.950	23.286	0.896	8.317	0.271	2.200
1989	32.349	4.352	3.276	24.568	22.930	0.929	8.189	0.290	3.117
1990	29.687	4.103	2.974	22.302	20.815	0.888	14.868	0.283	4.080
1991	29.320	4.163	2.905	21.787	20.334	0.913	14.524	0.296	5.758
1992	28.745	4.192	2.817	21.126	19.717	0.933	14.084	0.306	8.081
1993	27.897	4.178	2.704	20.276	18.925	0.942	13.518	0.313	11.248
1994	26.705	4.108	2.559	19.195	17.915	0.939	12.797	0.314	15.469
1995	25.105	3.965	2.379	17.844	16.654	0.920	11.896	0.308	20.930
1996	23.063	3.741	2.161	16.208	15.128	0.879	10.805	0.294	27.7[illegible]
1997	20.600	3.430	1.908	14.313	13.359	0.818	9.542	0.273	35.756
1998	17.811	3.045	1.631	12.235	11.419	0.736	8.157	0.244	44.[illegible]21
1999	14.866	2.609	1.346	10.095	9.422	0.639	6.730	0.211	54.081
2000	11.971	2.157	1.071	8.035	7.500	0.536	5.357	0.175	63.198

Source: Alaska Sea Grant Program.

In addition to the large projected changes in absolute levels of harvesting activity, there are some significant projected changes in relative levels of activity among the fisheries. The most notable is the previously mentioned change in the harvest mix between traditional species and the groundfish species. In terms of weight, the groundfish species are expected to account for less than one percent of the catch in 1980 but over 63 percent by 2000 (see Table 3.33); however, in terms of value, the groundfish species are expected to account for just over 9 percent of the Kodiak harvest (see Table 3.34). And as Tables 3.35 through 3.37 indicate, the groundfish fishery is expected to be relatively minor with respect to the number of boats, landings, or fishermen.

Within the traditional fisheries, less significant changes in relative importance are projected. By weight, the salmon fisheries are expected to become relatively more important as the king and Tanner crab fisheries become less important (see Table 3.38). The changes in terms of value are in the same directions but they are more dramatic (see Table 3.39).

The projected changes in the relative number of boats, landings, or fishermen among the traditional fisheries are minor (see Tables 3.40 through 3.42).

As is mentioned in Chapter II, the summation of the number of fishermen or boats over all fisheries results in double counting since a fisherman or boat is counted once for each fishery which is participated in. The method used to reduce this problem is discussed in Chapter II; the

TABLE 3.34

PERCENTAGE OF VALUE BY KODIAK
FISHERY INCLUDING GROUNDFISH, 1980-2000

Year	Salmon	Halibut	Herring	King Crab	Tanner Crab	Dungeness Crab	Shrimp	Razor Clams	Groundfish
1980	19.08	10.47	5.01	40.48	21.00	0.71	3.08	0.15	0.02
1981	21.20	10.26	4.84	39.88	19.77	0.73	3.10	0.18	(-).03
1982	23.36	10.04	4.68	39.18	18.61	0.75	3.12	0.21	0.04
1983	25.49	9.81	4.53	38.42	17.56	0.77	3.14	0.23	0.06
1984	27.82	9.54	4*37	37.48	16.53	0.79	3.15	0.25	0.07
1985	29.88	9.60	4.21	36.44	15.55	0.80	3.16	0.27	0.10
1986	30.69	9.81	4.1?	36.03	14.89	0.83	3.21	0.29	0.13
1987	31.43	10.02	4.03	35.62	14.29	0.86	3.27	0.31	0.17
1988	32.13	10.24	3.95	35.15	13.74	0.89	3.34	0.33	0.23
1989	3? .75	10.46	3.88	34.70	13.24	0.92	3.40	0.35	0.32
1990	32.27	10.31	3.68	33.02	1?.33	0.91	6.71	0.35	0.42
1991	32. 84	10.50	3.60	32.45	11.89	0.94	6.84	0.36	0.57
1992	33.28	10.69	3.53	31.89	11.50	0.97	6.98	0.38	0.77
1993	33.66	10.88	3.47	31.30	11.13	1.00	7.12	0.39	1.05
1994	34.01	11.05	3.40	30.64	10.76	1.03	7.26	0.40	1.44
1995	34.29	11.?1	3.32	29.94	10.41	1.06	7.38	0.41	1.97
1996	34.47	11.33	3.?4	29.18	10.07	1.09	7.50	0.42	?.70
1997	34.51	11.43	3.16	28.34	9.71	1.11	7.60	0.42	3.73
1998	“34.41	11.47	3.07	27.41	9.35	1.13	7.67	0.43	5.06
1999	34.06	11.46	2.96	26.36	8.97	1.14	7.71	0.43	6.91
2000	33.50	11.31	2.84	25.15	8.55	1.15	7.69	0.42	9.38

Source: Alaska Sea Grant Program.

TABLE 3.35

PERCENTAGE OF BOATS BY KODIAK
FISHERY INCLUDING GROUNDFISH, 1980-2000

Year	Salmon	Halibut	Herring	King Crab	Tanner Crab	Dungeness Crab	Shrimp	Razor Clams	Groundfish
1980	48.986	10.888	7.325	18.391	11.536	1.268	1.052	0.549	0.004
1981	48.907	10.871	7.313	18.361	11.518	1.335	1.050	(1.640	0.005
1982	48.829	10.854	7.301	18.332	11.499	1.399	1.049	0.730	0.007
1983	48.751	10.836	7.290	18.303	11.481	1.462	1.047	0.820	0.010
1984	48.675	10.819	7.278	18.274	11.463	1052?	1.045	0.910	0.013
1985	48.397	11.172	7.237	18.170	11.398	1.575	1.040	0.995	0.018
1986	48.158	11.545	7.201	18.080	11.341	1.626	1.034	0.990	0.024
1987	47.870	11.917	7.159	17.972	11.274	1.674	1.028	1.074	0.032
1988	47.619	12.311	7.121	17.878	11.215	1.722	1.023	1.068	().044
1989	47.318	12.705	7.076	17.765	11.144	1*767	1.016	1.150	0.060
1990	46.581	12.988	6.965	17.488	10.970	1*793	2.001	1.132	0.081
1991	46.311	13.410	6.925	17.387	10.907	1.835	1.989	1.125	0.110
1992	46.030	13.842	6.883	17.281	10.840	1.876	1.977	1.118	0.151
1993	45.697	14.271	6.833	17.156	10*762.	1.914	1.963	1.196	0.207
1994	45.389	14.720	6.787	17.041	10.68')	1.952	1.950	1.188	0.284
1995	45.061	15.177	6.738	16.918	10.612	1.989	1.936	1.179	0.391
1996	44.710	15.638	6.686	16.786	10.529	2.023	1.921	1.170	0.538
1997	44.328	16.101	6.628	16.(>42	10.439	2.056	1.9(?4	1.160	0.740
1998	43.906	16.562	6.565	16.484	10.340	2.086	1.886	1.149	1.021
1999	43.433	17.014	6.495	16.306	10.229	2.113	1.866	1.137	1.407
2000	42.892	17.449	6.414	16.103	10.101	2.136	1.843	1.122	1.940

Source: Alaska Sea Grant Program.

TABLE 3.36

PERCENTAGE OF FISHERMEN BY KODIAK
FISHERY INCLUDING GROUNDFISH, 1980-2000

Year	Salmon	Halibut	Herring	King Crab	Tanner Crab	Dungeness Crab	Shrimp	Razor Clams	Groundfish
1980	49.798	16.480	5.543	13.918	8.731	0.800	0.7(-)4	4.019	0.005
1981	49.400	16.348	5.499	13.806	8.661	0.836	().7(30	4.743	0.007
1982	49.041	16.230	5.459	13.706	8.598	0.872	0.695	5,391	0.009
1983	48.731	16.127	5.425	13.620	8.544	0.906	0.691	5.945	0.012
1984	48.459	16.037	5.394	13.544	8.496	0.940	0.687	6.428	0.016
1985	47.916	16.469	5.334	13.392	8.400	0.967	(').679	6.823	0.022
1986	47.404	16.919	5.277	13.249	8.311	0.993	(').672	7.146	0.029
1987	46.922	17.392	5.223	13.114	8.226	1.018	0.665	7.400	0.039
1988	46.457	17.883	5.171	12.984	8.145	1.042	0.658	7.606	0.053
1989	45.997	18.387	5.120	12.855	8.064	1.065	().652	7.787	0.072
1990	45.267	18.792	5.039	12.652	7.936	1.081	1.283	7.852	0.097
1991	44.837	19.330	4.991	12.531	7.861	1.10?	1.271	7.944	0.133
1992	44.415	19.885	4.944	1?.413	7.787	1.123	1.259	7.993	0.181
1993	43.989	20.453	4.897	12.294	7.712	1.14'3	1.247	8.018	0.247
1994	43.565	21.035	4.349	12.176	7.638	1.162	1.235	8.002	0.338
1995	43.129	21.527	4.801	12.054	7.561	1.181	1.222	7.962	0.464
1996	42.675	22.223	4.751	11.927	7.482	1.198	1.209	7.898	0.637
1997	42.197	22.820	4.697	11.794	7.398	1.214	1.196	7.809	0.874
1998	41.676	23.406	4.639	11.648	7.307	1.228	1.181	7.713	1.202
1999	41.115	23.980	4.577	11.491	7.208	1.241	1.165	7.571	1.653
2000	40.487	24.523	4.507	11.316	7.098	1.?51	1.147	7.399	2.272

Source: Alaska Sea Grant Program.

TABLE 3.37

PERCENTAGE OF NUMBER OF LANDINGS BY KODIAK FISHERY INCLUDING GROUNDFISH, 1980-2000

Year	Salmon	Halibut	Herring	King Crab	Tanner Crab	Dungeness Crab	Shrimp	Razor Clams	Groundfish
1980	64.621	4.415	2.228	14.526	llo O52	0.841	1.807	0.492	0.020
1981	65.342	4.294	2.167	14.128	10.750	0.895	1.757	0.641	0.026
1982	66.099	4.179	2.109	13.750	10.462	0.945	1.710	0.712	0.034
1983	66.846	4.068	2.052	"13.383	10.183	0.989	1.665	0.770	0.045
1984	67.576	3.960	1.998	13.028	9.913	1.030	1.621	0.816	0.059
1985	68.183	3.999	1.943	12.668	9.639	1.065	1.576	0.850	0.078
1986	68.106	4.124	1.930	12.583	9.574	10119	1.565	0.892	0.106
1987	68.020	4.254	1.916	12.496	9.508	1.172	1.554	0.934	(-).144
1988	67.933	4.387	1.903	12.411	9.443	1.224	1.544	0.960	0.196
1989	67.829	4.524	1.890	12.323	9.377	1.274	1.533	0.984	0.266
1990	66.695	4.595	1.848	12.051	9.169	1.302	2.998	0.986	0.357
1991	66.557	4.736	1.834	11.961	9.101	1.348	2.976	1.001	0.487
1992	66.387	4.879	1.820	11.866	9.029	1*393	2.952	1.008	0.666
1993	66.169	5.024	1.804	11.764	8.951	1.436	2.927	1.015	0.911
1994	65.890	5.168	1.787	11.653	8.867	1*476	2.899	1*013	1.?47
1995	65.522	5.309	1.768	11.529	$3.772	1*514	2.868	1.009	1.708
1996	65.041	5.445	1.746	11.386	8.663	1*549	2.833	0.997	2.340
1997	64.401	5.571	1.720	11.217	8.535	1.580	2.791	0.982	3.203
1998	63.549	5.681	1.689	11.015	8.381	1.604	2.740	0.964	4.376
1999	62.422	5.768	1.651	10.768	8.193	1.621	2.679	0.936	5.963
2000	60.934	5.820	1.604	1(?.462	7.960	1.427	2.603	0.902	8.089

Source: Alaska Sea Grant Program.

TABLE 3.38

PERCENTAGE OF CATCH BY WEIGHT BY KODIAK
FISHERY EXCLUDING GROUNDFISH, 1980-2000

Year	Salmon	Halibut	Herring	King Crab	Tanner Crab	Dungeness Crab	Shrimp	Razor Clams
1980	25.411	4.250	3.864	28.978	27.046	0.689	9.659	0.104
1981	26.796	4.168	3.789	28.416	26.521	().711	9.472	0.128
1982	28.228	4.083	30711	27.835	25.980	0.733	9.278	0.151
1983	29.705	3*995	3.632	27.238	25.422	0.756	90079	0.173
1984	31.227	3.905	3.550	26.624	24.849	0.778	8.875	0.193
1985	32.742	3.953	3.461	25.956	24.225	(-).798	8.652	0.212
1986	32.905	4.082	3.441	25.809	24.089	0.836	8.603	0.234
1987	33.067	4.215	3.421	25.661	23.95C	0.875	8.554	0.256
1988	33.229	4.352	3.401	25.511	23OEI1O	0.916	8.504	0.277
1989	33.389	4.492	3.381	25.358	23.668	0.959	0.453	0.299
1990	30.949	4.278	3.100	73.251	21.701	0.926	15.500	0.295
1991	310111	4.417	3.082	23.118	21.577	0.969	15.412	0.314
1992	31.272	4.560	3.064	22.983	21.451	1.015	15.322	0.333
1993	310432	4.708	3.046	22.846	.21.323	1.062	15.231	0.353
1994	31.592	4.859	3.028	22.7(77	21.194	1.111	15.138	0.371
1995	31.751	5.015	3.009	22.567	21.062	1.163	15.045	0.389
1996	31.909	5.175	2.990	22.424	20.929	1.217	14.949	0.407
1997	32.065	5.340	2.971	22.279	20.794	1.273	14.853	0.425
1998	32.221	50509	2.951	22.133	20.657	1.332	14.755	0.442
1999	32.376	5.683	2.931	21.984	20.519	1.393	14.656	0.459
2000	32.529	5.861	2.911	21.834	20.378	].456	14.556	0.475

Source: Alaska Sea Grant Program.

TABLE 3.39

PERCENTAGE OF VALUE BY KODIAK
FISHERY EXCLUDING GROUNDFISH, 1980-2000

Year	Salmon	Hal ibut	Herring	King Crab	Tanner Crab	Dungeness Crab	Shrimp	Razor Clams
1980	19.08	1(9.47	5.01	40.49	21.00	0.71	3.08	0.15
1981	210?1	10.27	4.85	39.89	19.77	0.73	3.10	0.18
1982	23.37	10.04	4.69	39.20	18.62	0.75	3.12	0.21
1983	25.51	9.81	4.53	38.44	17.57	0.77	3.14	0.23
1984	27.84	9.54	4.37	37.51	16.54	0.79	3.15	0.25
1985	29.91	9.61	4.21	36.47	15.57	0.80	3.16	0.27
1986	30.73	9.82	4.12	36.08	14.91	0.83	3.22	0.29
1987	31.48	10.04	4.04	35.68	14.31	0.86	3,28	0.31
1988	32.21	10.26	3.96	35.23	13.77	0.89	3.34	0.33
1989	32.85	10.49	3.89	34.81	13.28	0.92	3.42	0.35
1990	32.41	10.35	3.69	33.16	12.38	0,92	6.74	0.35
1991	33.03	10.56	3.62	32.64	11.96	0.95	6.88	0.37
1992	33.54	10.78	3.56	32.14	11.59	0.98	7.04	0.38
1993	34.01	11.00	3.50	31,63	11.25	1.01	7.20	0.39
1994	34.51	11.21	3.45	31.09	10.92	1.05	7.36	0.41
1995	34.98	11*43	3.39	30.55	10.62	1.08	7.53	0.42
1996	35.42	11.65	3.33	29.99	10.35	1.12	7.71	0.43
1997	35. 84	11.87	3.28	29.44	10.09	1.15	7.89	(-).44
1998	36. .?4	12.09	3.23	28.87	9.85	1.19	8.08	0.45
1999	36.58	12.31	3.18	28.32	9,64	1.23	8.28	0.46
2000	36.97	12.48	3.13	27.76	9.44	1.27	8.48	0.47

Source: Alaska Sea Grant Program.

TABLE 3.40

PERCENTAGE OF FISHERMEN BY KODIAK
FISHERY EXCLUDING GROUNDFISH, 1980-2000

Year	Salmon	Hal ibut	Herring	King Crab	Tanner Crab	Dungeness Crab	Shrimp	Razor Clams
1980	49.801	16.481	5.544	13.919	8.731	0.800	0.706	4.019
1981	49.403	16.350	5.499	13.807	8.661	0.836	0.7(-)0	4.743
1982	49.045	16.231	5.460	13.707	8.599	0.872	0.695	5.391
1983	48.737	16.129	5.425	13.621	8.545	0.906	0.691	5.945
1984	48.466	160040	5*395	13.546	8.497	(-).940	0.687	6.429
1985	47.926	16.471	5.335	13.395	8.402	(3.967	0.679	6.824
1986	47.418	16.924	5.278	13.253	8.313	0.993	0.672	7.148
1987	46.941	17.399	5.225	13.119	8.230	1.019	0,665	7.403
1988	46.482	17.892	5*174	12.991	8.149	1.043	0.659	7.610
1989	46.030	18.400	5.124	12.865	8.0713	1.066	0.652	7.793
1990	45.311	18.810	5.044	12.664	7*944	1.082	1.284	7.860
1991	44.896	190356	4.998	12.54[!	7.$71	1.104	1.272	7.955
1992	44.495	19.9'?1	4.953	17.436	7.801	1.125	1.261	8.007
1993	44.098	20.504	4.909	12.325	7.731	1.146	1.250	8.038
1994	43.712	21.107	4.866	12.217	7.664	1.166	1.239	8.029
1995	430330	21.728	4.823	12.110	7.596	1.186	1.228	7.999
1996	42.949	22.366	4.781	12.004	7.530	1.206	1.217	7.948
1997	42.569	23.022	4.739	11.898	7.463	1.225	10206	7.878
1998	42.183	23.691	4.696	110790	7.395	1.243	1.196	7.807
1999	41.806	24.383	4.654	11.684	7.329	1.262	1.185	7.698
2000	41.428	25.093	4.612	11.579	7.263	1.280	1.174	7.571

Source: Alaska Sea Grant Program.

TABLE 3.41

PERCENTAGE OF BOATS BY KODIAK
FISHERY EXCLUDING GROUNDFISH, 1980-2000

Year	Salmon	Hal i but	Herring	King Crab	Tanner Crab	Dungeness Crab	Shrimp	Razor Clams
1980	48.988	10.889	7.325	18.392	11.537	1.268	1.052	0.549
1981	48.9(39	10.871	7.314	18.362	11.518	1.335	1.051	0.640
1982	48.832	10.854	7.302	18.333	11.500	1.399	1.049	(-).730
1983	48.756	10.837	7.291	18.305	11.482	1.462	1.047	0.820
1984	48.681	10.821	7.279	18.276	110465	1.522	1.046	0.910
1985	48.405	11.174	7.238	18.173	110400	1.575	1.040	0.995
1986	48.169	11.547	7.?03	18.084	11.344	1.627	1.035	0.990
1987	47.886	11.921	7.160	17.978	11.277	1.675	1.029	1.074
1988	47.640	12.317	7.124	17.886	11.219	1.723	1.023	1.069
1989	47.347	12.712	7.080	17.776	11.150	1.768	1.017	1.150
1990	46.619	12.999	6.971	17.502	10.979	1.794	2.003	1.133
1991	46.362	13.425	6.933	17.406	10.919	1.838	1.992	1.127
1992	46.100	13.863	6.893	17.307	10.857	1.879	1.980	1.120
1993	45.792	140300	6.847	17.192	10.784	1.918	1.967	1.198
1994	45.518	14.762	6.806	17.089	10.720	1.958	1*955	1.191
1995	45.238	15.236	6.765	16.984	10*454	1.996	1.943	1.184
1996	44.952	15.722	6.722	16.876	10.586	2.034	1.931	1.176
1997	44.659	16.221	6.678	16.766	10*517	2.071	1.918	1.169
1998	44.359	160733	6.633	16.654	10.447	2.108	1.906	1.161
1999	44.(-)53	17.257	6.587	16*539	10.375	2.143	1.892	1*153
200(3	43.740	17.794	6.541	16.422	10.301	2.179	1.879	1*145

Source: Alaska Sea Grant Program.

TABLE 3.42

PERCENTAGE OF NUMBER OF LANDINGS BY KODIAK
FISHERY EXCLUDING GROUNDFISH, 1980-2000

Year	Salmon	Halibut	Herring	King Crab	Tanner Crab	Dungeness Crab	Shrimp	Razor Clams
1980	64.633	4.416	2.228	14.528	11.054	0.841	10807	0.492
1981	65.359	4.295	2.167	14.132	10.753	0.895	1.758	0.641
1982	66.122	44181	2.109	13.755	10.466	0.945	1.711	0.712
1983	66.876	4.069	2.053	13.389	10.187	00990	1.665	0.770
1984	67.616	3.962	1.999	13.036	9.919	1.030	1.622	0.816
1985	68.237	4.002	1.944	12.678	9.646	1.066	1.577	0.851
1986	68.179	4.129	1.932	12.596	9.584	10121	1.567	0.893
1987	68.118	4.260	1.919	12.514	9.522	1.174	1.557	0.936
1988	68.066	4.396	1.907	12.435	9.462	1.226	1.547	0.961
1989	68.010	4.536	1.895	12.356	9.402	1.277	10537	0.987
1990	66.933	4.611	1.855	12.094	9.202	1.307	3.009	0.989
1991	66.882	4.759	1.843	12.01?	9.145	1*355	2.990	1.006
1992	66.832	4.912	1.832	11.946	9.089	1.402	2.972	1.015
1993	66.777	5.(-)70	1.821	11.873	9.034	1.449	2.954	1.024
1994	66.722	5.233	1.810	11.801	8.979	10495	2.936	1.025
1995	66.661	5.402	1.799	11.729	8.924	1.541	2.918	1.027
1996	66.599	5.576	1.788	11.659	8.871	1.586	2.900	1.021
1997	66.532	5.756	1.777	11.589	8.818	1.632	2.883	10014
1998	64.457	5.941	1.766	11.519	0.765	1.678	2.866	1.008
199')	66.380	6.134	1.756	11.450	8.712	1.724	2.849	0.995
2000	66.296	6.332	1.746	11.382	8.661	1*77(-I	2.832	0.982

Source: Alaska Sea Grant Program.

results of this adjustment to reduce double counting are presented in Table 3.43 which includes adjusted and unadjusted projections of the numbers of boats and fishermen participating in the harvesting sector of the Kodiak commercial fishing industry.

Local Harvesting Effort

The difficulties associated with defining and measuring local fishing effort are discussed in Chapter II. The results of the method used to measure local effort are presented in this section. As the values of the local harvesting factors summarized in Table 3.44 indicate, the degree to which a fishery can be considered local varies greatly. For example, the halibut fisheries appear to be principally non-local while the Dungeness and Tanner crab fisheries appear to be principally local, and the salmon fisheries are close to being half local. In addition to the differences in local participation among fisheries, there is also a difference within some fisheries between smaller and larger boats.

There is a tendency for the participation factor to be higher for the small boats within a fishery; see for example the Tanner and king crab fisheries.

PROCESSING

The projections of processing plant activity presented in this section are based on the projections of industry-wide catch discussed in a preceding section. The measures of activity are in terms of processing

TABLE 3.43

ADJUSTED PROJECTIONS OF THE NUMBER OF BOATS
FOR THE KODIAK COMMERCIAL FISHING INDUSTRY 1980-2000

	SALMON FISHERIES		SHELLFISH FISHERIES		TRADITIONAL FISHERIES		ALL FISHERIES	
Year	Unadjusted	Adjusted	Unadjusted	Adjusted	Unadjusted	Adjusted	Unadjusted	Adjusted
1980	535	530	352	246	1092	895	1092	895
1981	535	530	353	247	1094	895	1094	895
1982	535	530	354	247	1096	896	1096	896
1983	535	530	354	248	1097	896	1097	897
1984	535	530	355	248	1099	897	1099	897
1985	535	530	356	249	1105	902	1105	902
1986	535	530	356	249	1111	[illegible]	1111	907
1987	535	530	357	250	1117	913	1118	913
1988	535	530	358	250	[illegible]	918	1124	919
1989	535	530	358	251	1130	924	1131	925
1990	535	530	370	259	1148	938	1149	939
1991	535	530	371	259	1154	944	1155	945
1992	535	530	372	260	1161	950	1162	952
1993	535	530	372	260	168	957	171	960
1994	535	530	373	261	175	964	179	967
1995	535	530	373	261	183	971	187	976
1996	535	530	374	262	190	978	197	985
1997	535	530	375	262	198	986	207	995
1998	535	530	375	262	206	994	218	1006
1999	535	530	376	263	[illegible]14	1002	232	1019
2000	535	530	376	263	1223	1011	1247	1035

Source: Alaska Sea Grant Program.

TABLE 3.43 Continued

ADJUSTED PROJECTIONS OF THE NUMBER OF FISHERMEN
FOR THE KODIAK COMMERCIAL FISHING INDUSTRY 1980-2000

Year	SALMON FISHERIES		SHELLFISH FISHERIES		TRADITIONAL FISHERIES		ALL FISHERIES	
	Unadjusted	Adjusted	Unadjusted	Adjusted	Unadjusted	Adjusted	Unadjusted	Adjusted
1980	2156	2135	1046	731	4329	3579	4329	3580
1981	2156	2135	1048	733	4364	3581	4364	3581
1982	2156	2135	1049	734	4396	3582	4396	3582
1983	2156	2135	1051	735	4424	3583	4424	3584
1984	2156	2135	1053	736	4448	3584	4449	3585
1985	2156	2135	1055	738	4499	3613	4500	3614
1986	2156	2135	1056	739	4547	3643	4548	3644
1987	2156	2135	1058	740	4593	3674	4595	3675
1988	2156	2135	1059	741	4638	3705	4641	3708
1989	2156	2135	1061	742	4684	3739	4687	3742
1990	2156	2135	1093	764	4758	3794	4763	3799
1991	2156	2135	1095	766	4802	3830	4809	3836
1992	2156	2135	1096	767	4845	3867	4854	3875
1993	2156	2135	1098	768	4889	3905	4901	3917
1994	2156	2135	1099	769	4932	3944	4949	3961
1995	2156	2135	1101	770	4976	3985	4999	4009
1996	2156	2135	1102	771	5020	4028	5052	4060
1997	2156	2135	1104	772	5065	4072	5109	4117
1998	2156	2135	1105	773	5111	4118	5173	4181
1999	2156	2135	1107	774	5157	4166	5244	4253
2000	2156	2135	1108	775	5204	4216	5325	4337

Source: Alaska Sea Grant Program.

TABLE 3.44
LOCAL HARVESTING FACTOR FOR KODIAK, 1976

Kodiak:	LPO	TP	P	P = LPO/TP
Herring, purse seine	-0-	NA		
Herring, set gillnet	-0-	NA		
King crab, small boat pots	108	169	,639	
King crab, large boat pots	101	180	.561	
Salmon, purse seine	194	394	.492	
Salmon, beach seine	11	23	.478	
Salmon, set gillnet	116	187	.620	

$$P = [(PF/TP) \cdot LPO]/B$$

Statewide	PF	TP	LPO	B	P
Halibut, hand troll	1	43	-0-		
Halibut, small boat longline	95	1,323	103	133	.056
Halibut, large boat longline	256	1,112	43	43	.230
Sablefish, large boat longline	NA	NA	-0-		
Dungeness crab, small boat pots	43	240	7	1	1.0*
Dungeness crab, large boat pots	12	43	13	3	1.0*
Herring, pound	3	6	-0-		
Herring, purse seine	129	251	27	1	1.0*
Herring, beach seine	NA	13	-0-		
Herring, drift gillnet			1		
Herring, set gillnet	109	249	3		
Herring, roe on kelp	407	1,529	9		
Bottomfish, hand troll	NA	10	-0-		
Bottomfish, small boat longline	3	66	2	15	.006
Bottomfish, large boat longline	8	59	3	6	.068
Bottomfish, otter trawl	12	40	16	29	.166
Bottomfish, beam trawl	NA	6	-0-		
Bottomfish, small boat pots	1	7	-0-	2	0
Bottomfish, other			1	-0-	
Shrimp, otter trawl	129	218	86	67	.760
Shrimp, beam trawl	22	69	23	10	.733
Shrimp, small boat pots	33	281	7		
Shrimp, large boat pots	4	30	8		
Razor clams, shovel	8	174	8		
Razor clams, dredge	NA	5	-0-		
Razor clams, other			-0-		
Salmon, hand troll	1,239	2,746	2		
Salmon, power troll	742	999	2		
Tanner crab, small boat pots	166	295	62	32	1.0*
Tanner crab, large boat pots	224	341	92	75	.806
Scallops, dredge	NA	NA	-0-	1	

*p = 1 when calculated value exceeds 1
P = Estimate of the proportion of fishing effort that is local
LPO = Number of local permit owners
TP = Total number of permits
PF = Number of permits fished
B = Number of boats participating in the fishery

Source: ADF&G and CFEC data files

plant input requirements and processing plant payrolls or income. Four sets of projections are presented for each measure of processing activity; the four sets are the traditional fisheries with and without increased efficiency and all fisheries with and without increased efficiency. The four sets of projections are presented due to the speculative nature of both the rate of development of the groundfish industry and the rate of increase in processing efficiency.

Water

In 1976 and 1977, the peak water usage by Kodiak processing plants was approximately 30 million liters (8 million gallons) per day. Using this as the base peak load, the peak load is projected to be between 21 and 36 million liters (5.6 and 9.4 million gallons) per day by 2000 (see Table 3.45).

Electricity

Based on a base peak load requirement of 2 million kilowatt hours of electricity per month, the projected peak use of electricity by processing plants in the year 2000 is projected to range from 1.4 to 6.7 million kilowatt hours per month (see Table 3.46).

Employment

Using the Alaska Department of Labor estimates of average monthly employment in the manufacturing of food and kindred products in Kodiak as the base,

TABLE 3.45

PROJECTED PEAK KODIAK PROCESSING REQUIREMENTS FOR WATER

	1000 GALLONS/DAY				PERCENTAGE INCREASE*			
	Traditional Fisheries		All Fisheries		Traditional Fisheries		All Fisheries	
Year	1	2	1	2	1	2	1	2
1980	6584	6323	6584	6323	-17.70	-20.96	-17.7(3	-20.96
1981	6714	6319	6714	632o	-16.08	-21.01	-16.07	-21.00
1982	6854	6322	6855	6323	-14.33	-20.98	-14.32	-20.97
19X3	7004	6331	7005	6332	-12.45	-20.86	-12.43	-20.85
1984	7166	6348	7168	6349	-10.43	-20.65	-10.41	-20.63
1985	7350	6381	7353	6383	-8.12	-20.24	-8.09	-20.21
1986	7392	6289	7396	6292	-7.60	-21.39	-7.55	-21.35
1987	7435	6199	7440	6203	-7.07	-22.52	-7.00	-22.46
1988	7478	6110	7486	6117	-6.52	-23.62	-6.42	-23.54
1989	7523	6024	7535	6033	-5.96	-24.7o	-5.82	-24.58
1990	8205	6439	8222	6452	2.57	-19.51	2.77	-19.35
1991	8252	6346	8276	6365	3.16	-20.67	3.45	-20.44
1992	8301	6256	8335	62R2	3.76	-21.80	4.19	-21.48
1993	8351	6168	8400	6204	4.3R	-22.91	5.01	-22.45
1994	8402	6081	8474	6133	5.02	-23.99	5.93	-23.33
1995	8454	5997	8559	6071	5.67	-25.04	6.99	-24.11
1996	8508	5414	8661	6021	6.35	-26.07	8.27	-24.74
1997	#563	5833	8787	5986	7.(34	-27.08	9.84	-25.17
1998	8620	5755	8948	5974	7.75	-28.07	11.85	-25.33
1999	8678	5678	9159	5992	8.47	-29.03	14.49	-25.09
2000	8738	5602	Y444	6055	9.22	-29.97	18.05	-24.31

Source: Alaska Sea Grant Program.

[1]Requirement without increased efficiency.

[2]Requirement with a 2 percent annual decrease in input requirements per unit produced.

*Projected percentage increase since the late 1970s.

TABLE 3.46

PROJECTED PEAK KODIAK PROCESSING REQUIREMENTS FOR ELECTRICITY

Year	1000 KWH/MONTH				PERCENTAGE INCREASE*			
	Traditional Fisheries		All Fisheries		Traditional Fisheries		All Fisheries	
	1	2	1	2	1	2	1	2
1980	1646	1581	1649	1584	-17.70	-20.96	-17.56	-20.82
1981	1678	1580	1683	1584	-16.08	-21.01	-15.87	-20.82
1982	1713	1580	1719	1586	-14.33	-20.98	-14.03	-20.71
1983	1751	1583	1759	1590	-12.45	-20.86	-12.03	-20.48
1984	1791	1587	1803	1598	-10*43	-20.65	-9.83	-20.12
1985	1838	15?5	1855	1610	-8.12	-20.24	-7.27	-19*5O
1986	1848	1572	1872	1593	-7.60	-21.39	-6.38	-20.35
1987	1859	1550	1894	1579	-7.07	-22.52	-5.31	-21.05
1988	1870	1528	1920	1569	-6.52	-23.62	-4.00	-21.56
1989	1881	1506	1953	1564	-5.96	-24.70	-2.33	-21.79
1990	2051	1610	2156	1692	2.57	-19.51	7.80	-15.41
1991	2063	1587	2214	i703	3.16	-20.67	10.71	-14.86
1992	2075	1564	2294	1729	3.76	-21.80	14.7(3	-13.56
1993	2088	1542	2405	1776	4.38	-22.91	20.25	-11.19
1994	2100	1520	?561	1854	5*O2	-23.99	28.07	-7.30
1995	2113	1499	2784	1975	5.67	-25.04	39.22	-1.25
1996	2127	1479	3105	2158	6.35	-26.07	55.26	7.92
1997	2141	1458	3570	2432	7004	-27.08	78.48	21.59
1998	2155	1439	4246	2834	7.75	-28.07	112.28	41.72
1999	2169	1419	5234	3424	8.47	-29.03	161.69	71.21
2000	2184	1401	6683	4285	9.22	-29.97	234.15	114.25

Source: Alaska Sea Grant Program.

[1] Requirement without increased efficiency.

[2] Requirement with a 2 percent annual decrease in input requirements per unit produced.

*Projected percentage increase. since the late 1970s.

the projections of average monthly employment for the year 2000 range from 1,698 to 2,312 (see Table 3.47).

Income

Using corresponding data of the annual payroll of processing plants, the annual real income for the year 2000 is projected to range from $26 million to $35.4 million (see Table 3.47). The projected percentage increases are summarized in Table 3.48.

Number of Plants

The number of plants can vary greatly due to changes in average plant size, and is therefore not a significant measure of processing activity. Since many Kodiak plants have either excess capacity or the capability of increasing their capacity, the number of plants is expected to remain relatively constant and perhaps range from 15 to 20, with most plants processing a combination of species. Since the projected development of the groundfish industry is more speculative and more significant than that of the traditional fisheries, a summary of projected groundfish processing activity, including the number of plants, is presented in Table 3.49.

Local Processing Effort

Industry sources have indicated that, during the summer months, less than half of the fish processing plant employees are full-time residents but

TABLE 3.47

PROJECTED KODIAK PROCESSING EMPLOYMENT AND INCOME, 1980-2000

	TRADITIONAL FISHERIES						ALL FISHERIES					
	WITHOUT INCREASED EFFICIENCY			WITH INCREASED EFFICIENCY			WITHOUT INCREASED EFFICIENCY			WITH INCREASED EFFICIENCY		
Year	Employment[1]	Nominal Income[2]	Real Income[3]	Employment	Nominal Income	Real Income	Employment	Nominal Income	Real Income	Employment	Nominal Income	Real Income
1980	1280	18040	16208	1229	17326	15566	1280	18050	16217	1230	17336	15576
1981	1305	19593	16685	12273	18440	15704	1306	19608	16698	1229	18455	15717
1982	1332	21301	17195	1229	19648	15860	1334	21323	17212	1230	19670	15878
1983	1361	23183	17738	1?31	20956	16034	1363	23216	17763	1233	20988	16059
1984	1393	25260	18319	1234	22376	16228	1395	25307	18354	1236	22424	16263
1985	1429	27594	18969	1240	23955	16468	1432	27664	19018	1244	24025	16516
1986	1437	29555	19258	1222	25144	16384	1442	29659	19325	1227	25248	16452
1987	1445	31658	19553	1205	26394	16302	1452	31812	19648	1212	26549	16397
1988	1454	33914	19854	1188	27?10	16222	1463	34143	19988	1198	27939	16356
1989	1462	36335	20163	1171	29095	16145	1476	36676	20352	1185	29435	16334
1990	1595	42205	22199	1252	33119	17420	1614	42713	22466	1271	33627	17687
1991	1604	45207	22538	1234	34765	17332	1631	45965	22916	1260	35523	17711
1992	1613	48428	22886	1216	36497	17?47	1651	49563	23422	1254	37632	17784
1993	1623	51885	23241	1199	38320	17165	1676	53587	24003	1252	40022	17927
1994	1633	55595	23604	1182	40239	17085	1708	58151	24690	1257	42796	18170
1995	1643	59577	23977	1166	42259	17007	1749	63425	25525	1272	46107	18556
1996	1654	63853	24358	1150	44386	16932	1804	69653	26570	1300	50187	19145
1997	1664	68445	24748	1134	46627	16859	1877	77206	27916	1347	55388	20027
1998	1675	73377	25148	1119	48987	16789	1978	86631	29691	1421	62241	21332
1999	1687	78675	25558	1104	51473	16722	2117	98760	32083	1534	71559	23247
2000	1698	84367	25979	1089	54093	16657	?312	114857	35367	1703	84583	26045

Source: Alaska Sea Grant Program.

[1] Average monthly employment.

[2] Annual payroll in $1,000.

[3] Income in 1978 dollars in ($1,000).

TABLE 3.48

PROJECTED PERCENTAGE CHANGE* IN KODIAK
PROCESSING EMPLOYMENT AND INCOME 1980-2000

Year	TRADITIONAL FISHERIES						ALL FISHERIES					
	WITHOUT INCREASED EFFICIENCY			WITH INCREASED EFFICIENCY			WITHOUT INCREASED EFFICIENCY			WITH INCREASED EFFICIENCY		
	Employ - ment[1]	Nominal Income[2]	Real Income[3]	Employ- ment	Nominal Income	Real Income	Employ- men t	Nominal Income	Real Income	Employ’ ment	Nominal Income	Real Income
1980	-17.7(1	-6.66	-16.14	-20.96	-10.35	-19.46	-17.66	-6.61	-16.09	-20.92	-10.30	-19.41
1981	-16.08	1.37	-13.67	-21.01	-4.59	-18.74	-16.01	1.45	-13.60	-20.95	-4.51	-18.68
1982	-14.33	10.21	-11.03	-20.98	1.66	-17.94	-14.24’	10.33	-10.94	-20.89	1.77	-17.85
1983	-12.45	19.95	-8.22	-20.86	8.43	-17.04	-12.33	20.12	-8.09	-20.74	8.60	-16.91
1984	-10.43	3(-).70	-5.21	-20.65	15.78	-16.03	-10.26	30.94	-5.03	-20.49	16.02	-15.85
1985	-8.12	42.78	-1.85	-20.24	23.95	-14.79	-7.89	43.14	-1.60	-20.01	24.31	-14.54
1986	-7.60	52.92	-0.36	-21.39	30.10	-15.23	-7.28	53.46	-0.01	-21.07	30.64	-14.88
1987	-7.07	63.80	1.17	-22.52	36.57	-15.65	-6.62	64.60	1.66	-22.07	37.37	-15.16
1988	-6.52	75.47	2.73	-23.62	43.37	-16.06	-5.89	76,66	3.42	-22.99	44.56	-15.37
1989	-5.96	88.00	4.32	-24.70	50.54	-16.46	-5.08	89.77	5.30	-23.82	52.30	-15.49
1990	2.57	118.37	14.86	-19.51	71.36	-9.87	3.80	121.00	16.24	-18.28	73.99	-8.49
1991	3.16	133.90	16.62	-20.67	79.88	-10.32	4.89	137.83	18.57	-18.94	83.80	-8.36
1992	3.76	150.57	18.41	-21.80	88.84	-10.76	6.19	156.44	21.19	-19.37	94.71	-7.98
1993	4.38	168.46	2(-).2'5	-22.91	98.27	-11.19	7.81	177.26	24.20	-19.48	107.08	-7.24
1994	5.02	187.65	22.13	-23.99	10H.2O	-11.60	9.85	200.88	27.75	-19.16	121.43	-5.98
1995	5.67	208.26	24.06	-25.04	118.65	-12.00	12.50	228.17	32.07	-18.22	138.56	-3.99
1996	6.35	230.38	26.03	-26.07	129.66	-12.39	16.01	260.39	37.48	-16.41	159.67	-(3.94
1997	7.04	254.14	28.05	-27.08	141.25	-12.77	20.74	299.47	44.44	-13.38	186.58	3.62
1998	7*75	279.66	30.12	-28.07	153.46	-13.13	27.21	348.24	53.62	-8.61	222.04	1(-).37
1999	8.47	307.07	32.24	.-7’>.03	166.33	-13.48	36.17	411.00	66.00	-1.34	270.26	20.28
2000	9.22	336.52	34.42	-29.97	179.89	-13.82	48.70	494.28	82.99	9.50	337.64	34.76

Source: Alaska Sea Grant Program.

*1977 is the base period.

[1]Average monthly employment.

‘Annual payroll in $1,000.

[3]Income in 1978 dollars in ($1,000).

TABLE 3.49

PROJECTED KODIAK GROUNDFISH PROCESSING ACTIVITY, 1980-2000

Year	CATCH (MT)	NUMBER OF PLANTS[1]	EMPLOYMENT (man years)	LAND (hectares)	ELECTRICITY (million KWH/year)	WATER (million gallons/year)
1980	70	0	1	0	0	0
1981	99	0	1	0	0	0
1982	141	0	1	0	0	0
1983	200	0	2	0	0	0
1984	285	0	3	0	0	0
1985	407	0	4	0	0	1
1986	583	0	5	0	0	1
1987	835	0	7	0	0	1
1988	1200	0	10	0	0	2
1989	1727	0	14	0	0	2
1990	2490	0	19	0	0	3
1991	3596	0	27	0	0	5
1992	5205	0	38	0	0	7
1993	7548	0	53	0	0	10
1994	10966	0	75	0	1	14
1995	15961	0	106	0	1	21
1996	23273	1	150	1	1	31
1997	33994	1	213	1	2	45
1998	49740	1	303	1	3	66
1999	72902	2	431	2	4	96
2000	107026	2	614	3	5	141

Source: Alaska Sea Grant Program.

[1] The number of full-time groundfish plants.

NOTE: The values are rounded to the nearest whole number, therefore a "0" indicates a value of less than 0.5.

that, during the remainder of the year, the employees are predominantly local residents.

THE FEASIBILITY OF THE PROJECTED GROWTH

In this section, the feasibility of the projected growth of the Kodiak commercial fishing industry is evaluated in terms of the projected input requirements and projected input availability. The inputs that are considered include small boat harbor facilities, port facilities, labor, land, electric power, water, and processing plant facilities. Projections of the availability of port facilities, labor, land, electric power, and water are drawn from the following SESP reports:

- Technical Report Number 37, Western Gulf of Alaska Petroleum Development Scenarios Transportation Systems Impacts
- Technical Report Number 40, Western Gulf of Alaska Petroleum Development Scenarios Local Socioeconomic Impacts

Projections of input requirements are based on forecasts of harvesting and processing activity presented in previous sections, and the projections of input availability that are not available from other SESP reports are developed in this section.

Small Boat Harbor

The Kodiak small boat harbor has been used well beyond its design capacity for a number of years. The inadequacy of this facility is demonstrated by the long waiting lists for permanent slips, the rafting of vessels that is often required, and the inability of very large fishing vessels to use the small boat harbor. The City of Kodiak is pursuing development programs for two additional small boat harbor facilities. The projected increases in the harvesting activity of the traditional fisheries can occur without a significant increase in the number of boats using the Kodiak small boat harbor; therefore, it is believed that the projected growth of the traditional fisheries can occur given the existing facility. However, the development of the groundfish fishery would be constrained by the existing facility since the groundfish fleet is expected to consist primarily of vessels that are too large to be adequately served by the existing small boat harbor. The facilities that are being planned would be adequate for the projected groundfish fleet and the projected fleets of the traditional fisheries.

Port Facility

Technical Report Number 37 indicates that the Kodiak port facilities are operating near capacity and that the capacity of the existing facilities will be inadequate by the early 1980s. The report does not indicate how or if port capacity will be increased. Inadequate port facilities could adversely affect the growth of the traditional fisheries and the development of the groundfish fishery. However, since the commercial fishing industry is the mainstay of the Kodiak economy, and since Kodiak has been identified as an area for the State of Alaska to concentrate groundfish development efforts, it is believed that eventually adequate port facilities will be available.

Labor, Electric Power, and Water

The projected growth of the commercial fishing industry is feasible only if the corresponding rates of increase in input requirements can be met or surpassed by the rates of increase in input availability. The rates of increase of input requirements can be derived from the projections of input requirements developed in the previous section and the rates of increase in input availability can be inferred from information included in Technical Report Number 40. The report presents projections of community requirements for labor, electric power, and water for each of the OCS petroleum scenarios and indicates that the requirements can be met. The rates of increase in community-wide input requirements corresponding to the projections of community-wide input requirements are, therefore, considered to only include rates of increase that do not exceed feasible rates of increase in input availability. The highest rates of increase are associated with the high find case, therefore, the rates of increase in input requirements for the commercial fishing industry are compared to the rates of increase in community-wide input requirements/availability of the high find case to determine if the former are feasible. The projected rates of increase in input availability and requirements are presented in Table 3.50.

With the exception of the 1990 fishing industry cases which do not allow for increased efficiency, the projected rate of growth of water usage by the fishing industry is below the record rate of growth of water availability projected for the early to mid-1980s. With the same exceptions and that of case 3 in the late 1990s, the annual projected rate of

TABLE 3.50

COMPARATIVE RATES OF GROWTH, HIGH FIND CASE AND THE KODIAK FISHING INDUSTRY

	PERCENTAGE CHANGE															
	WATER					ELECTRIC POWER					POPU-LATION	EMPLOYMENT				
	Ocs	Fishing Industry Case				Ocs	Fishing Industry Case				Ocs	(ICS	Fishing Industry Case			
Year	Case	1	2	3	4	Case	1	2	3	4	Case	Case	1	2	3	4
1981	7*7	2.0	-0.1	2.0	-0.1	10.0	2.0	-0.1	2.0	0.0	8.0	5.6	2.0	-0,1	2.0	-0.0
1982	7.0	2.1	0.0	2.1	0.0	9.2	2,01	0.0	2.2	0.1	7.2	5.2	2.1	0.0	2.1	0.1
1983	7.4	2.2	0.1	2*2	0.2	24.2	2.2	0.1	2.3	0.3	15*9	5.7	2*2	0.1	2.2	0.2
1984	8.0	2.3	0.3	2.3	0.3	9.7	2.3	0.3	2.5	0.4	11.0	6.0	2.3	0.3	2.4	O*3
1985	5.8	2.6	O*5	2.6	O*5	12*O	2.6	0*5	2.8	0.8	5.7	5.1	2.6	0.5	2.6	0.6
1986	3.9	O*6	-1.4	0.6	-1.4	-2.9	0.6	-1.4	1.0	-1.1	-0.5	3.7	0.6	-1.4	0.7	-1.3
1987	3.9	0.6	-1.4	0.6	-1.4	10*3	0.6	-1.4	1.1	-0.9	6.7	3.4	0.6	-1.4	0.7	-1.3
1988	3.4	0.6	-1*4	0.6	-1.4	5.7	0.6	-1.4	1.4	-0.6	4.2	6.1	0.6	-1.4	0.8	-1.2
1989	2.4	0.6	-1.4	0.6	-1*4	1.7	0.6	-1.4	1.7	-0.3	1*7	1.9	0.6	-1.4	0.9	-1.1
1990	2.6	9*1	6.9	9.1	6.9	2.3	9.1	6.9	10.4	8.2	2.4	1.9	9.1	6.9	9.4	7.3
1991	2.8	0.6	-1.4	0.7	-1.4	1.0	0.6	-1.4	2.7	O*7	2.7	1.5	0.6	-1.4	1.0	-0.8
1992	4.4	0.6	-1.4	O*7	-91*3	4.0	0.6	-1.4	3.6	1.5	4.1	2.7	0.6	-1.4	1.2	-0.5
1993	3.1	0.6	-1.4	0.8	-1.2	2.6	0.6	-1.4	4.8	2.7	2.6	1.6	O*IS	-1.4	1.5	-0.1
19'94	2.8	0.6	-1.4	0.9	-1.1	2.6	0.6	-.1.4	6.5	4.4	2.7	1.6	0.6	-1.4	1.9	0.4
1995	2.8	0.6	-1.4	1.0	-1.0	2.5	0.6	-1.4	8.7	6.5	2.6	1.5	0.6	-1.4	2.4	1.2
1996	1.9	0.6	-1.4	102	-0.8	1.9	0.6	-1.4	11.5	9.3	2.0	1.0	0.6	-1.4	3*1	2.2
1997	2.1	0.6	-1.4	1.5	-(').6	1.9	0.6	-1.4	15.0	12.7	1.9	1.0	0.6	-1.4	4.1	3.6
1998	1.5	0.7	-1.4	1.8	-0.2	1.3	0.7	-1,4	18.9	16.6	1*3	0.6	0.7	-1.4	5.4	5.5
19'99	2.6	0.7	-1.3	2.'4	0.3	2.4	0.7	-1.3	23.3	20.8	2.5	1.5	0.7	-1.3	7.0	8.0
2000	2.0	0.7	-1.3	3.1	1.1	0.5	0.7	-1.3	27.7	25.1	1.8	0.9	O*7	-1.3	9.2	11.0

Source: Alaska Sea Grant Program.

1) Traditional fisheries without increased efficiency.
2) Traditional fisheries with increased efficiency.
3) All fisheries without increased efficiency.
4) All fisheries with increased efficiency.

increase in water availability exceeds the projected rate of increase in fishing industry requirements. The largest percentage growth in the availability of electric power is projected to occur in 1983, and it exceeds the projected rates of increase in fishing industry use of electric power until 2000; and until the early 1990s, the projected annual increase in electric power capacity exceeds the projected increase in fishing industry requirements. With few exceptions, the projected rates of increase in fishing industry labor requirements are also below the record projected rates of growth of the Kodiak labor force. It therefore appears that the projected rates of growth of fishing industry requirements for water, electric power, and labor can be met. It should be noted that the high rates of increase in input requirements for 1990 are due to the projected doubling of the shrimp catch in 1990. Refer to the section on shrimp for an explanation of this increase.

Processing Facilities

Within a year, processing capacity can change significantly as the capacity of existing plants changes, as new plants are built, or as old plants become unusable. The ability to rapidly increase processing capacity, when the long-run prognosis indicates that it is profitable to do so, suggests that processing plant capacity will not be a constraint on the growth that is projected for the processing sector of the commercial fishing industry. The comparison of current processing capacity and the projected harvests for 2000, which is summarized in Table 3.51, also indicated that physical processing capacity is not expected to constrain the projected growth.

TABLE 3.51

CURRENT PROCESSING CAPACITY AND FORECASTED HARVEST

Species	Current Daily Processing Capacity (pounds/day)	Forecasted Harvest for 2000	Days Required to Process the Year 2000 Harvest with Current Capacity
Salmon	1,890,000	44,667,000	23.6
King Crab	1,390,000	30,000,000	21.6
Tanner Crab	1,490,000	28,000,000	18.8
Shrimp	1,010,000	20,000,000	19.8
Halibut	500,000	8,050,000	16.1

Land

The requirements for additional land for processing plants are expected to be minimal since many plants currently have excess capacity.

Conclusion

The conclusion is that the long-term growth that is projected for the Kodiak commercial fishing industry appears to be feasible in terms of the long-term availability of inputs. This does not mean that during the, next twenty years, temporary shortages of labor or water or other inputs will not prevent the level of activity of the fishing industry from being as high as it might otherwise be. What it means is that the long-term growth projected for the industry appears to be feasible despite the occasional shortages that will occur.

The Seward Commercial Fishing Industry

Seward is located adjacent to Resurrection Bay at the eastern extremity of the Cook Inlet management area. Although it can readily be demonstrated that the Seward economy is heavily dependent on the commercial fishing industry, it is very difficult to define the harvesting sector of the Seward commercial fishing industry. Seward is not the center of harvesting activity in any one management area; rather it is associated with the harvesting activity of several areas including Cook Inlet, Prince William Sound, and Kodiak. However, since it is most closely associated with the Cook Inlet fisheries, and since the data required to more narrowly define Seward harvesting activity are not available, the harvesting activity of the Cook Inlet management area will be used as a proxy for Seward harvesting activity. The exceptions are that the halibut and groundfish projections are in fact for Seward and not the entire Cook Inlet area. The usefulness of this definition of Seward harvesting activity will be discussed by fishery in subsequent sections. These fisheries include salmon, halibut, herring, groundfish, king crab, Tanner crab, Dungeness crab, and shrimp. The absolute and relative magnitudes of each fishery by weight are summarized in Table 3.52.

The importance of the Seward commercial fishing industry to the local community can be measured in a number of ways. It can be measured in absolute terms, such as, by the income of Seward fishermen or the number of commercial fishermen who reside in Seward (see Tables 3.53 and 3.54), or it can be measured in relative terms; for example, in 1976, approximately

TABLE 3.52
COOK INLET FISHERIES
1973-1977

Catch in 1000 pounds

YEAR	SALMON	HERRING	HALIBUT	KING CRAB	TANNER CRAB	DUNGENESS CRAB	SHRIMP	ALL SHELLFISH	TOTAL OF FISHERIES INCLUDED IN THIS STUDY	TOTAL ALL FISHERIES
1973	14,418	3,184	3,972	4,349	8,509	330	4,897	18,085	39,659	39,808
1974	10,341	5,389	1,930	4,602	7,661	721	5,749	18,733	36,393	36,535
1975	18,045	8,298	3,935	2,886	4,952	363	4,752	12,953	43,231	43,248
1976	23,298	9,696	3,418	4,954	5,935	119	6,208	17,216	53,628	53,639
1977	36,012	6,436	3,249	2,027	5,650	76	5,144	12,897	58,594	58,607
Mean	20,443	6,600	3,300	3,764	6,541	322	5,350	15,976	46,301	46,367

YEAR	PERCENTAGE OF SHELLFISH INCLUDED	PERCENTAGE OF MISCELLANEOUS FISH INCLUDED	PERCENTAGE OF ALL FISH INCLUDED
1973	99.55	97.87	99.62
1974	100.00	97.43	99.61
1975	99.91	99.92	99.96
1976	99.99	99.89	99.97
1977	99.98	99.82	99.97

Percentage of All Included Fisheries

YEAR	SALMON	HERRING	HALIBUT	KING CRAB	TANNER CRAB	DUNGENESS CRAB	SHRIMP	ALL SHELLFISH
1973	36.35	8.02	10.01	10.96	21.45	0.83	12.34	45.60
1974	28.41	14.80	5.30	12.64	21.05	1.98	15.79	51.47
1975	41.74	19.19	9.10	6.67	11.45	0.83	10.99	29.96
1976	43.44	18.98	6.37	9.23	11.06	0.22	11.57	32.10
1977	61.46	10.98	5.54	3.45	9.64	0.13	8.77	22.01

Sources: ADF&G Annual Catch and Production Reports and Salmon and Shellfish Catch Reports, IPHC Annual Reports.

12 percent of the residents of Seward had commercial fishing licenses. Data available from the Kenai Borough Management Data Base Study indicate that in 1976, approximately 50 percent of Seward's basic sector

TABLE 3.53
ESTIMATED GROSS EARNINGS OF SEWARD FISHERMEN 1969 - 1976

YEAR	NUMBER OF GEAR OPERATORS	ESTIMATED GROSS EARNINGS
1969	49	1,163,000
1970	72	1,612,000
1971	60	1,618,000
1972	64	2,011,000
1973	60	2,833,000
1974	62	2,978,000
1975	48	1,298,000
1976	52	3,153,000

Source: Alaska Commercial Fisheries Entry Commission, Distribution of Income from Alaska Fisheries, July, 1978

TABLE 3.54
NUMBER OF SEWARD* RESIDENTS HOLDING A COMMERCIAL FISHERMAN'S LICENSE
1969 - 1976

1969	199	1973	186
1970	178	1974	197
1971	190	1975	224
1972	207	1976	263

*A Seward resident is anyone who uses a Seward address when applying for a license.

Source: Commercial Fisheries Entry Commission, Commercial License File.

employment was in the industries dominated almost exclusively by commercial fishing and fish processing. The implication is that roughly one-half of the total employment in Seward is directly or indirectly generated by the Seward commercial fishing industry. Al - though more precise measures of the importance of the commercial fishing industry can be developed, the measurements used here are sufficient to demonstrate that the commercial fishingindustry is a principle source of employment and income in Seward. The following brief summary of the projected growth of this industry indicates that the Seward commercial fishing industry will be a continuing source of economic growth in Seward,

During the next twenty years, the growth of the industry is expected to be primarily the result of increased domestic utilization of the ground-fish resource of the Gulf of Alaska. Resource management, enhancement, and/or rehabilitation programs, which are expected to allow further ex-pansion of the salmon and halibut fisheries and stability in the shell-fish fisheries, are expected to result in the traditional fisheries being a continuing but moderate source of growth. Between 1980 and 2000, catch is projected to increase by over 375 percent by weight and by 149 percent by value. The corresponding rates of growth for the traditional fisheries alone are 24.5 percent and 121 percent. Processing employment and real income are expected to increase less rapidly than catch due to increased processing efficiency. It is projected that processing employment and real income will exceed current levels by 109 percent and 156 percent, respectively. If increases in processing efficiency are not allowed for the projected increases in processing employment and real into'me will exceed current levels by 152 percent and 210 percent respectively. The projections of harvesting activity by fishery on which this brief summary is based and the projections of processing activity are presented in the following sections.

HARVESTING

Projections of harvesting activity and limited historical data are presented by species or species group in this section. The detailed historical data which are referred to in this section and which serve as a basis for the projections are presented in tabular form in Appendix C. The models used in making the projections are discussed in Chapter II.

Salmon

Three distinct Cook Inlet salmon fisheries can be defined by gear type; they are the purse seine, drift gill net, and set gill net fisheries. The Upper Cook Inlet areas are primarily gill net areas, and the Lower and Outer Cook Inlet areas are primarily purse seine areas. Some of the pertinent differences between these fisheries are. summarized in Table 3.55.

TABLE 3.55

CHARACTERISTICS OF THE COOK INLET SALMON FISHERIES

	Purse Seine	Drift Gill Net	Set Gill Net
Season	July-August	June-August	June-September
Typical Boat Size[1]	(26-35 feet)	(26-35 feet)	(under 25 feet)[2]
Crew Size	4	2	1

[1]To convert to meters multiply by 0.305

‘In some areas, set gill net gear can be used without a boat.

In recent years there have been red and chum salmon harvests that approach or surpass record harvests of the last twenty-five years. These recent successes, together with continually improving management: enhancement, and rehabilitation programs, suggest that the Cook Inlet salmon resources will tend to increase. Catch is projected to increase from 9,224 metric tons (20.4 million pounds) in 1980 to 12,778 metric tons (28.2 million pounds) in the year 2000, and the real value of the catch is projected to increase from $20.8 million to $56.6 million (see Table 3.56). The corresponding percentage increases in the weight and value of the harvest are 38.5 percent and 172.4 percent (see Table 3.57). The more rapid increase in value is the result of the projected increase in the real ex-vessel price of salmon. Due to the excess harvesting capacity that exists today, an increase in the number of boats and/or fishermen is not necessary to harvest the catch projected for 2000, and due to the existence of the limited entry program such increases are not expected to occur. Projections of catch by species are presented in Table 3.58.

An issue which has become critical in Cook Inlet is the allocation of harvestable salmon between commercial and recreational fishermen. Cook Inlet salmon fishermen appear to be more concerned with this issue than any other. The proximity and accessibility of the Cook Inlet salmon resources to Anchorage has resulted in increased political pressure to increase the allocation to recreational fishermen. There is no simple solution to this problem since the resource base is not sufficient to fully satisfy the demands of both user groups. If there are dramatic reductions in the allocation to commercial fishermen, the projections

TABLE 3.56

PROJECTED HARVESTING ACTIVITY
COOK INLET SALMON FISHERY 1980-2000

	CATCH				EX-VESSEL PRICE ($/Pound)		NUMBER OF		
	WEIGHT		VALUE ($1,000)						
Year	POUNDS (1,000)	METRIC TONS	Nominal	Real[1]	Nominal	Real	Boats	Landings	Fishermen
1980	20335	9224	23141	20791	1.14	1.02	1249	11648	2039
1981	20860	9462	27089	23069	1.30	I*11	1249	11795	2039
1982	21413	9713	30966	24996	1*45	1.17	1249	11950	2039
1983	21996	9977	35787	27382	1.63	1.24	1249	12113	2039
1984	22611	10256	40622	29461	1.80	1030	1249	12285	2039
1985	23259	10550	46126	31709	1.98	1.36	1249	12467	2039
1986	23483	10652	51162	33337	2.18	1.42	1249	12532	2039
1987	23715	10757	56705	35022	2.39	1.48	1249	12599	2039
1988	23957	10867	62395	36528	2.60	1.52	1249	12670	2039
1989	24210	10982	68630	38084	2.83	1.57	1249	12745	2039
1990	24476	11102	75499	39711	3.08	1.62	1249	12824	2039
1991	24755	11229	82860	41311	3.35	1.67	1249	12908	2039
1992	25049	11362	90552	4?792	3.62	1.71	1249	12997	2039
1993	25359	11503	9'3179	44426	3.91	1.75	1249	13091	2 0 3 9
1994	25687	11652	108189	45935	4.21	1.79	1249	13192	2039
1995	26035	11810	118400	47650	4*55	1.83	1249	13301	2039
1996	26406	11978	129324	49333	4.90	1.87	1249	13417	2039
1997	26802	12157	141202	51056	5.27	1.90	1249	13543	2039
1998	27225	12349	154121	52822	5.66	1.94	1249	13678	2039
1999	27680	12556	168261	54662	6.08	1.97	1249	13826	2039
2000	28171	12778	183921	56634	6.53	2.01	1249	13987	2039

Source: Alaska Sea Grant Program.

[1] The real values and prices are in terms of 1978 dollars.

TABLE 3.57

PROJECTED PERCENTAGE CHANGE FROM 1980,
COOK INLET SALMON FISHERY

	CATCH		EX-VESSEL PRICE		NUMBER OF		
Year	Weight	Real Value	Nominal	Real	Boats	Landings	Fishermen
1980	0	0	0	0	o	0	o
1981	2.583	10.956	14.111	8.162	0	1.260	0
1982	5.304	20.227	27.076	14.172	0	2.588	0
1983	8.170	31.700	42.968	21.753	0	3.9$9	0
1984	11.192	41.7(-)0	57.872	27.437	0	5.468	0
1985	14.379	52.512	74.269	33.339	0	7.030	0
1986	15.482	6(3.344	91.449	38.847	0	7.586	0
1987	16.622	68.449	11O*115	44.441	0	8*166	0
1988	17.812	75.691	128.865	49.128	0	8.776	0
1989	19.058	83.173	149.102	53.853	0	9.418	0
1990	20.363	91.000	171.059	58.686	0	10.097	0
1991	21.736	98.696	194.136	63.219	0	10.815	0
1992	23.180	105.81c)	217.668	67.087	0	11.577	0
1993	24.706	113.676	243.679	71.345	0	12.390	0
1994	26.320	120.937	270.110	74.903	0	13.257	0
1995	28.032	129.184	299.624	79.005	0	14.186	0
1996	29.855	137.279	330.367	82.726	0	15.185	0
1997	31.801	145.565	362.957	86.316	0	16.263	0
1998	33.884	154.059	397.451	89.761	0	17.430	0
1999	36.122	162.909	434*164	93.143	0	18.697	0
2000	38.534	172.395	473.712	96.628	0	20.078	0

Source: Alaska Sea Grant Program.

TABLE 3.58

PROJECTED COOK INLET SALMON CATCH BY SPECIES, 1980-2000
(1 ,000 Pounds)

Year	King	Red	Pink	Chum	Silver	Total
1980	176	8206	44?4	6279	1250	20335
1981	176	8346	4695	6288	1356	20860
1982	176	8487	4982	6298	147(-I	21413
1983	176	8632	5287	6307	1594	21996
1984	176	8778	5611	6317	1729	22611
1985	176	8928	5954	6326	1875	23259
1986	203	8930	6124	6329	1897	23483
1987	235	8930	6301	6329	1920	23715
1988	272	8930	6483	6329	1943	23957
1989	314	893(I	6670	6329	1967	24210
1990	363	8930	6863	6329	1991	24476
1991	419	8930	7062	6329	2015	24755
1992	484	8930	7266	6329	2040	25049
1993	559	8930	7476	6329	2065	25359
1994	646	893(-)	7692	6329	2090	25687
1995	747	8930	7914	6329	2116	26035
19?6	863	8930	8143	6329	2141	26406
1997	997	8930	8378	6329	2168	26802
1998	1152	8930	8620	6329	2194	27225
1999	1331	8930	8869	6329	2221	27680
2000	1538	8930	9126	6329	2248	28171

Source: Alaska Sea Grant Program.

will tend to overstate the level of harvesting activity that will occur. Since much of the salmon that is landed in Seward is delivered by tenders, the projections of the number of landings grossly overstate the amounts of vessel traffic and harbor space use that are expected to occur in Seward. The projected percentage increases in the number of landings should however be meaningful.

Herring

The Cook Inlet herring fishery is primarily a roe herring fishery. The market conditions which result in the roe herring both being fully utilized and being "the principal herring fishery are expected to exist throughout the forecast period. The average annual catch is projected at 2,919 metric tons (6.4 million pounds) (see Table 3.59). The real value of the harvest is expected to increase by 21 percent by the year 2000 (see Table 3.60).

Halibut

The Cook Inlet halibut fishery is similar to other Alaskan halibut fisheries in that it consists of a large boat fleet which fishes the Gulf of Alaska and/or the Bering Sea, and a small boat fleet which consists of boats that are usually primarily participants in other fisheries and which fish in protected waters. The boats in the former fleet are typically over 15.2 meters (50 feet) in length while those in the latter fleet are typically less than 10.7 meters (35 feet) in length. The catch is projected to increase by 76 percent in terms of weight and by 121 percent in terms

TABLE 3.59

PROJECTED HARVESTING ACTIVITY
COOK INLET HERRING FISHERY 1980-2000

Year	CATCH: WEIGHT POUNDS (1,000)	CATCH: WEIGHT METRIC TONS	CATCH: VALUE ($1,000) Nominal	CATCH: VALUE ($1,000) Real[1]	EX-VESSEL PRICE ($/Pound) Nominal	EX-VESSEL PRICE ($/Pound) Real	NUMBER OF Boats	NUMBER OF Landings	NUMBER OF Fishermen
1980	6436	2919	5475	4919	0.85	0.76	68	428	272
1981	6436	2919	5831	4966	0.91	0.77	68	428	272
1982	6436	2919	6210	5013	0.96	0.78	68	428	272
1983	6436	2919	6613	5060	1.03	0.79	68	428	272
1984	6436	2919	7043	5108	1.09	0.79	68	428	272
1985	6436	2919	7501	5157	1.17	0.80	68	428	272
1986	6436	2919	7989	5205	1.24	0.81	68	428	272
1987	6436	2919	8508	5255	1.32	0.82	68	428	272
1988	6436	2919	9061	5305	1.41	0.82	68	428	272
1989	6436	2919	9650	5355	1.50	0.83	68	428	272
1990	6436	2919	10277	5406	1.60	0.84	68	428	272
1991	6436	2919	10945	5457	1.70	0.85	68	428	272
1992	6436	2919	11657	5509	1.81	0.86	68	428	272
1993	6436	2919	12414	5561	1.93	0.86	68	428	272
1994	6436	2919	13221	5613	2.05	0.87	68	428	272
1995	6436	2919	14081	5667	2.19	0.88	68	428	272
1996	6436	2919	14996	5720	2.33	0.89	68	428	272
1997	6436	2919	15971	5775	2.48	0.90	68	428	272
1998	6436	2919	17033	5829	2.64	0.91	68	428	272
1999	6436	2919	18114	5885	2.81	0.91	68	428	272
2000	6436	2919	19292	5940	3.00	0.92	68	428	272

Source: Alaska Sea Grant Program.

[1] The real values and prices are in terms of 1978 dollars.

TABLE 3.6o

PROJECTED PERCERTAGE CHANGE FROM 1980, COOK INLET HERRING FISHERY

Year	CATCH Weight	CATCH Real Value	EX-VESSEL PRICE Nominal	EX-VESSEL PRICE Real	NUMBER OF Boats	NUMBER OF Landings	NUMBER OF Fishermen
1980	0	0	0	0	0	0	0
1981	0	0.95	6.50	0.95	0	0	0
1982	0	1.90	13.42	1.90	0	0	0
1983	0	2.87	20.79	2.87	0	0	0
1984	0	3.85	28.65	3.85	0	0	0
1985	0	4.83	37.01	4.83	0	0	0
1986	0	5.82	45.91	5.82	0	0	0
1987	0	6.83	55.40	6.83	0	0	0
1988	0	7.84	65.50	7.84	0	0	0
1989	0	8.86	76.26	8.86	0	0	0
1990	0	9.89	87.71	9.89	0	0	0
1991	0	10.94	99.92	10.94	0	0	0
1992	0	11.99	112.91	11.99	0	0	0
1993	0	13.05	126.75	13.05	0	0	0
1994	0	14.12	141.49	14.12	0	0	0
1995	0	15.20	157.18	15.20	0	0	0
1996	0	16.29	173.90	16.29	0	0	0
1997	0	17.40	191.70	17.40	0	0	0
1998	0	18.51	210.67	18.51	0	0	0
1999	0	19.63	230.86	19.63	0	0	0
2000	0	20.77	252.36	20.77	0	0	0

Source: Alaska Sea Grant Program.

of value resulting in a harvest of 2,638 metric tons (5.8 million pounds) and $12.6 million (real dollars) in the year 2000 (see Tables 3.61 and 3.62).

The projections of the number of landings are indicative of the vessel traffic and harbor usage that are expected in Seward since the projections are based on Seward and not Cook Inlet landings. It should also be noted that since the small boat fleet consists of boats and fishermen that are primarily associated with other fisheries, the projections of the numbers of boats and fishermen are for the large boat fleet that delivers halibut to Seward.

Groundfish

In recent years there have been two distinct groundfish fleets in the Cook Inlet management area, a small boat long line fleet and a large boat trawl fleet. The long line boats are typically less than 13.7 meters (45 feet) in length, have a crew of one, and are active in this fishery during May and September. The average number of landings per boat per year has been less than three; this indicates that the boats and fishermen of the long line fleet are only casual participants and are primarily associated with other fisheries. The trawl fleet has included no more than two or three boats in the last nine years. These boats have typically been shrimp trawlers which ranged in length from under 13.7 meters (45 feet) to over 25.9 meters (85 feet),

As the domestic groundfish industry develops, there are expected to continue to be distinct small and large boat fleets; both fleets may,

TABLE 3.61

PROJECTED HARVESTING ACTIVITY
COOK INLET HALIBUT FISHERY 1980-2000

	CATCH								
	WEIGHT		VALUE ($1,000)		EX-VESSEL PRICE ($/Pound)		NUMBER OF		
Year	POUNDS (1,000)	METRIC TONS	Nominal	Real[1]	Nominal	Real	Boats	Landings	Fishermen
1980	3300	1497	6349	5704	1.92	1.73	89	357	535
1981	3300	1497	6847	5831	2.07	1.77	89	357	535
1982	3300	1497	7379	5957	2.24	1.81	89	357	535
1983	3300	1497	7933	6070	2.40	1.84	89	357	535
1984	3300	1497	8519	6178	2.58	1.87	89	357	535
1985	3300	1497	9136	6280	2.77	1.90	89	357	535
1986	3427	1554	10161	6621	2.96	1.93	93	370	556
1987	3559	1614	11284	6969	3.17	1.96	96	385	577
1988	3696	1677	12523	7332	3.39	1.98	100	400	599
1989	3838	1741	13885	7705	3.62	2.01	104	415	622
1990	3986	1808	15379	8089	3.86	2.03	108	431	646
1991	4140	1878	17029	8490	4.11	2.05	112	448	671
1992	4299	1950	18827	8997	4.38	2.07	116	465	697
1993	4464	2025	20800	9317	4.66	2.09	121	483	724
1994	4636	2103	22975	9755	4.96	2.10	125	501	752
1995	4815	2184	25364	10208	5.27	2.12	130	521	781
1996	5000	2268	27964	10667	5.59	2.13	135	541	811
1997	5193	2355	30841	11151	5.94	2.15	140	561	842
1998	5393	2446	33976	11645	6.30	2.16	146	583	874
1999	5600	2540	37405	12152	6.68	2.17	151	605	908
2000	5816	2638	41017	12630	7.05	2.17	157	629	943

Source: Alaska Sea Grant Program.

[1]The real values and prices are in terms of 1978 dollars.

TABLE 3.62

PROJECTED PERCENTAGE CHANGE FROM 1980,
COOK INLET HALIBUT FISHERY

Year	CATCH		EX-VESSEL PRICE		NUMBER OF		
	Weight	Real Value	Nominal	Real	Boats	Landings	Fishermen
1980	0	0	0	0	0	0	0
1981	0	2.23	7.86	2.23	0	0	0
1982	0	4.43	16.23	4.43	0	0	0
1983	0	6.41	24.96	6.41	0	0	0
1984	0	8.32	34.18	8.32	0	0	0
1985	0	10.10	43.90	10.10	0	0	0
1986	3.85	16.07	54.11	11.77	3.85	3.85	3.85
1987	7.85	22.19	64.80	13.29	7.85	7.85	7.85
1988	12.00	28.53	76.12	14.76	12.00	12.00	12.00
1989	16.31	35.08	88.04	16.14	16.31	16.31	16.31
1990	20.79	41.82	100.55	17.41	20.79	20.79	20.79
1991	25.44	48.94	113.83	18.65	25.44	25.44	25.44
1992	30.27	55.93	127.64	19.74	30.27	30.27	30.27
1993	35.29	63.34	142.18	20.74	35.29	35.29	35.29
1994	40.49	71.01	157.58	21.72	40.49	40.49	40.49
1995	45.90	78.95	173.82	22.65	45.90	45.90	45.90
1996	51.52	87.01	190.70	23.42	51.52	51.52	51.52
1997	57.35	95.50	208.72	24.24	57.35	57.35	57.35
1998	63.41	104.15	227.50	24.93	63.41	63.41	63.41
1999	69.70	113.93	247.18	25.53	69.70	69.70	69.70
2000	76.24	121.43	266.59	25.64	76.24	76.24	76.24

Source: Alaska Sea Grant Program.

however, include a variety of gear types. The small boat fishery is expected to remain a casual or supplemental fishery with its participants being principally associated with other fisheries. The groundfish projections that are presented below exclude harvesting activity in the Cook Inlet management area that does not result in fish being landed in Seward; the projections of the numbers of boats, fishermen, and landings exclude the small boat fleet since they are accounted for elsewhere.

The annual groundfish harvest is projected to increase from 52 metric tons (114,000 pounds) in 1980 to 72,000 metric tons (159 million pounds) in the year 2000 and to increase in real value from $14,000 to $11.4 million (see Table 3.63). The associated percentage increases are staggering (see Table 3.64). In terms of its relative importance, the Seward groundfish catch is expected to increase from 0.3 percent of total Cook Inlet catch in 1980 to 74 percent of the catch by the year 2000. The relative importance in terms of value is projected to increase from 0.03 percent to 11.4 percent (see Table 3.65). The significant difference between the projected relative importance of the fishery measured by weight and by value is explained by the large ex-vessel price differential that is expected to exist between the relatively low-valued groundfish and the high-valued traditional species. The relative importance of the groundfish fisheries is also expected to be relatively low in terms of the number of boats, fishermen, or landings. Projections of groundfish catch by species are presented in Table 3.66.

TABLE 3.63

PROJECTED HARVESTING ACTIVITY
COOK INLET GROUNDFISH FISHERY 1980-2000

Year	CATCH: WEIGHT: POUNDS (1,000)	CATCH: WEIGHT: METRIC TONS	CATCH: VALUE ($1,000): Nominal	CATCH: VALUE ($1,000): Real[1]	EX-VESSEL PRICE ($/Pound): Nominal	EX-VESSEL PRICE ($/Pound): Real	NUMBER OF: Boats	NUMBER OF: Landings	NUMBER OF: Fishermen
1980	114	52	15	14	0.13	0.12	0	1	0
1981	161	73	22	19	0.14	0.12	0	2	0
1982	228	104	32	26	0.14	0.11	0	3	0
1983	324	147	46	35	0.14	0.11	0	4	0
1984	461	209	67	49	0.15	0.11	0	5	0
1985	655	297	98	67	0.15	0.10	0	7	1
1986	934	424	144	94	0.15	0.10	0	9	1
1987	1334	605	210	130	0.16	0.10	0	12	1
1988	1908	865	309	181	0.16	0.09	0	17	2
1989	2733	1240	454	252	0.17	0.09	0	23	2
1990	3922	1779	670	352	0.17	0.09	1	31	3
1991	5637	2557	990	494	0.18	0.09	1	42	4
1992	8115	3681	1467	693	0.18	0.09	1	58	6
1993	11702	5308	2177	975	0.19	0.08	2	80	8
1994	16903	7667	3241	1376	0.19	0.08	2	110	11
1995	24455	11093	4932	1945	0.20	0.08	3	151	15
1996	35441	16076	7222	2755	0.20	0.08	4	209	21
1997	51446	23336	10393	3939	0.21	0.08	6	289	29
1998	74800	33929	16242	5567	0.22	0.07	8	400	40
1999	108930	49410	24435	7938	0.22	0.07	11	554	55
2000	158886	72070	36954	11348	0.23	0.07	15	770	77

Source: Alaska Sea Grant Program.

[1]The real values and prices are in terms of 1978 dollars.

TABLE 3.64

PROJECTED PERCENTAGE CHANGE FROM 1980,
COOK INLET GROUNDFISH FISHERY

Year	CATCH Weight	CATCH Real Value	EX-VESSEL PRICE Nominal	EX-VESSEL PRICE Real	NUMBER OF Boats	NUMBER OF Landings	NUMBER OF Fishermen
1980	0	0	0	0	C	C	0
1981	41.45	37.17	2.31	-3.03	34071	34.71	34.71
1982	100.38	88.75	4.84	-5.80	81.75	81.75	81.75
1983	184.29	159.91	7.35	-8.58	145.58	145.58	145.58
1984	303.98	258.79	10.03	-11.19	232.36	232.36	232.36
1985	474.97	396.43	12.84	-13.66	350.51	350.51	350.51
1986	719.64	588.21	15.77	-16.04	511.63	511.63	511.63
1987	1070.32	955.54	18.77	-18.35	731.72	731.72	731.73
1988	1573.76	1230.12	21.96	-20.53	1032.86	1032.R6	1037OP6
1989	2297.68	1754.75	25.25	-22.64	1445.57	1445.57	1445.57
1990	3340.39	2493.53	28.77	-24.62	2012.10	2012.10	2o12.in
1991	4844.73	3532.08	32.37	-26.55	2791.08	2791.08	2791.C8
1992	7018.65	5001.27	36.24	-28.34	3863.93	3863.93	3863.93
1993	10165.37	7076.47	40.22	-30.09	5343.94	534?.94	5343.94
1994	14727.64	10023.46	44.47	-31.73	7388.96	7388.96	7388.97
1995	21353.00	14207.67	48.89	-33.31	10219.26	10219.26	10219.26
1996	30989.92	20171.05	53.57	-34.80	14142.65	14142.65	14142.65
1997	45029.69	28879.15	59.56	-35.79	19589.94	19589.94	19589.94
1998	65516.15	40859.43	63.64	--37*5H	27164.87	27164.87	27164.87
1999	95456.01	58307.17	69.05	-38.88	37714.76	37714.76	37714.76
2000	139278.59	83399.91	74.86	-40.09	52430.33	52430.33	52430.33

Source: Alaska Sea Grant Program.

TABLE 3.65

SEWARD GROUNDFISH PROJECTED CATCH BY SPECIES 1980-2000

YEAR	WEIGHT (Metric tons) POLLOCK	PACIFIC COD	SABLEFISH	OTHER	TOTAL	REAL VALUE[1] ($1,000) POLLOCK	PACIFIC COD	SABLEFISH	OTHER	TOTAL
1980	7	18	1	26	52	1	5	1	6	14
1981	11	24	1	38	73	1	7	1	9	19
1982	16	32	1	54	104	2	9	2	12	26
1983	25	44	2	77	147	3	12	3	17	35
1984	37	59	3	109	209	5	16	4	24	49
1985	57	80	5	156	297	7	21	6	33	67
1986	86	108	7	222	424	11	28	8	46	94
1987	131	146	11	317	605	16	37	13	65	130
1988	198	197	17	453	865	23	49	19	90	181
1989	301	266	27	645	1240	34	65	28	125	252
1990	457	360	41	921	1779	51	85	42	174	352
1991	694	487	63	1313	2557	75	112	63	243	494
1992	1053	658	97	1873	3681	111	149	95	339	693
1993	1598	889	149	2672	5308	165	196	143	472	975
1994	2426	1201	229	3811	7667	244	259	214	658	1376
1995	3681	1624	352	5436	11093	363	343	322	918	1945
1996	5587	2195	540	7754	16076	538	453	483	1281	2755
1997	8480	2967	829	11060	23336	805	603	730	1800	3939
1998	12870	4010	1273	15776	33929	1188	793	1090	2496	5567
1999	19533	5420	1954	22503	49410	1765	1049	1639	3485	7938
2000	29646	7326	3000	32098	72070	2624	1389	2465	4870	11348

[1] Value in terms of 1978 dollars.

Source: Alaska Sea Grant Program.

TABLE 3.66

PROJECTIONS OF COOK INLET GROUNDFISH HARVESTING ACTIVITY
AS A PERCENTAGE OF TOTAL COOK INLET HARVESTING ACTIVITY

	CATCH		NUMBER OF		
Year	Weight	Value	Boats	Landings	Fishermen
1980	0.25	0.03	0.00	0.01	0.00
1981	0.35	0.04	0.00	0.01	0.01
1982	0.49	0.06	0.00	0.02	0.01
1983	0.68	0.07	0.00	0.02	0.01
1984	0.95	0.10	0.01	0.03	0.01
1985	1.33	0.13	0.01	0.04	0.02
1986	1.87	0.17	0.01	0.05	0.03
1987	2.64	0.23	0.01	0.07	0.03
1988	3.70	0.30	0.02	0.09	0.05
1989	5.18	0.41	0.03	0.13	0.06
1990	7.21	0.55	0.04	0.17	0.08
1991	9.97	0.74	0.05	0.24	0.12
1992	13.64	1.01	0.07	0.32	0.16
1993	18.42	1.36	0.10	0.44	0.21
1994	24.41	1.86	0.13	0.60	0.29
1995	31.63	2.52	0.18	0.82	0.40
1996	39.89	3.43	0.25	1.12	0.54
1997	48.79	4.69	0.34	1.53	0.75
1998	57.79	6.31	0.47	2.09	1.02
1999	66.33	8.52	0.64	2.86	1.40
2000	73.94	11.42	0.89	3.89	1.91

Source: Alaska Sea Grant Program.

King Crab

The Cook Inlet king crab fishery provides an excellent example of the over capitalization that often occurs in an open entry fishery. In an attempt to reduce this problem, the ADF&G prohibits boats that participate in other Alaska king crab fisheries from participating in the Cook Inlet fishery. One result has been that the Cook Inlet king crab fleet consists of smaller boats than does the Kodiak fleet. The typical Cook Inlet boats are between 7.6 and 13.7 meters (25 and 45 feet) in length, have a crew of three to four, and participate in the fishery from August through March.

Despite the recent declines in annual harvest, the sustainable yield is thought to be approximately 1,900 metric tons (4.2 million pounds). The annual catch is expected to increase to this level by 1985 and to be maintained at this level through the year 2000, at which time the real value of the harvest is expected to equal $10.9 million (see Table 3.67). The projected increases in the harvest by weight and real value are 14.6 percent and 52 percent respectively (see Table 3.68), Although Seward boats and fishermen participate in the Cook Inlet shellfish fisheries, they do not dominate them, and the harvesting activity is concentrated in the Lower Cook Inlet, not in the areas around Seward. For these reasons, the projections of the number of landings grossly overstate the harbor use and vessel traffic that are expected to occur in Seward. The projected percentage increases are, however, indicative of the expected rates of growth in traffic and harbor use.

TABLE 3.67

PROJECTED HARVESTING ACTIVITY
COOK INLET KING CRAB FISHERY 1980-2000

Year	CATCH: WEIGHT: POUNDS (1,000)	CATCH: WEIGHT: METRIC TONS	CATCH: VALUE ($1,000): Nominal	CATCH: VALUE ($1,000): Real[1]	EX-VESSEL PRICE ($/Pound): Nominal	EX-VESSEL PRICE ($/Pound): Real	NUMBER OF: Boats	NUMBER OF: Landings	NUMBER OF: Fishermen
1980	3674	1667	4008	3601	1.09	0.98	69	881	242
1981	3776	1713	4465	3803	1.18	1.01	70	907	243
1982	3880	1760	4966	4009	1.28	1.03	70	933	245
1983	3988	1809	5509	4215	1.38	1.06	70	960	246
1984	4098	1859	6099	4423	1.49	1.08	70	988	247
1985	4212	1910	6740	4633	1.60	1.10	71	1017	248
1986	4211	1910	7255	4727	1.72	1.12	71	1017	248
1987	4211	1910	7795	4814	1.85	1.14	71	1017	248
1988	4211	1910	8357	4893	1.98	1.16	71	1017	249
1989	4211	1910	8955	4969	2.13	1.18	71	1017	249
1990	4211	1910	9575	5036	2.27	1.20	71	1017	249
1991	4211	1910	10231	5101	2.43	1.21	71	1017	249
1992	4211	1910	10914	5158	2.59	1.22	71	1017	249
1993	4211	1910	11628	5208	2.76	1.24	71	1017	250
1994	4211	1910	12380	5256	2.94	1.25	71	1017	250
1995	4211	1910	13171	5301	3.13	1.26	71	1017	250
1996	4211	1910	13994	5338	3.32	1.27	71	1017	250
1997	4211	1910	14867	5375	3.53	1.28	71	1017	250
1998	4211	1910	15775	5407	3.75	1.28	72	1017	250
1999	4211	1910	16726	5434	3.97	1.29	72	1017	250
2000	4211	1910	17727	5459	4.21	1.30	72	1017	251

Source: Alaska Sea Grant Program.

[1]The real values and prices are in terms of 1978 dollars.

135

TABLE 3.68

PROJECTED PERCENTAGE CHANGE FROM 1980,
COOK INLET KING CRAB FISHERY

Year	CATCH		EX-VESSEL PRICE		NUMBER OF		
	Weight	Real Value	Nominal	Real	Boats	Landings	Fishermen
1980	0	0	0	0	0	C	0
1981	2.77	5.60	8.41	2.76	0.50	2.93	0.50
1982	5.62	11.32	17.32	5.40	0.96	5.93	0.96
1983	8.54	17.05	26.63	7.84	1.40	9.03	1.40
1984	11.55	22.84	36.42	10.12	1.82	12.20	1.82
1985	14.64	23.66	46.68	12.?3	?.22	15.47	?.22
1986	14.62	31.27	57.92	14.53	2.36	15 .44	2.36
1987	14.62	33.69	69.68	16.64	2.49	15.44	2.49
1988	14.62	35.87	81.93	18.54	2.60	15.44	2.60
1989	14.62	38.00	94.94	20.40	2.70	15.44	2.70
1990	14.62	39.87	108.44	22.03	2.80	15.44	2.80
1991	14.62	41.66	122.72	23.59	2.88	15.44	2.88
1992	14.62	43.23	137.59	24.')-?	?. ')6	15.44	2.96
1993	14.62	44.64	153.12	26.20	3.03	15.44	3.03
1994	14.62	45.77	169.49	27.35	3.10	15.44	3.10
1995	14.62	47.21	186.73	28.43	3.16	15.44	3.16
1996	14.62	48.24	204.63	?') .34	3.22	15.44	3.22
1997	14.62	49.28	223.63	30.24	3.27	15.44	3.27
1998	14.62	50.14	243.40	31.00	3.32	15.44	3.32
1999	14.62	50.89	264.10	31.65	3.37	15.44	3.37
2000	14.62	51.59	285.99	32.26	3.41	15.44	3.41

Source: Alaska Sea Grant Program.

Tanner Crab

The Cook Inlet Tanner crab fishery is similar to the Kodiak fishery in that its development was promoted by a decline in the local king crab resources. The Tanner crab season is from December through May; there are therefore several months when the same boats are participating in both the king and Tanner crab fisheries. Since many boats participate in both fisheries, it is not surprising that the characteristics of the two fleets are similar. They both have boats that are typically between 7.6 and 13.7 meters (25 and 45 feet) in length and a crew of three to four.

The Cook Inlet Tanner crab resources appear to be fully utilized. Successful management of these resources is expected to allow modest increase in harvest between 1980 and 1985 and an average annual harvest of 2,410 metric tons (5.3 million pounds) during the remainder of the forecast period (see Table 3.69). The real value of the average annual harvest is projected to increase to approximately $2.5 million by the year 2000. The small (2.6 percent) increase in harvest and favorable market conditions are expected to assure that resource abundance will remain as the binding constraint (see Table 3.70).

Dungeness Crab

The Cook Inlet Dungeness crab fleet consists of boats that typically are 7.9 to 10.7 meters (26 to 35 feet) in length, have a crew of two, and participate in the Dungeness crab fishery from May through December. The annual harvest has fluctuated significantly in recent years; for example, the catch

TABLE 3.69

PROJECTED HARVESTING ACTIVITY
COOK INLET TANNER CRAB FISHERY 1980-2000

Year	CATCH: WEIGHT: POUNDS (1,000)	CATCH: WEIGHT: METRIC TONS	CATCH: VALUE ($1,000): Nominal	CATCH: VALUE ($1,000): Real[1]	EX-VESSEL PRICE ($/Pound): Nominal	EX-VESSEL PRICE ($/Pound): Real	NUMBER OF: Boats	NUMBER OF: Landings	NUMBER OF: Fishermen
1980	5180	2350	3141	2822	0.61	0.54	63	893	222
1981	5206	2361	3270	2785	0.63	0.53	64	897	222
1982	5232	2373	3408	2751	0.65	0.53	64	900	223
1983	5258	2385	3556	2721	0.68	0.52	64	903	224
1984	5284	2397	3716	2695	0.70	0.51	64	907	225
1985	5311	2409	3887	2672	0.73	0.50	64	910	226
1986	5313	2410	4052	2640	0.76	0.50	64	910	226
1987	5313	2410	4227	2611	0.80	0.49	64	910	226
1988	5313	2410	4415	2585	0.83	0.49	64	910	225
1989	5313	2410	4618	2562	0.87	0.48	64	910	225
1990	5313	2410	4835	2543	0.91	0.48	64	910	225
1991	5313	2410	5068	2527	0.95	0.48	64	910	225
1992	5313	2410	5319	2514	1.00	0.47	64	910	225
1993	5313	2410	5539	2503	1.05	0.47	64	910	225
1994	5313	2410	5870	2496	1.11	0.47	64	910	225
1995	5313	2410	6191	2492	1.17	0.47	64	910	225
1996	5313	2410	6527	2490	1.23	0.47	64	910	225
1997	5313	2410	6839	2491	1.30	0.47	64	910	225
1998	5313	2410	7278	2494	1.37	0.47	64	910	225
1999	5313	2410	7697	2501	1.45	0.47	64	910	225
2000	5313	2410	8149	2509	1.53	0.47	64	910	225

Source: Alaska Sea Grant Program.

[1]The real values and prices are in terms of 1978 dollars.

TABLE 3.70

PROJECTED PERCENTAGE CHANGE FROM 1980.
COOK INLET TANNER CRAB FISHERY

Year	CATCH Weight	CATCH Real Value	EX-VESSEL PRICE Nominal	EX-VESSEL PRICE Real	NUMBER OF Boats	NUMBER OF Landings	NUMBER OF Fishermen
1980	0	0	0	0	0	C	0
1981	0.50	-1.31	3.60	-1.80	0.34	C*37	0.34
1982	1.00	-2.50	7.44	-3.47	0.70	0.75	0.70
1983	1.51	-3.56	11.56	-4.99	1.08	1.12	1.08
1984	2.02	-4.50	15.98	-6.38	1.46	1.50	1.46
1985	2.53	-5.31	20.71	-7.64	1.86	1.88	1.86
1986	2.57	-6.43	25.78	-8.78	1.84	1.91	1.84
1987	2.57	-7.47	31.23	-9.79	1.80	1.91	1.80
1988	2.57	-8.39	37.07	-10.69	1.76	1.91	1.76
1989	2.57	-9.19	43.35	-11.46	1..73	1.91	1.73
1990	2.57	-9.87	50.10	-12.13	1.69	1.91	1.69
1991	2.57	-10.45	57.34	-12.69	1.66	1.91	1.66
1992	2. ',7	-10.92	65.13	-13.15	1.64	1.91	1.64
1993	2.57	-11.28	73.51	-13.50	1.61	1.91	I*61
1994	2.57	-11.53	82.52	-13.75	1.59	1.91	1*59
1995	2. ')7	-11.69	92.20	-13.91	1.57	1.91	1*57
1996	2.57	-11.75	102.64	-13.96	1.55	1.91	1055
1997	2.57	-11.72	113.86	-13.93	1.53	1.91	1.53
1998	2.57	-11.60	125.95	-13.81	1.51	1.91	1.51
1999	2.57	-11.38	138.96	-13.60	1.50	1.91	1.50
2000	2.57	-11.07	152.98	-13.30	1.48	1.91	1.48

Source: Alaska Sea Grant Program.

in 1978 exceeded that of 1977 by a factor of 15. Market conditions have been a principal determinant of the fluctuation in harvest, The favorable markets that resulted in a near-record harvest in 1978 are expected to continue, and it is projected that during the forecast period the average annual harvest will equal the allowable biological catch of 204 metric tons (450,000 pounds). By the year 2000, the real value of the annual harvest is expected to approach $400,000 (see Table 3.71). This represents a 22 percent increase in real value during the forecast period (see Table 3.72).

Shrimp

There are two shrimp fisheries in Cook Inlet, a trawl fishery and a pot fishery. The trawlers range in length from under 7.6 meters (25 feet) to over 24.4 meters (80 feet), have a crew of three, and participate in the fishery from June through March. Although several times as many boats participate in the pot fishery as in the trawl fishery, the trawl fleet harvests the majority of the annual catch. The pot boats range in length from under 7.6 meters to 13.7 meters (25 feet to 45 feet) but are predominately under 10.7 meters (35 feet). They have a crew of two, and are active throughout the year.

The shrimp fisheries are we'll developed and have well defined resources that are expected to result in a sustainable annual harvest of 2,540 metric tons (5.6 million pounds). The market conditions that have resulted in resource abundance being a binding constraint are expected to exist throughout the forecast period and result in an annual harvest

TABLE 3.?1

PROJECTED HARVESTING ACTIVITY
COOK INLET DUNGENESS CRAB FISHERY 1980-2000"

Year	CATCH: WEIGHT: POUNDS (1,000)	CATCH: WEIGHT: METRIC TONS	CATCH: VALUE ($1,000)[1]: Nominal	CATCH: VALUE ($1,000)[1]: Real	EX-VESSEL PRICE ($/Pound): Nominal	EX-VESSEL PRICE ($/Pound): Real	NUMBER OF: Boats	NUMBER OF: Landings	NUMBER OF: Fishermen
1980	450	2(.4	363	327	0.81	0.73	48	591	95
1981	450	704	390	332	0.87	0 ..74	48	591	95
1982	450	204	419	338	0.93	0.75	48	592	96
1983	450	204	449	343	1.00	0.76	48	592	96
1984	450	204	480	3(,8	1.07	0.77	48	593	96
1985	450	204	513	353	1.14	0.78	48	593	96
1986	450	204	549	358	1.22	0.80	48	594	96
1987	450	204	587	363	1.30	0.81	48	594	96
1988	450	204	627	367	1*39	0.82	4a	595	96
1989	450	204	668	371	1.49	0.82	48	595	96
1990	450	204	712	375	1.53	0.83	48	596	96
1991	450	204	759	378	1.69	0.84	4$	596	96
1992	450	204	807	381	1.79	0.85	48	596	96
1993	450	204	858	384	1.91	0.85	4a	597	96
1994	450	204	911	387	2.03	0.86	4R	597	97
1995	450	204	968	390	2.15	0.87	4f3	597	97
1996	450	204	1027	392	2.28	0.87	48	598	97.
1997	450	204	1090	394	2.42	0.88	48	598	97
1998	450	204	1155	396	?.57	0.88	48	598	9-7
1999	450	204	1224	3 q&{	?.72	0.88	48	599	97.
2000	450	204	1296	399	2.88	0.89	48	599	97

Source: Alaska Sea Grant Program.

[1]The real values and prices are in terms of 1978 dollars.

TABLE 3.72

PROJECTED PERCENTAGE CHANGE FROM 1980,
COOK INLET DUNGENESS CRAB FISHERY

	CATCH		EX-VESSEL PRICE		NUMBER OF		
Year	Weight	Real Value	Nominal	Real	Boats	Landings	Fishermen
1980	0	0	0	0	0	0	0
1981	0	1.82	7.42	1.82	0.11	0.10	0.11
1982	0	3.59	15.30	3.59	0.22	0.19	0.22
1983	0	5.18	23.51	5.18	0.32	0.28	0.32
1984	0	6.68	32.15	6.68	0.41	0.36	0.41
1985	0	8.08	41.25	8.08	0.50	0.44	0.50
1986	0	9.62	51.14	9.62	0.61	0.54	0.61
1987	0	11.03	61.51	11.03	0.71	0.62	0.71
1988	0	12.33	72.39	12.33	0.80	0.71	0.80
1989	0	13.59	83.91	13.59	0.89	0.79	0.89
1990	0	14.72	95.96	14.72	0.98	0.86	0.98
1991	0	15.81	109.71	15.81	1.05	0.93	1.05
1992	0	16.78	122.02	16.78	1.13	1.00	1.13
1993	0	17.65	135.98	17.65	1.20	1.06	1.20
1994	0	18.49	150.74	18.49	1.27	1.12	1.27
1995	0	19.29	166.31	19.29	1.33	1.17	1.33
1996	0	19.96	182.53	19.96	1.39	1.23	1.39
1997	0	20.65	199.78	20.65	1.44	1.28	1.44
1998	0	21.23	217.80	21.23	1.50	1.32	1.50
1999	0	21.74	236.70	21.74	1.55	1.37	1.55
2000	0	22.25	256.69	22.25	1.59	1.41	1.59

Source: Alaska Sea Grant Program.

value in real dollars of over $4 million by the year 2000 (see Table 3.73); this represents a 165 percent increase in real value during the forecast period (see Table 3.74).

Razor Clams

The razor clam fishery is located in the Upper Cook Inlet and is not considered part of the Seward commercial fishing industry.

Summation of Harvesting Activity Projections

This section consists of the presentation and analysis of the projections of harvesting activity of the Seward commercial fishing industry as a whole. The tables presented in this section include summations of projected harvesting activity and projections of the relative importance of each fishery.

Total catch is projected to increase from 20,452 metric tons (45.1 million pounds) in 1980 to 97,500 metric tons (214.9 million pounds) in 2000 and its real value is projected to increase from $39.8 million to 99,4 million (see Table 3.75). The corresponding percentage increases by weight and real value are 377 percent and 149 percent respectively (see Table 3.76). Less significant increases in the number of boats, fishermen, and landings are expected. Excluding groundfish, catch is expected to increase from 20,400 metric tons (45 million pounds) to 25,400 metric tons (56.0 million pounds); or in terms of real value, it

TABLE 3.73

PROJECTED HARVESTING ACTIVITY
COOK INLET SHRIMP FISHERY 1980-2000

	CATCH				EX-VESSEL PRICE		NUMBER OF		
	WEIGHT		VALUE $1,000)[1]		($/Pound)				
Year	POUNDS (1,000)	METRIC TONS	Nominal	Real[1]	Nominal	Real	Boats	Landings	Fishermen
1980	5600	2540	1861	1672	0.33	0.30	55	1474	117
1981	5600	2540	2062	1756	0.37	0.31	55	1473	117
1982	5600	2540	2294	1843	0.41	0.33	55	1471	117
1983	5600	2540	2530	1936	0.45	0.35	55	1470	117
1984	5600	2540	2802	2032	0.50	0.36	55	1469	117
1985	5600	2540	3104	2134	0.55	0.38	55	1468	117
1986	5600	2540	3430	2241	0.61	0.40	55	1468	117
1987	5600	2540	3809	2353	0.68	0.42	55	1467	117
1988	5600	2540	4220	2470	0.75	0.44	55	1466	117
1989	5600	2540	4674	2594	0.83	0.46	55	1466	117
1990	5600	2540	5179	2724	0.92	0.49	55	1465	117
1991	5600	2540	5736	2860	1.02	0.51	55	1465	117
1992	5600	2540	6354	3003	1.13	0.54	55	1464	117
1993	5600	2540	7039	3153	1.26	0.56	55	1464	117
1994	5600	2540	7797	3311	1.39	0.59	55	1464	117
1995	5600	2540	8637	3476	1.54	0.62	55	1463	117
1996	5600	2540	9568	3650	1.71	0.65	55	1463	117
1997	5600	2540	10599	3832	1.89	0.68	55	1463	117
1998	5600	2540	11741	4024	2.10	0.72	55	1463	117
1999	5600	2540	13006	4225	2.32	0.75	55	1462	117
2000	5600	2540	14397	4436	2.57	0.7[illegible]	55	1462	117

Source: Alaska Sea Grant Program.

[1] The real values and prices are in terms of 1978 dollars.

TABLE 3.74

PROJECTED PERCENTAGE CHANGE FROM 1980,
COOK INLET SHRIMP FISHERY

Year	CATCH		EX-VESSEL PRICE		N MB		
	Weight	Real Value	Nominal	Value	Boats	Landings	Fishermen
1980	0	0	0	0	0	C	0
1981	0	5.00	10.77	5.00	0	-0.10	0
1982	0	10.25	22.71	10.25	0	-0.19	0
1983	0	15.76	35.93	15.76	0	-0.26	0
1984	0	21.55	50.58	21.55	0	-0.33	0
1985	0	27.63	66.80	27.63	0	-0.38	0
1986	0	34.01	84.78	34.01	0	-0.44	0
1987	0	40.71	104.69	40.71	0	-0.48	0
1988	0	47.75	126.74	47.75	0	-0.52	0
1989	0	55.13	151.17	55.13	0	-0.56	0
1990	0	62.89	178.24	62.89	0	-0.59	0
1991	0	71.03	208.22	71.03	0	-0.63	0
1992	0	79.59	241.43	79.59	0	-0.65	0
1993	0	88.56	278.22	88.56	0	-0.68	0
1994	0	97.99	318.97	97.99	0	-0.70	0
1995	0	107.89	364.12	107.89	0	-0.73	0
1996	0	118.29	414.12	118.29	0	-0.75	0
1997	0	129.20	469.52	129.20	0	-0.77	0
1998	0	140.66	530.89	140.66	0	-0.78	0
1999	0	152.69	598.87	152.69	0	-0.80	0
2000	0	165.33	674.17	165.33	0	-0.82	0

Source: Alaska Sea Grant Program.

TABLE 3.75

PROJECTED HARVESTING ACTIVITY
COOK INLET ALL FISHERIES 1920-2000

	CATCH								
	WEIGHT		VALUE ($1,000)		EX-VESSEL PRICE ($/Pound)		NUMBER OF		
Year	POUNDS (1,000)	METRIC TONS	Nominal	Real[1]	Nominal	Real	Boats	Landings	Fishermen
1980	45089	20452	44353	39849	0.98	0.88	1641	16273	3523
1981	45789	20770	49976	42560	1.09	0.93	1642	16449	3525
1982	46540	21110	55664	44933	1.20	0.97	1643	16633	3527
1983	47352	21479	62423	47762	1.32	1.01	1643	16827	3529
1984	48240	21882	69349	50295	1.44	1.04	1644	17032	3531
1985	49223	22327	77105	53005	1.57	1.08	1644	17247	3533
1986	49855	22614	84749	55223	1.70	1.11	1648	17328	3555
1987	50618	22960	93125	57517	1.84	1.14	1652	17413	3577
1988	51571	?3392	101907	59660	1.98	1.16	1656	17503	3600
1989	52792	23946	111535	61892	?.11	1.17	1660	17599	3624
1990	54394	24673	122126	64236	2.25	1.18	1664	17703	3649
1991	56541	25647	133619	666]7	2.36	1.18	1668	17814	3675
1992	59473	26977	145897	68946	2.45	1.16	1673	17936	3702
1993	63535	28819	159684	71528	2.51	1.13	1678	18070	3732
1994	69236	31405	174593	74129	2.52	1.07	1683	18220	3763
1995	77316	35070	191644	77127	2.48	1.00	1689	18389	3796
1946	88857	40305	210622	80345	2.37	0.90	1695	18583	3832
1997	105450	47832	232350	84013	2.20	0.80	1702	18809	3871
1998	129427	58708	257297	88183	1.99	0.68	1710	19077	3915
1999	1('4,??0	74490	286869	93193	1.75	0.57	1719	19402	3964
2000	214882	97470	322663	99356	1.50	0.46	1729	19802	4021

Source: Alaska Sea Grant Program.

[1] The real values and prices are in terms of 1978 dollars.

TABLE 3.76

PROJECTED PERCENTAGE CHANGE FROM 1980,
COOK INLET ALL FISHERIES

	CATCH		EX-VESSEL PRICE		NUMBER OF		
Year	Weight	Real Value	Nominal	Real	Boats	Landings	Fishermen
1980	n	0	n	o	0	0	0
1981	1.55	6.80	10.95	5.17	0.04	1.08	0.06
1982	3.22	12.76	21.59	9.24	0.08	2.21	0.12
1983	5.02	19.86	34.02	14.13	0.11	3.40	0.18
1984	6.99	26.21	46.14	17.97	0.15	4.66	0.24
1985	9*17	33.02	59.25	21.84	0.19	5.99	0.30
1986	10.57	38.58	72.81	25.33	0.41	6.48	0.90
1987	12.26	44.34	87.03	28.57	0.63	7.00	1.53
1988	14.38	49.71	100.89	30.90	0.87	7.56	2*1U
1989	17.08	55.32	114.78	32.65	1.12	8.15	2.86
1990	20.64	61.20	128.25	33.62	1.38	8.78	3.57
1991	25.40	67.17	140.24	33.31	1.65	9.47	4.31
1992	31.90	73.02	149.39	31.17	1.93	10.22	5.10
1993	40.'?1	79.50	155.50	27.38	2.24	11.04	5.92
1994	53*55	86.03	156.36	21.15	?.54	11.96	6.81
1995	71.47	93.55	151.99	12.87	2.91	13.00	7.75
1996	97.07	101.63	140.97	2.31	3.29	14.19	8.77
1997	133.87	110.83	1.?24.00	-9.85	3.71	15.58	9.89
1998	187.05	121.29	102.10	-22.91	4.17	17.23	11.13
1999	264.21	133.87	77.59	-35.79	4.71	19.23	12.52
2000	376.57	'149.33	52.65	-47.68	5.33	21.68	14.13

Source: Alaska Sea Grant Program.

is expected to increase from $39.8 million to over $88 million (see Table 3.77). The corresponding percentage increases are 24.5 percent by weight and 120.9 percent by real value (see Table 3.78). The more rapid increase in real value is explained by the 73 percent projected increase in the average ex-vessel price.

In addition to the significant changes in absolute harvesting activity, there are expected to be notable changes in the relative importance of individual fisheries. For example, in 1980, groundfish is projected to account for less than one percent of total catch by weight or value but by the year 2000, it is expected to equal 73.9 of total catch by weight and 11.4 percent by value (see Table 3.79 and 3.80). The large difference in the importance of groundfish as measured by weight or value is due to the large ex-vessel price differential between groundfish and the traditional high-valued species such as crab and salmon. As is indicated by the projections in Tables 3.81 through 3.83, the changes in the relative number of boats, fishermen, or landings are not expected to be significant. Within the traditional fisheries the changes in relative importance are expected to be less dramatic. In terms of pounds harvested, the salmon and halibut fisheries are expected to make minor gains at the expense of the shellfish fisheries (see Table 3.84). In terms of relative value, the salmon and shrimp fisheries have minor gains and the other fisheries have minor losses or are little changed (see Table 3.85). The changes in the relative importance of individual traditional fisheries as measured by the number of boats, fishermen, or landings are insignificant except for the gains by the halibut fishery at the expense of the salmon fishery (see Tables 3.86 through 3.88).

TABLE 3.77

PROJECTED HARVESTING ACTIVITY
COOK INLET TRADITIONAL FISHERIES 1980-2000

	CATCH				EX-VESSEL PRICE				
	WEIGHT		VALUE ($1,000)[1]		($/Pound)		NUMBER OF		
Year	POUNDS (1,000)	METRIC TONS	Nominal	Real	Nominal	Real	Boats	Landings	Fishermen
1980	44975	20401	44338	39835	0.99	0.89	1641	16272	3523
1981	45628	20697	49954	42541	1.09	0.93	1642	1644?	3525
1982	46312	21007	55632	44907	1*2O	0.97	1643	16631	3527
1983	47028	2133?	62377	47727	1.33	1.O1	1643	16824	3529
1984	4778(-)	21673	69282	50246	1.45	1.05	1644	17027	3531
1985	48568	2?030	77007	52938	1.59	1.09	1644	17241	3533
1986	48920	22190	84606	55129	1.73	1.13	1648	17319	3554
1987	49284	22355	92915	57387	1.89	1.16	1652	17401	3575
1988	49663	22527	101598	59479	2.05	1.20	1655	17487	3598
1989	5(-)059	22706	111081	61640	2.22-	1.23	1659	17577	3621
1990	50472	22894	171456	63884	2.41	1.27	1663	17672	3646
1991	50904	23090	132628	66123	2.61	1.30	1668	17772	3671
1992	51358	23296	144430	68253	2*81	1.33	1672	17878	3697
1993	51833	23511	157507	70552	3.04	1.36	1676	17990	3724
1994	52333	23738	171-353	72753	3.27	1.39	1681	18110	3752
1995	52860	23977	186813	75182	3.53	1.42	1686	18237	3781
1996	53416	24?29	203400	77590	3.81	1.45	1691	18374	3811
1997	54004	24496	221457	80074	4.10	1.48	1696	18520	3842
1998	54628	24779	241055	82617	4.41	1.51	1702	18678	3875
1999	55291	25080	262434	85255	4.75	1.54	1707	18848	3909
2000	55997	25400	285809	88008	5.10	1..57	1713	19032	3944

Source: Alaska Sea Grant Program.

[1]The real values and prices are in terms of 1978 dollars.

TABLE 3.78

PROJECTED PERCENTAGE CHANGE FROM 1980, COOK INLET TRADITIONAL FISHERIES

Year	CATCH		EX-VESSEL PRICE		NUMBER OF		
	Weight	Real Value	Nomina	Real	Boats	Landings	Fishermen
1980	0	0	0	0	0	0	0
1981	1.45	6.79	11.05	5.27	0.04	1.07	0.06
1982	2.97	12.73	21.85	9.48	0.07	2.20	0.12
1983	4.57	19.81	34.54	14.58	0.11	3.39	0.17
1984	6.24	26.14	47.09	18.73	0.15	4.64	0.23
1985	7.99	32.89	60.84	23.06	0.18	5.95	0.28
1986	8.77	38.39	75.43	27.23	0.40	6.44	0.88
1987	9.58	44.06	91.24	31.46	0.62	6.94	1.50
1988	10.42	49.31	107.52	35.22	0.85	7.46	2.13
1989	11.30	54.74	125.09	39.02	1.09	8.02	2.80
1990	12.22	60.37	144.10	42.90	1.34	8.60	3.48
1991	13.18	65.99	164.29	46.66	1.60	9.22	4.20
1992	14.19	71.34	185.27	50.05	1.87	9.87	4.94
1993	15.25	77.11	208.24	53.68	2.14	10.56	5.70
1994	16.36	82.64	232.13	56.96	2.43	11.30	6.50
1995	17.53	88.73	258.49	60.58	2.73	12.08	7.32
1996	18.77	94.78	286.26	64.00	3.04	12.92	8.18
1997	20.08	101.01	315.97	67.41	3.36	13.82	9.07
1998	21.46	107.40	347.61	70.75	3.69	14.79	10.00
1999	22.94	114.02	381.47	74.09	4.03	15.83	10.96
2000	24.51	120.93	417.74	77.45	4.39	16.96	11.95

Source: Alaska Sea Grant Program.

TABLE 3.79

PERCENTAGE OF CATCH BY WEIGHT BY COOK INLET
FISHERY INCLUDING GROUNDFISH, 1980-2000

Year	Salmon	Halibut	Herring	King Crab	Tanner Crab	Dungeness Crab	Shrimp	Groundfish
1980	45.100	7.319	14.274	8.148	11.488	0.998	12.420	0.253
1981	45.557	7.?07	14.056	8.246	11.369	0.983	12.230	0.352
1982	46.011	7.091	13.829	8.338	11.242	0.967	12.033	0.491
1983	46.452	6.969	13.592	8.422	11.104	(3.950	11.826	0.684
1984	46.871	6.841	13.342	8.496	10.954	0.933	11.609	0.955
1985	47.252	6.704	13.075	8.557	10.789	08914	11.377	1.332
1986	47.103	6.874	1.?*G'10	8.447	10.657	0.903	11.?33	1.874
1987	46.851	7.(")"31 '	12.715	8.319	10.496	0.889	11.063	2.636
1988	46.454	"7. 15-?	12.480	8.165	10.302	0.873	10.859	3.700
1989	45.860	7.271	12.191	7.977	1(-).06.4	0.852	10.608	5.177
1990	44.998	7.328	11.832	7.74?	9.768	0.827	10.295	7.210
1991	43.782	"?. 321	11.383	7.448	9.397	0.796	9.904	9.969
1992	42.118	7.228	10.822	7.081	8.934	0.757	9.416	13.645
1993	39.913	7.027	in.]30	6.628	8.362	0.708	8.814	18.418
1994	37.101	6.696	9.296	6.082	7.674	0.650	8.088	24.413
1995	33.674	6.227	8.324	5.447	6.872	0.582	7.243	31.631
1996	29.717	5.627	7.243	4.739	5.979	0.506	60302	39.885
1997	25.416	4.924	6.103	3.993	5.038	0.427	5.311	48.787
1998	21.035	4.167	4.973	3.254	4.105	0.348	4.327	57.793
1999	16.856	3.410	3.919	2.564	3.235	0.274	3.410	66.331
2000	13.116	2.707	2.995	1.960	2.473	0.209	2.606	73.941

Source: Alaska Sea Grant Program.

TABLE 3. 80

PERCENTAGE OF VALUE BY COOK INLET
FISHERY INCLUDING GROUNDFISH, 1980-2000

Year	Salmon	Halibut	Herring	King Crab	Tanner Crab	Dungeness Crab	Shrimp	Groundfish
1980	52.17	14.31	12.34	9.04	7.08	0.82	4.20	0.03
1981	54.20	13.70	11.67	8*93	6.54	0.78	4.13	0.04
1982	55.63	13.26	11.16	8.92	6.12	0.75	4.10	0.06
1983	57.33	12.71	10.59	8.82	5.70	0.72	4.05	0.07
1984	58.58	12.28	10.16	8.79	5.36	0.69	4.04	0.10
1985	59.82	11.85	9.73	8.74	5.04	0.67	4.03	0.13
1986	60.37	11.99	9.43	8.56	4.7P	0.65	4.06	0.17
1987	60.89	12.12	9.14	8.37	4.54	0.63	4.09	0.23
1988	61.23	12.29	8.89	8.20	4.33	0.61	4.14	0.30
1989	61.53	1?.45	8.65	8.03	4.14	0.60	4.19	0.41
1990	61.82	12.59	8.42	7.84	3.96	0.58	4.24	0.55
1991	62.(-)1	12.74	8.19	7.66	3.79	0.57	4.29	0.74
1992	62.07	12.90	7.99	7.48	3.65	0.55	4.36	1.01
1993	62.11	13.03	7.77	7.28	3.5(-)	0.54	4.41	1.36
1994	61.97	13.16	7.57	7.09	3.37	0.52	4.47	1.86
1995	61.78	13.23	7.35	6.87	3.23	0.51	4.51	2.52
1996	61.40	13.28	7.12	6.64	3.10	0.49	4.54	3.43
1997	6(-).77	13.27	6.87	6.40	2.96	0.47	4.56	4.69
1998	59.90	13.21	6.61	6.1.3	2.83	0.45	4.56	6.31
1999	58.65	13.04	6.31	5.83	2.68	(3.43	4.s3	8.52
2000	57.00	12.71	5.98	5.44	2.53	0.40	4.47	11.42

Source: Alaska Sea Grant Program.

TABLE 3.81

PERCENTAGE OF BOATS BY COOK INLET
FISHERY INCLUDING GROUNDFISH, 1980-2000

Year	Salmon	Halibut	Herring	King Crab	Tanner Crab	Dungeness Crab	Shrimp	Groundfish
1980	76.096	5.434	4.143	4.218	3.857	2.904	3.347	0.002
1981	76.067	5.432	4.141	4.237	3.868	2.906	3.346	0.002
1982	76.039	5.430	4.140	4.255	3.881	2.908	3.345	0.003
1983	76.011	5.428	4.138	4.272	3.894	2.910	3.343	0.004
1984	75.983	5.426	4.137	4.288	3.907	2.911	3.342	0.006
1985	75.955	5.424	4.135	4.303	3.921	2.913	3.341	0.008
1986	75.788	5.620	4.126	4.300	3.912	2.910	3.333	0.011
1987	75.617	5.823	4.117	4.295	3.901	2.906	3.326	0.015
1988	75.439	6.033	4.107	4.290	3.891	2.902	3.318	0.020
1989	75.254	6.250	4.097	4.284	3.880	2.897	3.310	0.027
1990	75.063	6.474	4.087	4.277	3.869	2.892	3.302	0.037
1991	74.862	6.706	4.076	4.269	3.857	2.887	3.293	0.051
1992	74.652	6.944	4.064	4.260	3.845	2.881	3.284	0.069
1993	74.431	7.190	4.052	4.250	3.833	2.874	3.274	0.095
1994	74.196	7.444	4.040	4.240	3.820	2.867	3.263	0.130
1995	73.945	7.704	4.026	4.228	3.806	2.859	3.252	0.179
1996	73.674	7.971	4.011	4.215	3.792	2.850	3.241	0.246
1997	73.376	8.245	3.995	4.200	3.776	2.840	3.227	0.339
1998	73.048	8.524	3.977	4.183	3.758	2.829	3.213	0.467
1999	72.676	8.807	3.957	4.164	3.738	2.816	3.197	0.645
2000	72.246	9.092	3.933	4.141	3.716	2.801	3.178	0.891

Source: Alaska Sea Grant Program.

TABLE 3.82

PERCENTAGE OF FISHERMEN BY COOK INLET
FISHERY INCLUDING GROUNDFISH, 1980-2000

Year	Salmon	Halibut	Herring	King Crab	Tanner Crab	Dungeness Crab	Shrimp	Groundfish
1980	57.878	15.190	7.721	6.877	6.289	2.706	3.335	C.004
1981	57.843	15.181	7.716	6.907	6.307	2.707	3.333	0.006
1982	57.809	15.172	7.712	6.935	6.326	2.708	3.331	0.008
1983	57.775	15.163	7.707	6.961	6.345	2.709	3.329	0.010
1984	57.740	15.154	7.703	6.986	6.366	2.710	3.327	C.014
1985	57.706	15.145	7.698	7.009	6.386	2.711	3.325	C.019
1986	57.361	15.634	7.652	6.977	6.348	2.698	3.305	0.025
1987	57.008	16.136	7.605	6.943	6.306	2.684	3.285	0.034
1988	56.645	16.650	7.556	6.906	6.263	2.669	3.264	0.046
1989	56.270	17.177	7.506	6.867	6.220	2.654	3.243	0.063
1990	55.884	17.716	7.455	6.826	6.175	2.638	3.220	C.085
1991	55.485	18.267	7.402	6.783	6.129	2.621	3.197	C.115
1992	55.071	18.829	7.346	6.738	6.082	2.604	3.174	C.157
1993	54.641	19.401	7.289	6.690	6.033	2.585	3.149	C.214
1994	54.190	19.981	7.229	6.639	5.982	2.565	3.123	C.292
1995	53.715	20.569	7.166	6.584	5.928	2.545	3.095	C.398
1996	53.211	21.160	7.098	6.526	5.871	2.522	3.066	0.545
1997	52.670	21.752	7.026	6.463	5.810	2.498	3.035	C.745
1998	52.083	22.337	6.948	6.394	5.745	2.471	3.001	1.021
1999	51.437	22.909	6.861	6.318	5.672	2.442	2.964	1.398
2000	50.711	23.456	6.765	6.231	5.592	2.408	2.922	1.915

Source: Alaska Sea Grant Program.

TABLE 3.83

PERCENTAGE OF THE NUMBER OF LANDINGS BY COOK INLET
FISHERY INCLUDING GROUNDFISH, 1980-2000

Year	Salmon	Halibut	Herring	King Crab	Tanner Crab	Dungeness Crab	Shrimp	Groundfish
1980	71.578	2.192	2.630	5.413	5.49(-)	3.629	9.058	0.009
1981	71.707	2.169	2.602	5.512	5.452	3.594	8.953	0.012
1982	71.841	2.145	2.573	5.610	5.411	3*557	8.846	C.016
1983	71.982	2.120	?.543	5.708	5.369	3.519	8.737	0.021
1984	72.130	2.095	2.513	5.803	5.324	3.480	8.627	0.029
1985	72.284	2.068	2.482	5.898	5.277	3.439	8.514	0.038
1986	72.3?1	2.138	2.470	5.869	5.254	3.426	8.470	C.052
1987	72.356	2.210	2.458	5.840	5.229	3.413	8.425	0.070
1988	72.389	2.283	2.445	5.810	54202	3.398	8.378	C.095
1989	72.419	2.358	2.432	5.778	5.173	3.382	8.329	0.129
1990	72.443	2.434	2.418	5*-745	5.143	3.365	8.278	C.175
1991	72.459	2.512	?.403	5.709	5.111	3.346	8.223	C.238
1992	72.462	2.591	2.386	5.670	5.076	3.325	8.165	C.324
1993	72.44"1	2.671	2.369	5.628	5.039	3.303	8.102	C.442
1994	72.407	2.751	2.349	5.582	4.99"?	3.278	8.(-)34	C.602
1995	72.330	2.831	2.328	5.530	4.951	3.249	7.958	C.822
1996	72.202	2.909	2.303	5.473	4.900	3.217	7.873	1.123
1997	72.001	2.985	2.276	5.407	4.841	3.180	7.777	1.534
1998	71.700	3.056	2.243	5.331	4.773	3.137	7.666	2.095
1999	71.261	3.12)	2.206	5.242	4.693	3.085	7.537	2.857
2000	70.634	3.175	2.1('1	5.136	4.598	3.074	7.383	3.888

Source: Alaska Sea Grant Program.

TABLE 3.84

PERCENTAGE OF CATCH BY WEIGHT BY COOK INLET
FISHERY EXCLUDING GROUNDFISH, 1980-2000

Year	Salmon	Halibut	Herring	King Crab	Tanner Crab	Dungeness Crab	Shrimp
1980	45.214	7.337	14.310	8.169	11.518	1.001	12.451
1981	45.718	7.232	14.105	8.275	11.409	0.986	12.273
1982	46.238	7.126	13.897	8.379	11.297	0.972	12.092
1983	460773	7.017	13.685	8.480	11.181	0.957	110908
1984	47.323	6.907	13.470	8.578	11.060	0.942	11.721
1985	47.890	6.795	13.252	8.672	10.935	0.927	11.530
1986	4800(33	7.005	13.156	8.608	10.861	0.920	11.447
1987	48.119	7.221	13.059	8.544	10.780	0.913	11.363
1988	48.239	7.442	12.959	8.479	10.698	0.906	11.276
1989	48.364	7.668	12.857	8.412	10.614	0.899	11.187
1990	48.494	7.898	120752	8.343	10.527	0.892	110095
1991	48.630	8.132	12.643	8.272	10.437	0.884	11.001
1992	48.773	8.371	12.532	8.199	10.345	0.876	1(').904
1993	48.924	8.613	12.417	8.124	10.250	0.868	10*804
1994	49.084	8.859	12.298	8.046	10.152	0.860	10.701
1995	49. ?53	9.1(-)9	12.176	7.966	10.051	0.851	10.594
1996	49.434	9.361	12.049	7.883	9.946	0.842	10.484
1997	49.629	9.615	11.918	7.798	9.838	0.833	10*37O
1998	49.838	9.872	11.782	7.709	9.726	0.824	10.251
1999	50.063	10.129	11.640	7.616	9.609	0.814	10.128
?000	50.308	10.386	11.494	7.52o	9.488	0.804	10.001

Source: Alaska Sea Grant Program.

TABLE 3.85

PERCENTAGE OF THE VALUE BY COOK INLET FISHERY EXCLUDING GROUNDFISH, 1980-2000

Year	Salmon	Halibut	Herring	King Crab	Tanner Crab	Dungeness	Shrimp
1980	52.19	14.32	12.35	9.04	7.08	0.82	4.20
1981	54.23	13.71	11.67	8.94	6.55	0.78	4.13
1982	55.66	13.26	11.16	8.93	6.13	0.75	4.10
1983	57.37	12.72	10.60	8.83	5.70	0.72	4.06
1984	58.63	12.30	10.17	8.80	5.36	0.69	4.04
1985	59.90	11.86	9.74	8.75	5.05	0.67	4.03
1986	60.47	12.01	9.44	8.57	4.79	0.65	4.06
1987	61.03	12.14	9.16	8.39	4.55	0.63	4.10
1988	61.41	12.33	8.92	8.23	4.35	0.62	4.15
1989	61.78	12.50	8.69	8.06	4.16	0.60	4.21
1990	62.16	12.66	8.46	7.88	3.98	0.59	4.26
1991	62.48	12.84	8.25	7.71	3.82	0.57	4.32
1992	62.70	13.04	8.07	7.56	3.68	0.56	4.40
1993	62.97	13.21	7.88	7.38	3.55	0.54	4.47
1994	63.14	13.41	7.72	7.22	3.43	0.53	4.55
1995	63.38	13.58	7.54	7.05	3.31	0.52	4.62
1996	63.58	13.75	7.37	6.88	3.21	0.50	4.70
1997	63.76	13.93	7.21	6.71	3.11	0.49	4.79
1998	63.94	14.09	7.06	6.54	3.02	0.48	4.87
1999	64.12	14.25	6.90	6.37	2.93	0.47	4.96
2000	64.35	14.35	6.75	6.20	2.85	0.45	5.04

Source: Alaska Sea Grant Program.

TABLE 3.86

PERCENTAGE OF BOATS BY COOK INLET
FISHERY EXCLUDING GROUNDFISH, 1980-2000

Year	Salmon	Halibut	Herring	King Crab	Tanner Crab	Dungeness Crab	Shrimp
1980	76.098	5*434	4.143	4.218	3.857	2.904	3.347
1981	76. 069	5.432	4.141	4.237	3.868	2.906	3.346
1982	760041	5.430	4.140	4.255	3.881	2.9o8	3.345
1983	76.014	5.428	4.138	4.272	3.894	2.910	3*343
1984	75.987	5.426	4.137	4.288	3.907	2.912	3.342
1985	75.961	5.424	4.136	4.304	3.921	2.913	3.341
1986	75*796	5.621	4.127	40300	3.912	2.910	3.334
1987	75.628	5.824	4.117	4.296	3.902	2.906	3.326
1988	75.454	6.035	4.108	4.291	3.891	2.902	3.319
1989	75.275	6.252	4.098	4.285	3.881	2.898	3*311
1990	75.090	6.477	4.088	4.278	3.870	2.893	3.303
1991	74.9(30	6.709	4.078	4.271	3.859	2.888	3.294
1992	74.704	6.949	4.067	4.263	3.848	2.883	3.286
1993	74.502	7.197	4.056	4.254	3.837	2.877	3.277
1994	74.293	7.453	4.045	4.245	3.825	2.871	3.268
1995	74.(-)78	7.718	4.033	4.235	3.813	2.864	3.258
1996	73.856	7.991	4.021	4.225	3.801	2.857	3.249
1997	73.627	8.273	4.0(-)9	4.214	3.789	2.850	3.238
1998	73.391	8.564	3.996	4.203	3.77(5	2.842	3.228
1999	73.148	8.864	3.982	4.191	3.763	2.834	3,217
2000	72.898	9*174	3.969	4.178	3.749	2.826	3.206

Source: Alaska Sea Grant Program.

TABLE 3.87

PERCENTAGE OF FISHERMEN BY COOK INLET
FISHERY EXCLUDING GROUNDFISH, 1980-2000

Year	Salmon	Halibut	Herring	King Crab	Tanner Crab	Dungeness Crab	Shrimp
1980	57.880	15.191	7.721	6.878	6.289	2.706	3.335
1981	57.846	15.182	7.717	6.908	6.307	2.707	3.333
1982	57.813	15.173	7.712	6.936	6.326	2.709	3.332
1983	57.781	15.,164	7.708	6.962	6.346	2.710	3.330
1984	57*748	15.156	7.704	6.987	6.366	2.711	3.328
1985	570717	15.148	7.699	7.011	6.388	2.712	3.326
1986	57.375	15.638	7.654	6.979	6.349	2.699	3.306
1987	57.027	16.141	7.607	6.945	6.308	2.685	3.286
1988	56.671	16.658	7.560	6.909	6.266	‘2.671	3,266
1989	56.306	17.188	7*511	6.871	6.224	2.656	3.245
1990	55.932	17.731	7.461	6.832	6.180	2.640	3.223
1991	55.549	18.288	7.410	6.791	6.136	2.624	3.201
1992	55.158	18.858	7.358	6.748	6.091	2.608	3.179
1993	54.758	19.442	7.305	6.704	6.046	2.591	3.155
1994	54.348	20.040	7.250	6.658	5.999	2.573	3.132
1995	53.930	20.651	7.194	6.611	5.952	2.555	30108
1996	53.5(32	21.27(5	7.137	6.562	5.903	2.536	3.083
1997	53.066	21.915	7.079	6.512	5.854	2.517	3.058
1998	52.620	22.567	7.019	6.460	5.804	2.497	3.032
1999	52.165	23.234	6.959	6.407	5.753	2.476	3.006
2000	51.701	23.914	6.897	6.353	5.7(-)1	2.455	2.979

Source: Alaska Sea Grant Program.

TABLE 3.88

PERCENTAGE OF THE NUMBER OF LANDINGS BY COOK INLET
FISHERY EXCLUDING GROUNDFISH, 1980-2000

Year	Salmon	Halibut	Herring	King Crab	Tanner Crab	Dungeness Crab	Shrimp
1980	71.584	2.192	2.630	5.414	5.491	3.629	9.059
1981	71.715	2.169	2.602	5.513	5.452	3.594	8.954
1982	71.853	2.145	2.574	5.611	5.412	3.558	8.847
1983	71.998	2*121	2.544	5.709	5.370	3.520	8.739
1984	72.15(I	2.095	2.514	5.805	5.326	3.481	8.629
1985	72.311	2.069	2.482	5.900	5.279	3.441	8.517
1986	72.358	2.139	2.471	5.872	5.257	3.428	8.474
1987	72.407	2.211	2.460	5.844	5.232	3.415	8.431
1988	72.458	2.285	2.448	5.816	5.207	3.401	8.386
1989	72.512	2.361	2.435	5.786	5.180	3,386	8.340
1990	72.570	2.439	2.4?2	5.755	5*152	3*371	8,292
1991	72.631	2.518	2.408	5.722	5.123	3.354	8.243
1992	77.697	2.600	2.394	5.688	5.093	3.336	8.191
1993	72.769	2.683	2.379	5.653	5.061	3.317	8.138
1994	72.846	2.768	2.363	5.616	5.028	3.297	8.082
1995	72.930	2.854	2.347	5.576	4.992	3.276	8.024
1996	73.022	2.942	2.329	5.535	4.955	3.254	7.963
1997	73.123	3.031	2.311	5.491	4.916	3,229	7.898
1998	73.234	3.121	2.291	5.445	4.875	3.204	7.830
1999	73*356	3.212	2.271	5.396	4.831	3.176	7.758
2000	73*49]	3.304	2.249	5*343	4.784	3.147	7.682

Source: Alaska Sea Grant Program.

As is mentioned in Chapter II, the summation of the number of landings of fishermen or boats over all fisheries results in double counting since a fisherman or boat is counted once for each fishery which is participated in. The method used to reduce this problem is also discussed in Chapter II; the results of this method are presented in Tables 3.89 and 3.90 which include adjusted and unadjusted projections of the numbers of fishermen and boats that will participate in the harvesting sector of the Seward commercial fishing industry. Again it should be noted that since, with the exception of the groundfish and halibut fisheries, Cook Inlet harvesting activity is used as a proxy for Seward harvesting activity and since the harvesting activity is not concentrated in the waters adjacent to Seward, the projections of the number of boats greatly overstates the vessel traffic and harbor usage that is expected to occur. However, the projected percentage increases are expected to be applicable to Seward as well as the entire Cook Inlet area, such projections are presented in Table 3.76.

Local Harvesting Effort

The difficulties associated with defining and measuring local harvesting effort are discussed in Chapter II. The 'results of the method developed to measure local effort in that chapter are presented in this section. As the values of the local harvesting factors of Table 3.91 indicate, the degree to which a fishery can be considered local varies greatly. For example, although 19 percent of the purse seine salmon harvesting activity is local (i.e., carried on by residents of Seward), less than 3 percent of the drift gill net fishery and almost none of the set gill

TABLE 3.89

ADJUSTED PROJECTIONS OF THE NUMBER OF FISHERMEN
FOR THE SEWARD COMMERCIAL FISHING INDUSTRY 1980-2000

Year	SALMON FISHERIES		SHELLFISH FISHERIES		TRADITIONAL FISHERIES		ALL FISHERIES	
	Unadjusted	Adjusted	Unadjusted	Adjusted	Unadjusted	Adjusted	Unadjusted	Adjusted
1980	2039	1942	677	431	3523	2908	3523	2908
1981	2039	1942	679	432	3525	2909	3525	2910
1982	2039	1942	681	434	3527	2911	3527	2911
1983	2039	1942	683	435	3529	2912	3529	2912
1984	2039	1942	685	436	3531	2913	3531	2914
1985	2039	1942	687	437	3533	2914	3533	2915
1986	2039	1942	687	438	3554	2935	3555	2936
1987	2039	1942	687	438	3575	2957	3577	2958
1988	2039	1942	688	438	3598	2979	3600	2981
1989	2039	1942	688	438	3621	3002	3624	3005
1990	2039	1942	688	438	3646	30?7	3649	3030
1991	2039	1942	688	438	3671	3052	3675	3056
1992	2039	1942	689	439	3697	3078	3702	3083
1993	2039	1942	689	439	3724	3105	3732	3113
1994	2039	1942	689	439	3752	3133	3763	3143
1995	2039	1942	689	439	3781	3162	3796	3177
1996	2039	1942	689	439	3811	3192	383?	3213
1997	2039	1942	689	439	3842	3223	3871	3252
1998	2039	1942	689	439	3875	3256	3915	3295
1999	2039	1942	690	439	3909	3289	3964	3345
2000	2039	1942	690	439	3944	3324	4021	3401

Source: Alaska Sea Grant Program.

TABLE 3.90

ADJUSTED PROJECTIONS OF THE NUMBER OF BOATS
FOR THE SEWARD COMMERCIAL FISHING INDUSTRY 1980-2000

Year	SALMON FISHERIES		SHELLFISH FISHERIES		TRADITIONAL FISHERIES		ALL FISHERIES	
	Unadjusted	Adjusted	Unadjusted	Adjusted	Unadjusted	Adjusted	Unadjusted	Adjusted
1980	1249	1190	235	150	1641	1428	1641	1429
1981	1249	1190	236	150	1642	1429	1642	1429
1982	1249	1190	236	151	1643	1429	1643	1429
1983	1249	1190	237	151	1643	1430	1643	1430
1984	1249	1190	238	151	1644	1430	1644	1430
1985	1249	1190	238	152	1644	1430	1644	1430
1986	1249	1190	238	152	1648	1434	1648	1434
1987	1249	1190	238	152	1652	1438	1652	1438
1988	1249	1190	238	152	1655	1441	1656	1442
1989	1249	1190	239	152	1659	1445	1660	1446
1990	1249	1190	239	152	1663	1449	1664	1450
1991	1249	1190	239	152	1668	1453	1668	1454
1992	1249	1190	239	152	1672	1458	1673	1459
1993	1249	1190	239	152	1676	1462	1678	1464
1994	1249	1190	239	152	1681	1467	1683	1469
1995	1249	1190	239	152	1686	1472	1689	1475
1996	1249	1190	239	152	1691	1477	1695	1481
1997	1249	1190	239	152	1696	1482	1702	1488
1998	1249	1190	239	152	1702	1488	1710	1496
1999	1249	1190	239	152	1707	1493	1719	1504
2000	1249	1190	239	152	1713	1499	1729	1514

Source: Alaska Sea Grant Program.

TABLE 3.91
LOCAL HARVESTING FACTOR FOR SEWARD, 1976

Cook Inlet:	LPO	IP	P	LPO/TP = P
King crab small boat pots	1	103	.010	
King crab large boat pots	4	33	.121	
salmon drift gill net	16	596	.027	
salmon set gill net	4	718	.001	
salmon purse seine	15	79	.190	

$$P = [(PF/TP) \cdot LPO]/B$$

Statewide:	PF	TP	LPO	B	P
Halibut hand troll	1	43	-0-		
Halibut small boat long line	95	1,323	11		.009
Halibut large boat long line	256	1,112	19	1:?	.026
Sablefish small boat long line	NA	NA	-0-		
Sablefish large boat long line	NA	NA	2		
Sablefish large boat pots	NA	NA	-0-		
Dungeness crab small boat pots	43	240	2	18	.020
Dungeness crab large boat pots	12	43	1	1	.280
Herring purse seine	129	251	13	66	.101
Herring beach seine	NA	13	-o-		
Herring set gill net	109	249	-0-	3	-0-
Herring pound	3	6	1		
Herring roe on kelp	407	1,529	43		
Bottomfish hand troll	NA	10	1		
Bottomfish small boat long line	3	66	1	5	.009
Bottomfish large boat long line	8	59	3		
Bottomfish small boat pots	1	7	1		
Bottomfish otter trawl	12	40	1		
Bottomfish beam trawl	NA	6	-0-		
Shrimp otter trawl	129	218	-0-	8	-0-
Shrimp beam trawl	22	69	1		
Shrimp large boat pots	4	30	1		
Shrimp small boat pots	33	281	12	34	.041
Razor clams shovel	8	174	1		
Razor clams dredge	NA		1		
Salmon hand troll	1,239	2,74:	-0-	2	-0-
Salmon power troll	742	999	2		
Tanner crab small boat pots	166	295	5	47	.060
Tanner crab large boat pots	224	341	10	25	.263
Tanner crab other	NA	1	1		
Scallops dredge	NA	NA	7		

P = Estimate of the proportion of fishing effort that is local
LPO = Number of local permit owners
TP = Total number of permits
PF = Number of permits fished
B = Number of boats participating in the fishery

Source: ADF&G and CFEC data files.

net salmon harvesting activity are local. For each fishery in which separate data are available by boat size, the local participation factor is significantly higher for large boats than for small boats. This can in part be explained by the fact that Seward is some distance from the major fishing grounds; therefore, for Seward residents to participate in the fisheries, larger and more seaworthy boats are required.

PROCESSING

The projections of processing plant activity presented in this section are based on the projections of industry-wide catch discussed in a preceding section. The measures of activity are in terms of processing plant input requirements and processing plant payrolls or income. Four sets of projections are presented for each measure of processing activity; the four sets are the traditional fisheries with and without increased efficiency and all fisheries with and without increased efficiency.

Water

In 1976 and 1977, the peak water usage by Seward processing plants was approximately 3.4 million liters (0.9 million gallons) per day. Using this as the base peak load, the peak load is projected to be between 2.6 and 5.9 million liters (0.7 and 1.56 million gallons) per day by 2000 (see Table 3.92).

TABLE 3.92

PROJECTED PEAK SEWARD PROCESSING REQUIREMENTS FOR WATER

Year	1000 GALLONS/DAY Traditional Fisheries		All Fisheries		PERCENTAGE INCREASE* Traditional Fisheries		All Fisheries	
		2	1	2	1	2	1	2
1980	873	838	873	839	-3*OO	-6.84	-2.96	-6.81
1981	886	834	886	834	-1.59	-7.38	-1.54	-7*33
1982	899	829	900	830	-0.12	-7.87	-0.04	-7.80
1983	913	825	914	826	1.43	-8.32	1.53	-8.22
1984	927	822	929	823	3.05	-8.72	3.20	-8.58
1985	943	818	945	820	4.74	-9.07	4.96	-8*88
1986	950	808	952	810	5.51	-10.24	5.82	-9.97
1987	957	798	961	801	6.29	-11.38	6.73	-11.01
1988	964	788	970	792	7.11	-12.48	7.74	-11.97
1989	972	778	980	785	7.96	-13.55	8.87	-12.82
1990	980	769	991	778	8.85	-14.58	10.16	-13.56
1991	988	760	1005	773	9.78	-15.57	11.66	-14.13
1992	997	751	1021	77(3	10.76	-16.53	13.46	-14.49
1993	1006	743	1041	769	11.79	-17.44	15.68	-14.56
1994	1016	735	1066	772	12.87	-18.31	18.49	-14.24
1995	1026	728	1099	780	14.00	-19.13	22.14	-13.36
1996	1037	721	1143	794	15.20	‘19.92	26.99	-11.72
1997	1048	714	1202	819	16.47	-20.66	33.58	-9.00
1998	1060	708	1284	857	17.81	-21.35	42.70	-4.74
1999	1073	702	1399	916	19*24	-21.98	55.48	1.72
2000	1087	697	1563	1002	20.77	-22.57	73.62	11032

Source: Alaska Sea Grant Program.

‘Requirement without increase efficiency.

‘Requirement with a 2 percent annual decrease in input requirements per unit produced.

*Projected percentage increase since the late 1970s.

Electricity

Based on a base peak load requirement of 0.3 million kilowatt hours of electricity per month, the projected peak use of electricity by processing plants in the year 2000 is projected to range from 0.4 to 3.4 million kilowatt hours per month (see Table 3.93).

Employment

Using 1976-1977 Alaska Department of Labor estimates of average monthly employment in Seward processing plants as the base, the projections of average monthly employment for the year 2000 range from 244 to 794 (see Table 3,94).

Income

Using corresponding data of the annual payroll of processing plants, the annual real income for the year 2000 is projected to range from $2.5 million to 8.2 million (see Table 3.94). The projected percentage changes in income and employment are presented in Table 3.95.

Number of Plants

By the end of the forecast period there are expected to be two large multi-species processing plants in addition to two to three smaller, more specialized plants. Since the projected development of the ground-

TABLE 3.93

PROJECTED PEAK SEWARD PROCESSING REQUIREMENTS FOR ELECTRICITY

Year	1000 KWH/MONTH				PERCENTAGE INCREASE*			
	Traditional Fisheries		All Fisheries		Traditional Fisheries		All Fisheries	
	1	2	1	2	1	2	1	2
1980	320	307	322	310	-3.00	-6*84	-2.34	-6.21
1981	325	306	328	309	-1.59	-7.38	-0.66	-6.50
1982	330	304	334	308	-0.12	-7.87	1.20	-6.66
1983	335	303	341	308	1*43	-8.32	3.30	-6.63
1984	340	301	349	309	3.05	-8.72	5.71	-6,36
1985	346	300	358	311	4,74	-9.07	8.53	-5.79
1986	348	296	366	311	5.51	-10.24	10.90	-5.65
1987	351	292	376	314	6.29	-11.38	14.00	-4.95
1988	353	2R9	390	319	7*11	-12.48	18.13	-3.48
1989	356	285	408	327	7.96	-13.55	23.75	-0.91
1990	359	282	434	341	8.85	‘14.58	31051	3.20
1991	362	279	470	361	9*78	-15.57	42.35	9.47
1992	366	275	520	392	10.76	-16.53	57.65	18.81
1993	369	272	592	437	11.79	-17.44	79.40	32.50
1994	372	270	695	503	12.87	-18.31	110.52	52.38
1995	376	267	842	598	14*OO	-19.13	155.29	81.09
1996	380	264	1056	734	15*2O	-19.92	219.96	122.42
1997	384	262	1365	930	16.47	-20.66	313.70	181.82
1998	389	260	1815	1212	17.81	-21.35	449.97	267.16
1999	394	257	2470	1616	19.24	-21.98	648.58	389.76
2000	399	256	3428	2198	20.77	-22.57	938.72	566.00

Source: Alaska Sea Grant Program.

[1]Requirement without increased efficiency.

[2]Requirement with a 2 percent annual decrease in input requirements per unit produced.

*Projected percentage increase since the late 1970s.

TABLE 3.94

PROJECTED SEWARD PROCESSING EMPLOYMENT AND INCOME, 1980-2000

	TRADITIONAL FISHERIES						ALL FISHERIES					
	WITHOUT INCREASED EFFICIENCY			WITH INCREASED EFFICIENCY			WITHOUT INCREASED EFFICIENCY			WITH INCREASED EFFICIENCY		
Year	Employment[1]	Nominal Income[2]	Real Income[3]	Employment	Nominal Income	Real Income	Employment	Nominal Income	Real Income	Employment	Nominal Income	Real Income
1980	306	2923	2626	293	2807	2522	306	2928	2631	294	2813	2527
1981	310	3158	2690	292	2973	2532	311	3166	2696	292	2980	2538
1982	315	3414	2756	290	3149	2542	316	3425	2765	291	3160	2551
1983	319	3692	2825	289	3337	2554	321	3708	2837	290	3354	2566
1984	325	3995	2897	288	3539	2567	327	4019	2915	289	3563	2584
1985	330	4325	2973	286	3754	2581	333	4359	2997	289	3789	2605
1986	332	4639	3023	283	3947	2572	336	4691	3056	286	3998	2605
1987	335	4978	3074	279	4150	2563	340	5054	3121	284	4226	2610
1988	337	5342	3127	276	4365	2555	344	5454	3193	283	4477	2621
1989	340	5735	3182	272	4592	2548	350	5901	3274	282	4758	264(I
1990	343	6158	3239	269	4832	2542	357	6404	3368	283	5078	2671
1991	346	6614	3298	266	5086	2536	365	6980	3480	285	5452	2718
1992	349	7107	3358	263	5356	2531	376	7652	3616	290	5901	2789
1993	352	7639	3422	260	5642	2527	390	8451	3786	298	6454	2891
1994	356	8214	3487	257	5945	2524	408	9427	4003	310	7158	3039
1995	359	8836	3556	255	6268	2522	433	10651	4286	328	8082	3253
1996	363	9509	3627	252	6610	2522	467	12228	4665	356	9329	3559
1997	367	10239	3702	250	6975	2522	513	14320	5178	396	11056	3998
1998	371	11030	3780	248	7364	2524	578	17166	5883	454	13499	4627
1999	376	11890	3863	246	7779	2527	667	21129	6864	538	17018	5528
2000	380	12824	3949	244	8223	2532	794	26758	8239	657	22156	6822

Source: Alaska Sea Grant Program.

[1] Average monthly employment.

[2] Annual payroll in $1,000.

[3] Income in 1978 dollars in ($1,000).

TABLE 3.95

PROJECTED PERCENTAGE CHANGE* IN SEWARD
PROCESSING EMPLOYMENT AND INCOME 1980-2000

Year	TRADITIONAL FISHERIES						ALL FISHERIES					
	WITHOUT INCREASED EFFICIENCY			WITH INCREASED EFFICIENCY			WITHOUT INCREASED EFFICIENCY			WITH INCREASED EFFICIENCY		
	Employ-ment[1]	Nominal Income[2]	Real Income[3]	Employ-ment	Nominal Income	Real Income	Employ-men t"	Nominal Income	Real Income	Employ-ment	Nominal Income	Real Income
1980	-3.00	10.02	-1.15	-6.84	5.66	-5.07	-2.83	10.21	-0.98	-6.67	5.85	-4.90
1981	-1.59	18.87	1023	-7038	11.88	-4.72	-1.36	19015	1*47	-7.15	12.16	-4.48
1982	-0012	28.49	3.72	-7.87	18.52	-4.33	0020	28.90	4005	-7.55	18.93	-4.00
1983	1*43	38.96	6.32	-8.32	25.61	-3.89	1.87	39*57	6*79	-7.88	26.22	-3*43
1984	3*O5	50*36	9.05	-8.72	33*19	-3.40	3.66	51.25	9.69	-8.11	34008	-2.76
1985	4*74	62.76	11.89	-9.07	41030	-2.87	5.58	64.07	12.79	-8.23	42.61	-1.97
1986	5.51	74.61	13.78	-10.24	48.55	-3.20	6.67	76.54	15004	-9.07	50.49	-1.94
1987	6.29	87*35	15.71	-11.38	56.20	-3*53	7*91	90.20	17*47	-9.76	59*O5	-1.77
1988	7.11	101.06	17071	-12.48	64.28	-3.83	9036	105.27	20.17	-10.24	68.50	-1.36
1989	7.96	115.83	19.77	-13*55	72.82	-4*1O	11.08	122.08	23.23	-10.43	79.07	-0.63
1990	8.85	131.76	21.90	-14.58	81.87	-4*34	13.21	141.03	26.78	-10.23	91.13	0.53
1991	9.78	148.94	24.11	-15.57	91.44	-4.56	15.86	162.71	30.98	-9050	105.21	2.31
1992	10.76	167.48	26.40	-16.53	101.58	-4.74	19.25	187.98	36.09	-8.04	122.08	4.95
1993	11.79	187.50	28.78	-17*44	112.34	-4.89	23.67	218.07	42.47	-5.55	142.91	8.81
1994	12.87	209.14	31.26	-18.31	123.76	-5000	29.53	254.80	50.64	-1.64	169.41	14.39
1995	14.00	232.55	33.84	-19.13	135.89	-5.07	37.42	300.85	61.32	4.28	204.18	22.42
1996	15,20	257.89	36.52	-19.92	148.79	-5.10	48.15	360.24	75.56	13.02	251.13	33.94
1997	16.47	285.35	39*34	-20.66	162.52	-5.08	62.90	438.96	94.88	25.77	316.12	50.46
1990	17081	315.14	42.28	-21.35	177*15	-5.01	83.35	546.06	121.42	44019	408.07	74.13
1999	19.24	347.49	45*37	-21.98	192.77	-4.89	111.90	695.20	158.33	70,67	540.49	108.07
2000	20.77	382.66	48.62	-22.57	209.47	-4.71	151.98	907.07	210010	108.65	733.88	156.77

Source: Alaska Sea Grant Program.

*1977 is the base period.

[1]Average monthly employment.

‘Annual payroll in $1,000.

[3]Income in 1978 dollars in ($1,000).

fish industry is more speculative and more significant than that of the traditional fisheries, a summary of projected groundfish processing activity including the number of processing plants is presented in Table 3,96.

Local Processing Effort

On the basis of information provided by the processing sector of the industry, it is estimated that full-time residents account for between 20 and 25 percent of the processing plant employment.

THE FEASIBILITY OF THE PROJECTED GROWTH

In this section, the feasibility of the projected growth of the Seward commercial fishing industry is evaluated in terms of the projected input requirements and projected input availability. The inputs that are considered include small boat harbor facilities, port facilities, labor, land, electric power, water, and processing plant facilities. Projections of the availability of port facilities, labor, land, electric power, and water are drawn from the following Studies Program reports:

- Technical Report Number 31, Northern Gulf of Alaska Petroleum Development Scenarios Transportation Systems Impacts
- Technical Report Number 33, Northern Gulf of Alaska Petroleum Development Scenarios Local Socioeconomic Impacts

TABLE 3.96

PROJECTED SEWARD GROUNDFISH PROCESSING ACTIVITY, 1980-2000

Year	CATCH (MT)	NUMBER OF PLANTS[1]	EMPLOYMENT (man years)	LAND (hectares)	ELECTRICITY (million KWH/year)	WATER (million gallons/year)
1980	70	o	1	0	0	0
1981	99	0	1	0	0	0
1982	141	0	1	0	0	1
1983	200	0	2	0	0	1
1984	285	0	3	0	0	1
1985	407	0	4	0	0	2
1986	583	0	5	0	0	3
1987	835	0	7	0	0	4
1988	1200	0	10	0	0	6
1989	1727	0	14	0	0	9
1990	2490	0	19	0	0	12
1991	3596	0	27	0	0	18
1992	5205	0	38	0	0	26
1993	7548	0	53	0	0	38
1994	10966	0	75	0	1	55
1995	15961	0	106	0	1	80
1996	23273	1	150	1	1	116
1997	33994	1	213	1	2	170
1998	49740	1	303	1	3	249
1999	72902	2	431	2	4	365
2000	107026	2	614	3	5	535

Source: Alaska Sea Grant Program.

[1] The number of full-time groundfish plants.

NOTE: The values are rounded to the nearest whole number, therefore a “O” indicates a value of less than 0.5.

Projections of input requirements are based on forecasts of harvesting and processing activity presented in previous sections, and the projections of input availability that are not available from other SESP reports are developed in this section.

Small Boat Harbor

The Seward small boat harbor has been used well beyond its design capacity for a number of years. The inadequacy of this facility is demonstrated by the long waiting lists for permanent slips, the rafting of vessels that is often required, and the lack of permanent slips for fishing vessels over 33.5 meters (110 feet). The City of Seward is planning to develop additional small boat harbor facilities. The projected increases in the harvesting activity of the traditional fisheries can no doubt occur in the absence of significant improvements to the existing small boat harbor, however, the development of the groundfish fishery will be constrained if adequate facilities are not available for large fishing vessels. There are two reasons for expecting that such facilities will be available; the City of Seward is actively promoting the development of the groundfish industry, and Seward has been identified in the state groundfish development program as one of five communities in which the state should concentrate its development efforts.

Port Facilities

Technical Report Number 31 indicates that the Seward port facilities are currently underutilized, and that a 278 percent to 442 percent increase in usage could occur before capacity is reached. The projected port usage through 2000 does not approach the facilities' current capacity, therefore, adequate port facilities are expected to exist throughout the forecast period.

Labor, Electric Power, and Water

The projected growth of the commercial fishing industry is feasible only if the corresponding rates of increase in input requirements can be" met or surpassed by the rates of increase in input availability. The rates of increase of input requirements can be derived from the projections of input requirements developed in the previous section and the rates of increase in input availability can be inferred from information included in Technical Report Number 40. The report presents projections of community requirements for labor, electric power, and water for each of the OCS petroleum scenarios and indicates that the requirements can be met. The rates of increase in community-wide input requirements corresponding to the projections of community-wide input requirements are, therefore, considered to only include rates of increase that do not exceed feasibile rates of increase in input availability. The highest rates of increase are associated with the high find case, therefore, the rates of increase in input requirements for the commercial fishing industry are compared to the rates of increase in community-wide input requirements/availabili ty of the high find case to determine if the former are feasible. The projected rates of increase in input availability and requirements are presented in Table 3.97.

TABLE 3.97

COMPARATIVE RATES OF GROWTH, HIGH FIND CASE AND THE SEWARD (NORTHERN GULF) FISHING INDUSTRY

	PERCENTAGE CHANGE															
	WATER					ELECTRIC POWER					POPULATION	EMPLOYMENT				
	OCS	Fishing Industry Case				Ocs	Fishing Industry Case				Ocs	Ocs	Fishing Industry Case			
Year	Case	1	2	3	4	Case	1	2	3	4	Case	Case	1	2	3	4
1981	1*5	1.5	-0.6	1.5	-0.6	4.5	1.5	-0.6	1.7	-0.3	2*6	2.7	1.5	-0.6	1.5	-0.5
1982	1.5	1.5	-0.5	1.5	-0.5	4.1	1.5	-0.5	1.9	-0.2	2.1	2.3	1.5	-0.5	1.6	-O*4
1983	2.1	1.5	-0.5	1.6	-90.5	4.7	1*5	-0.5	2.1	0.0	2.8	4.6	1.5	-0.5	1.7	-0.3
1984	4,6	1.6	-0.4	1.6	-0.4	9.3	1.6	-0.4	2.3	0*3	7.3	9.5	1.6	-004	1.8	-0.3
1985	4.7	1.6	-0.4	1.7	-0.3	4.9	1.6	-0.4	2.7	0.6	3.1	4.6	1.6	-0.4	1.9	-0.1
1986	O*3	(-),7	-1.3	0.8	-1.2	2.2	0.7	-1.3	2*2	0.1	0.4	2.1	0.7	-1.3	1.0	-0.9
1987	1.3	0.7	-1.3	0.9	-1.1	7.6	0.7	-1.3	2.8	0.7	5.8	7.9	O*7	-1.3	1.2	-0.8
1988	2.3	0.8	-1.2	0.9	-1.1	13.7	0.8	-1.2	3.6	1.6	11.8	14.0	0.8	-1.2	1.3	-0.5
1989	5*4	0.8	-1.2	1*O	-1.0	5.8	0.8	-1.2	4.8	2.7	5.8	7.4	0.8	-1.2	1.6	-0.2
199(I	4,1	0.8	-1.2	1*2	-().8	3.0	0.8	-1.2	6.3	4.1	3.0	4.6	0.8	-1.2	1.9	0.2
1991	1.0	0.9	-1.2	1.4	-0.7	1*I	0.9	-1.2	8.2	6.1	1.1	2.8	0.9	-1*2	2.3	0.8
1992	-0.4	0.9	-1*1	1.6	-0.4	-6.8	0.9	-1.1	10.7	8.5	-6.8	-5.0	0.9	-1.1	2.9	1.6
1993	2.4	0.9	-1.1	2.(-I	-0.1	-0.2	0.9	-1.1	13.8	11.5	-O*2	-0.0	0.9	-1.1	3.7	2.7
1994	2.4	1.0	-1.1	?.4	0.4	-1.0	1.0	-1.1	17.4	15.0	-1.0	-0.8	1.0	-1.1	4.7	4.1
1995	3.3	1.0	-1.0	3.1	1.0	4.6	1.0	-1.0	21.3	18.8	4.6	2.0	1.0	-1.0	6.1	6.0
1996	2.6	1*1	-1,0	4.0	1.9	0.1	1.1	-1.0	25.3	22.8	0.1	2.7	1.1	-1.0	7.8	8.4
1997	3.1	1.1	-0.9	5.2	3.1	3.0	1.1	-0.9	29.3	26.7	3.0	3.0	1.1	-0.9	10.0	11.3
1998	3.0	1.2	-0.9	6.8	4*7	3.0	1.2	-0.9	32.9	30.3	3.0	3.0	1.2	-0.9	12.6	14.6
1999	3.1	1.2	-0.8	9.(-)	6.8	3.0	1.2	-0.8	36.1	33.4	3.0	3.2	1*2	-0.8	15.6	18.4
2000	3.1	1.3	-0.7	11.7	9.4	2.9	1.3	-0.7	38.8	36.0	2.9	2.8	1*3	-0.7	18.9	22.2

Source: Alaska Sea Grant Program.

1) Traditional fisheries without increased efficiency.
2) Traditional fisheries with increased efficiency.
3) All fisheries without increased efficiency.
4) All fisheries with increased efficiency.

TABLE 3.97 Continued

COMPARATIVE RATES OF GROWTH, HIGH FIND CASE AND THE SEWARD (WESTERN GULF) FISHING INDUSTRY

	PERCENTAGE CHANGE															
	WATER					ELECTRIC POWER					POPULATION	EMPLOYMENT				
	OCS	Fishing Industry Case				OCS	Fishing Industry Case				Ocs	Ocs	Fishing Industry Case			
Year	Case	1	2	3	4	Case	1	2	3	4	Case	Case	1	2	3	4
1981	8.4	1.5	-0.6	1.5	-0.6	15.4	1.5	-0.6	1.7	-0*3	4.0	4.3	1*5	-0.6	1.5	-0.5
1982	8.5	1.5	-0.5	1.5	-0.5	13.4	I*5	-0.5	1.9	-0.2	3.8	4.1	1.5	-0.5	1.6	-0.4
1983	2.7	1.5	-0.5	1.6	-0.5	4.1	1*5	-0.5	2.1	0*0	2.9	4.6	1.5	-0.5	1.7	-0.3
1984	11.6	1.6	-0.4	1.6	-0.4	8.5	1.6	-0.4	2.3	0.3	7*9	10.1	1.6	-0.4	1.8	-0.3
1985	8.4	1.6	-0.4	1.7	-0.3	28.2	1.6	-0.4	2.7	0.6	24.4	11.9	1.6	-0.4	1.9	-0.1
1986	-6.9	0.7	-1.3	0.8	-1.2	O*1	0.7	-1.3	2.2	0.1	-12.4	-1.2	0.7	-1.3	1.0	-0.9
1987	0.6	0.7	-1.3	0.9	-1.1	-3*O	0.7	-1.3	2.8	0.7	0.8	3.6	0.7	-1.3	1*2	-0.8
1988	3.0	0.8	-1.2	0.9	-1.1	2.9	0.8	-1.2	3.6	1.6	2.3	3.6	0.8	-1.2	1*3	-0.5
1989	9.8	0.8	-1.2	1.0	-1*O	12.4	0.8	-1*2	4.8	2.7	9.4	11.0	0.8	-1,2	1.6	-0.2
1990	2.1	0.8	-1.2	1*2	-0.8	-10.7	0.8	-1.2	6.3	4.1	0.6	3.8	0.8	-1.2	1.9	0.2
1991	-6.6	0.9	-1.2	1.4	-0.7	-9.0	0.9	-1.2	8.2	6.1	-4.5	-2.8	0.9	-1.2	2.3	0.8
1992	-4.5	0.9	-1.1	1.6	-0.4	-2.7	0.9	-1.1	10.7	8.5	-2.8	-0.9	0.9	-1.1	2.9	1.6
1993	-0.0	0.9	-1.1	2.0	-0.1	1.3	0.9	-1.1	13.8	11.5	1.4	1.4	0.9	-1.1	3.7	2.7
1994	2.4	1.0	-1.1	2.4	0.4	2.2	1.0	-1.1	17.4	15.0	2.3	2.4	1.0	-1.1	4*7	4*1
1995	5.3	1.0	-1.0	3.1	1.0	5.3	1.0	-1.0	21.3	18.8	5.6	2.9	1.0	-1.0	601	6.0
1996	0.6	1.1	-1.0	4.0	1.9	0.4	1.1	-1.0	25.3	22.8	0.4	2.9	1.1	-1*O	7.8	8.4
1997	2.9	1.1	-O*9	5.2	3.1	2.9	1.1	-0.9	29.3	26.7	3.0	3.0	1*1	-0.9	10.0	11.3
1998	3.1	1.2	-0.9	6.8	4*7	2.8	1.2	-0.9	32.9	30.3	2.9	3.0	102	-0.9	12,6	14.6
1999	3.0	1.2	-0.8	9.0	6.8	2.9	1*2	-0.8	36.1	33.4	3.0	3.0	1*2	-0.8	15.6	18.4
2000	2.9	1.3	-0.7	11.7	9*4	2.9	1.3	-0.7	38.8	36.0	3.1	3.1	1.3	-0.7	18.9	22.2

Source: Alaska Sea Grant Program.

1) Traditional fisheries without increased efficiency.
2) Traditional fisheries with increased efficiency.
3) All fisheries without increased efficiency.
4) All fisheries with increased efficiency.

Through the mid 1990s, the projected annual rate of increase in the availability of water exceeds the projected rate of growth of water usage by the Seward commercial fishing industry; however, in the late 1990s, the fishing industry’s demand for water is projected to be growing at record levels that exceed the projected growth of the supply of water. The development of the fishing industry will be constrained if the supply of water is not increased more rapidly in the late 1990s. The projected rates of growth in the fishing industry demand for electric power exceed the record rates of increase in capacity by the late 1980s or early 1990s. However, due to the importance of the commercial fishing industry to Seward, due to the important role Seward is expected to have in the development of the Alaska groundfish industry, and due to the long planning horizon that exists, it is believed that adequate steps will be taken to assure that the continued development of the Seward commercial fishing industry is not constrained by an inadequate supply of water and/or electric power during the 1990s.

The projected rate of increase in processing plant employment in the late 1990s also exceeds the record projected increases in population and total employment. However, it is significantly higher in only 1999 and 2000, therefore, the development of the Seward commercial fishing industry through 2000 is not expected to be substantially constrained by the availability of labor and the required housing.

Processing Facilities

Within a year, processing capacity can change significantly as the capacity of existing plants changes, as new plants are built, or as old plants become unusable. The ability to rapidly increase processing capacity, when the long-run prognosis-indicates that it is profitable to do so, suggests that processing plant capacity will not be a constraint on the growth that is projected for the processing sector of the commercial fishing industry. The comparison of current Seward processing capacity and the projected Cook Inlet harvests for 2000, which is summarized in Table 3.98, also indicates that physical processing capacity is not expected to constrain the projected growth.

TABLE 3.98

Seward Processing Capacity

	Current Capacity (1,000 pounds per day)	Catch Forecast for 2000	Days Required to Process the Catch Projected for 2000
Salmon	510,000″	28,170	55.2
Halibut	310	5,816	18.8
Herring	430	6,436	15.0

The other species that are harvested in Cook Inlet are primarily processed in communities other than Seward.

Land

The number of processing plants is not expected to increase substantially during the forecast period, therefore, the availability of land is not expected to constrain the growth projected for the commercial fishing industry.

Conclusion

The conclusion is that the long-term growth that is projected for the Seward commercial fishing industry appears to be feasible in terms of the long-term availability of inputs. This does not mean that, during the next twenty years, temporary shortages of labor or water or other inputs will not prevent the level of activity of the fishing industry from being as high as it might otherwise be. What it means is that the long-term growth projected for the industry appears to be feasible despite the occasional shortages that will occur.

The Cordova Commercial Fishing Industry

Cordova is located at the eastern end of Prince William Sound. Its economic base is dominated by the commercial fisheries of Prince William Sound of which Cordova is the center of both harvesting and processing activity. The salmon fishery is by far the most important fishery in the Prince William Sound management area which also includes herring, halibut, king crab, Tanner crab, Dungeness crab, shrimp, and razor clam fisheries. The absolute and relative magnitudes of the fisheries in terms of pounds harvested are presented in Table 3.99.

TABLE 3.99
PRINCE WILLIAM SOUND FISHERY
1973-1977

Catch in 1000 pounds

YEAR	SALMON	HERRING	HALIBUT	KING CRAB	TANNER CRAB	DUNGENESS CRAB	SHRIMP	RAZOR CLAMS	ALL SHELLFISH	TOTAL OF FISHERIES INCLUDED IN THIS STUDY	TOTAL ALL FISHERIES
1973	21,340	14,290	317	208	12,697	806	7	32	13,750	49,697	49,809
1974	9,468	13,322	126	85	9,598	559	14	30	10,286	33,202	33,278
1975	22,178	13,078	275	53	5,017	818	29	15	5,932	41,463	41,488
1976	25,701	5,653	330	18	6,000	290	135	2	6,445	38,129	38,213
1977	35,429	5,019		89	2,895	736	175	2	3,897	44,345	44,429
mean	22,823	10,272	210	90	7,241	641	72	16	8,062	41,367	41,443

YEAR	PERCENTAGE OF SHELLFISH INCLUDED	PERCENTAGE OF MISCELLANEOUS FISH INCLUDED	PERCENTAGE OF ALL FISH INCLUDED
1973	99.9491	99.2706	99.7751
1974	100.0000	99.4328	99.7716
1975	99.9831	99.8168	99.9397
1976	99.9845	98.5530	99.7802
1977	100.0000	98.3539	99.8109

Percentage of All Included Fisheries

YEAR	SALMON	HERRING	HALIBUT	KING CRAB	TANNER CRAB	DUNGENESS CRAB	SHRIMP	RAZOR CLAMS	ALL SHELLFISH
1973	42.94	28.75	0.637	0.415	25.54	1.62	0.014	0.064	27.66
1974	28.51	40.12	0.379	0.256	28.90	1.68	0.042	0.090	30.98
1975	53.48	31.54	0.663	0.127	12.09	1.97	0.069	0.036	14.30
1976	67.40	14.82	0.865	0.047	15.73	0.76	0.354	0.005	16.90
1977	79.89	11.31	-0-	0.200	6.52	1.65	0.394	0.004	8.78

Source: ADF&G Annual Catch and Production Reports and Salmon and Shellfish Catch Reports, IPHC Annual Reports.

The importance of the Cordova commercial fishing industry to the local community can be measured in a number of ways. It can be measured in absolute terms such as the income of Cordova fishermen or the number of commercial fishermen who reside in Cordova (see Tables 3.100 and 3.101), or it can be measured in relative terms; for example, in 1976, over 27 percent of the residents of Cordova had commercial fishing licenses, and in 1974, over 75 percent of the base sector employment was in agriculture and manufacturing, the two segments of the base sector that are dominated by commercial fishing and fish processing, respectively. The implication is that in 1974, approximately 75 percent of the total employment in Cordova was generated either directly or indirectly by the Cordova commercial fishing industry. The employment projections for 1978 that are presented in ''Northern Gulf of Alaska Local Socioeconomic and Physical Systems Impact Analysis" indicate that the contribution of the commercial fishing industry to the economic base is as great as or greater than it was in 1974. Despite their lack of precision, these measures are sufficient to demonstrate that the commercial fishing industry is the principal component of the Cordova economy; and as the following brief summary of the projected growth of the industry indicates, the Cordova commercial fishing industry is expected to be the source of increasing levels of economic activity.

During the next twenty years, the development of domestic groundfish fisheries and continued growth of the traditional fisheries will contribute to the growth of the industry and the community. Total catch is projected to increase from 17,846 metric tons (39.3 million pounds) in 1980 to 55,425 metric tons (122.2 million pounds) in 2000, and the

TABLE 3.100

ESTIMATED GROSS EARNINGS OF CORDOVA[1] FISHERMEN 1969 - 1976

YEAR	GEAR OPERATORS	GROSS EARNINGS
1969	330	3,219
1970	391	3,918,000
1971	361	4,225,000
1972	357	2,927,000
1973	429	7,869,000
1974	378	6,163,000
1975	354	6,629,000
1976	377	11,677,000

[1] Cordova - McCarthy

Source: Alaska Commercial Fisheries Entry Commission, Distribution of Income from Alaska Fisheries, July, 1978

TABLE 3.101

NUMBER OF CORDOVA* RESIDENTS HOLDING A COMMERCIAL FISHERMAN'S LICENSE

1969 - 1976

1969	186	1973	286
1970	205	1974	264
1971	216	1975	467
1972	211	1976	572

*A Cordova resident is anyone who uses a Cordova address when applying for a license.

Source: Commercial Fisheries Entry Commission, Commercial License File.

real value of catch is projected to increase from $27.3 million to $65.2 million. The corresponding percentage increases are 211 percent by weight and 139 percent by value. processing activity is also expected to increase, but due to increases in processing efficiency, processing employment and real income are not projected to increase as rapidly as catch. A 52.6 percent increase in employment and a 87.8 percent increase in real income are expected between 1980 and 2000. If the increases in processing efficiency were not allowed for, 98.9 percent and 144.9 percent increases in employment and real income would be projected. The projections of harvesting activity by fishery, on which the preceding summary is based, and more detailed projections of processing activity are presented in the following sections.

HARVESTING

Projections of harvesting activity and limited historical data are presented by species or species group in this section. The detailed historical data which are referred to in this section and which serve as a basis for the projections are presented in tabular form in Appendix C. The models used in making the projections are discussed in Chapter II.

Salmon

Two major Prince William Sound salmon fisheries can be defined by gear type; they are the purse seine and drift gill net fisheries. The drift gill net fleet consists of boats which are typically 6 to 10.7

meters (20 to 35 feet) in length, have a crew of one, and are active during specified periods which occur between May and September. The purse seiners are typically 7.9 to 16.8 meters (26 to 55 feet) in length, have a crew of four, and fish during open periods which occur between June and August.

Recent record salmon harvests and continuously improving resource management, enhancement, and rehabilitation programs suggest that the Prince William Sound salmon resources will increase during the forecast period. Catch is projected to increase from 9,835 metric tons (21.7 million pounds) in 1980 to 15,773 metric tons (34.8 million pounds) in 2000, and its real value is expected to increase from $15.0 million to $44.2 million (see Table 3.102). The resulting percentage increases are 60 percent by weight and 195 percent by real value (see Table 3. 103). The Prince William Sound salmon fisheries are similar to many other Alaskan salmon fisheries both in that increases in the number of boats or fishermen participating in the fishery are not necessary to substantially increase the annual harvest because there is currently excess harvesting capacity, and in that increases are not expected to occur because they are limited entry fisheries. Projections of catch by species are presented in Table 3.104.

Herring

There are two major roe fisheries and a relatively minor bait herring fishery in Prince William Sound. The roe herring fleet consists of purse seiners, many of which participate in the salmon fishery after

TABLE 3.102

PROJECTED HARVESTING ACTIVITY
PRINCE WILLIAM SOUND SALMON FISHERY 1980-2000

	CATCH								
	WEIGHT		VALUE ($1,000)		EX-VESSEL PRICE ($/Pound)		NUMBER OF		
Year	POUNDS (1,000)	METRIC TONS	Nominal	Real[1]	Nominal	Real	Boats	Landings	Fishermen
1980	21683	9835	16683	14989	0.77	0.69	849	13985	1746
1981	21953	9958	19059	16231	0.87	0074	849	14047	1746
1982	22226	10082	21444	17310	0.96	0.78	849	14110	1746
1983	22505	10208	24178	18500	1007	0.82	849	14174	1746
1984	22788	10337	27061	19626	1.19	0.86	849	14239	1746
1985	23076	10467	30191	20754	1.31	0.90	849	14305	1746
1986	23711	10755	33937	22113	1.43	0.93	849	14460	1746
1987	24352	11046	38053	23502	1.56	O*97	849	14618	1746
1988	25013	11346	42485	24872	1.70	0.99	849	14780	1746
1989	25694	11655	47335	26267	1.84	1.02	849	14946	1746
1990	26397	1 1?74	52781	27762	2.00	1*O5	849	15117	1746
1991	27123	12303	58792	29311	2.17	1.08	849	15293	1746
1992	27871	12642	65122	30775	2.34	1*1O	849	15473	1746
1993	28642	12992	72144	32316	2.52	1.13	849	15658	1746
1994	29438	13353	79819	33890	2.71	1015	849	15848	1746
1995	30260	13726	88333	35549	2.92	1.17	849	16043	1746
1996	31107	14110	97582	37224	3.14	1*2O	849	16244	1746
1997	31981	14506	107686	38937	3.37	1.22	849	16450	1746
1998	32882	14915	118696	40681	3.61	1.24	849	16661	1746
1999	33813	15337	130530	42404	3.86	I*25	849	16879	1746
2000	34772	15773	143699	44249	4.13	1.27	849	17102	1746

Source: Alaska Sea Grant Program.

[1]The real values and prices are in terms of 1978 dollars.

TABLE 3.103

PROJECTED PERCENTAGE CHANGE FROM 1980
PRINCE WILLIAM SOUND SALMON FISHERY

	CATCH		EX-VESSEL PRICE		NUMBER OF		
Year	Weight	Real Value	Nominal	Real	Boats	Landings	Fishermen
1980	0	0	0	0	0	0	0
1981	1.243	8.291	12.$44	6.961	0	0.443	0
1982	2.506	15.489	25.399	12.665	0	0.894	0
1983	3.791	23.425	39.637	18.917	0	1.352	0
1984	5.096	30.940	54.346	24.591	0	1.817	0
1985	6.424	38.467	70.048	30.109	0	2.290	0
1986	9*354	47.535	86.026	34.915	0	3.400	0
1987	120309	56.803	103.098	39.617	0	4.528	0
1988	15*357	65.940	120.764	43.850	0	5.687	0
1989	18.500	75.245	139.441	47.886	0	6.876	0
1990	21.743	85.219	159.876	52.140	0	8.097	0
1991	25.087	95.557	181.733	56.337	0	9.352	0
1992	28.537	105.321	203.692	59.737	0	10.640	0
1993	32.096	115.602	227.375	63.216	0	11.963	0
1994	35.767	126.104	252.411	66.539	0	13.322	0
1995	39.554	137*176	279.415	69.953	0	14.718	0
1996	43.461	148.351	307.729	73.114	0	16.152	0
1997	47.492	159.780	337.652	76.132	0	17.625	0
1998	51.650	171.411	369.169	78.972	0	19.138	0
1999	55.941	I82.91O	401.748	81.421	0	20.694	0
2000”	60.367	195.217	437.1?4	84.088	0	22.291	0

Source: Alaska Sea Grant Program.

TABLE 3.104

PROJECTED PRINCE WILLIAM SOUND SALMON CATCH BY SPECIES, 1980-2000
(1,000 Pounds)

Year	King	Red	Pink	Chum	Silver	Total
1980	700	4170	12000	3433	1380	21683
1981	700	4170	12210	3469	1403	21953
1982	700	4170	12424	3505	1427	22226
1983	700	4170	12641	3542	1452	22505
1984	700	4170	12862	3579	1476	22788
1985	700	4170	13087	3617	1501	23076
1986	700	4240	13552	3719	1500	23711
1987	700	4312	14019	3820	1500	24352
1988	700	4385	14503	3925	1500	25013
1989	700	4459	15004	4032	1500	25694
1990	700	4534	15521	4142	1500	26397
1991	700	4611	16057	4255	1500	27123
1992	700	4689	16611	4371	1500	27871
1993	700	4768	17184	4490	1500	28642
1994	700	4849	17776	4613	1500	29438
1995	700	4931	18390	4739	1500	30260
1996	700	5014	19024	4868	1500	31107
1997	700	5099	19681	5001	1500	31981
1998	700	5185	20360	5138	1500	32882
1999	700	5273	21062	5278	1500	33813
2000	700	5362	21789	5422	1500	34772

Source: Alaska Sea Grant Program.

the brief and intensive roe herring fishery which occurs during April and May. The seiners are typically between 7.9 to 13.7 meters (26 and 45 feet) in length and have a crew of four. The herring roe on kelp season is also during April and May. The boats in this fishery are typically under 10.7 meters (35 feet) in length and many are under 7.6 meters (25 feet).

Favorable market conditions have resulted in the roe fishery resources being fully utilized; catch is therefore not expected to increase during the forecast period. Average annual catch is projected at 4,725 metric tons (10.4 million pounds) and its real value is expected to increase from $7.9 million in 1980 to $9.6 million in 2000 (see Table 3.105). This represents a 21 percent increase in real value (see Table 3.106).

Halibut

In recent years, Cordova has had a relatively minor role in the halibut fishery of the Gulf of Alaska and this situation is not expected to change. The small boat fleet is more active locally than the large boat fleet which fishes throughout the Gulf. The small boat fleet consists of boats and fishermen that are typically only casual participants in the halibut fishery and are more closely associated with other fisheries such as salmon. The casual nature of their participation in the halibut fishery is reflected in the number of landings per boat per year which has not reached four in recent years. The boats of this fleet are typically between 6 and 16,8 meters (20 feet and 55 feet) in

TABLE 3.105

PROJECTED HARVESTING ACTIVITY
PRINCE WILLIAM SOUND HERRING FISHERY 1980-2000

Year	CATCH: WEIGHT: POUNDS (1,000)	CATCH: WEIGHT: METRIC TONS	CATCH: VALUE ($1,000): Nominal	CATCH: VALUE ($1,000): Real[1]	EX-VESSEL PRICE ($/Pound): Nominal	EX-VESSEL PRICE ($/Pound): Real	NUMBER OF: Boats	NUMBER OF: Landings	NUMBER OF: Fishermen
1980	10417	4725	8876	7974	0.85	0.77	164	716	540
1981	10417	4725	9453	8050	0.91	0.77	164	716	540
1982	10417	4725	10067	8126	0.97	0.78	164	716	540
1983	10417	4725	10721	8203	1.03	0.79	164	716	540
1984	10417	4725	11418	8281	1.10	0.79	164	716	540
1985	10417	4725	12160	8360	1.17	0.80	164	716	540
1986	10417	4725	12951	8439	1.24	0.81	164	716	540
1987	10417	4725	13793	8519	1.32	0.82	164	716	540
1988	10417	4725	14689	8600	1.41	0.83	164	716	540
1989	10417	4725	15644	8681	1.50	0.83	164	716	540
1990	10417	4725	16661	8763	1.60	0.84	164	716	540
1991	10417	4725	17744	8846	1.70	0.85	164	716	540
1992	10417	4725	18897	8930	1.81	0.86	164	716	540
1993	10417	4725	20126	9015	1.93	0.87	164	716	540
1994	10417	4725	21434	9100	2.06	0.87	164	716	540
1995	10417	4725	22827	9187	2.19	0.88	164	716	540
1996	10417	4725	24311	9274	2.33	0.89	164	716	540
1997	10417	4725	25891	9362	2.49	0.90	164	716	540
1998	10417	4725	27574	9450	2.65	0.91	164	716	540
1999	10417	4725	29366	9540	2.82	0.92	164	716	540
2000	10417	4725	31276	9630	3.00	0.92	164	716	540

Source: Alaska Sea Grant Program.

[1] The real values and prices are in terms of 1978 dollars.

TABLE 3.106

PROJECTED PERCENTAGE CHANGE FROM 980,
PRINCE WILLIAM SOUND HERRING FISHERY

	CATCH		EX-VESSEL PRICE		NUMBER OF		
Year	Weight	Real Value	Nominal	Real	Boats	Landings	Fishermen
1980	0	0	0	0	0	C	0
1981	0	0.95	6.50	0.95	0	C	0
1982	0	1.90	13.42	1.90	0	0	0
1983		2.87	20.79	2.87	0	0	0
1984	0	3.85	28.65	3.85	0	0	0
1985	0	4.83	37.01	4.83	0	0	0
1986		5.82	45.91	5.82	0	0	0
1987	0	6.83	55.40	6.83	0	0	0
1988	0	7.84	65.50	7.84	0	0	0
1989	0	8.86	76.26	8.86	0	0	0
1990	0	9.89	87.71	9.89	0	0	0
1991	0	10.94	99.92	10.94	0	0	0
1992	0	11.99	112.91	11.99	0	0	0
1993	0	13.05	126.75	13.05	0	0	0
94		14.12	141.49	14.12	0	0	0
1995	0	15.20	157.18	15.20	0	C	0
1996		16.29	173.90	16.29	0	0	0
1997		17.40	191.70	17.40	0	0	0
1998		18.51	210.67	18.51	0	0	0
1999		19.63	230.86	19.63	0	0	0
[illegible]		.77	252.36	20.77	0	0	0

Source: Alaska Sea Grant Program.

length, have a crew of one, and participate in the fishery during May through August or September.

Since these boats and fishermen are primarily associated with other fisheries and therefore accounted for elsewhere, the projections of the numbers of boats and fishermen are for the large boat fleet. The projections of catch are, however, for the entire fishery. Catch is pro-ejected to increase from 100 metric tons (220,000 pounds) in 1980 to 176 metric tons (388,000 pounds) in the year 2000, and its real value is expected to increase from $380,000 to $842,000 (see Table 3.107). This amounts to a 76 percent increase by weight and a 121 percent increase by value (see Table 3.108).

Groundfish

In the past several years there have been two distinct groundfish fleets in the Prince William Sound management area, a small boat long line fleet and a trawl fleet. The long line fleets have included up to 51 boats; the boats are typically under 10.7 meters (35 feet) in length, have a crew of one, and participate in the fishery on an occasional or casual basis between May and August or September. The average number of landings per boat per year has not exceeded three in recent years. This suggests that the small boat long line groundfish fishery is a supplemental fishery for boats and fishermen more closely associated with other fisheries. The trawl fleet has included between one and five boats in the last few years. The boats have ranged in size from under 7.6 meters (25 feet) to over 22.9 meters (75 feet) in length but boats under 10.7 meters (35 feet)

TABLE 3.107

PROJECTED HARVESTING ACTIVITY
PRINCE WILLIAM SOUND HALIBUT FISHERY 1980-2000

Year	CATCH: WEIGHT: POUNDS (1,000)	CATCH: WEIGHT: METRIC TONS	CATCH: VALUE ($1,000): Nominal	CATCH: VALUE ($1,000): Real[1]	EX-VESSEL PRICE ($/Pound): Nominal	EX-VESSEL PRICE ($/Pound): Real	NUMBER OF-: Boats	NUMBER OF-: Landings	NUMBER OF-: Fishermen
1980	220	100	423	380	1.92	1.-?3	6	24	36
1981	220	100	456	389	2.07	1.77	6	24	36
1982	220	100	492	397	2.24	1.81	6	24	36
1983	220	100	529	405	2.40	1.84	6	24	36
1984	220	100	568	41?	2.58	1.87	6	24	36
1985	220	100	609	419	2.77	1.90	6	24	36
1986	228	104	677	441	2.96	1.93	6	25	37
1987	237	108	752	465	3.17	1.96	6	26	38
1988	246	112	835	489	3.39	1.98	7	27	40
1989	256	116	926	514	3.62	2.01	7	28	41
1990	266	121	1025	539	3.86	2.03	7	29	43
1991	276	125	1135	566	4.11	2.05	7	30	45
1992	287	130	1255	593	4.38	2.07	8	31	46
1993	298	135	1387	621	4.66	2.09	8	32	48
1994	309	140	1532	650	4.96	2.10	8	33	50
1995	321	146	1691	681	5.27	2.12	9	35	52
1996	333	151	1864	711	5.59	2.13	9	36	54
1997	346	157	2056	743	5*94	2.15	9	37	56
1998	360	163	2265	776	6.30	2.16	10	39	58
1999	373	169	2494	810	6.68	2.17	1(-I	40	61
2000	388	176	2734	842	7.05	2.17	10	42	63

Source: Alaska Sea Grant Program.

[1] The real values and prices are in terms of 1978 dollars.

TABLE 3.108

PROJECTED PERCENTAGE CHANGE FROM 1980,
PRINCE WILLIAM SOUND HALIBUT FISHERY

	CATCH		EX-VESSEL PRICE		NUMBER OF		
Year	Weight	Real Value	Nominal	Real	Boats	Landings	Fishermen
1980	0	0	0	0	0	0	0
1981	0	2.23	7.86	2.23	0	0	0
1982	0	4.43	16.23	4.43	0	0	0
1983	0	6.41	24.96	6.41	0	0	0
1984	0	8.32	34.18	8.32	0	0	0
1985	0	10.10	43.90	10.10	0	0	0
1986	3.85	16.07	54.11	11.77	3.85	3.85	3.85
1987	7.85	22.18	64.80	13.29	7.85	7.85	7.85
1988	12.00	28.53	76.12	14.76	12.00	12.00	12.00
1989	16.31	35.08	88.04	16.14	16.31	16.31	16.31
1990	20.79	41.82	100.55	17.41	20.79	20.79	20.79
1991	25.44	48.84	113.83	18.65	25.44	25.44	25.44
1992	30.27	55.98	127.64	19.74	30.27	30.27	30.27
1993	35.29	63.34	142.18	20.74	35.29	35.29	35.29
1994	40.49	71.01	157.58	21.72	40.49	40.49	40.49
1995	45.90	78.95	173.82	22.65	45.90	45.90	45.90
1996	51.52	87.01	190.70	23.42	51.52	51.52	51.52
1997	57.35	95.50	208.72	24.24	57.35	57.35	57.35
1998	63.41	104.15	227.50	24.93	63.41	63.41	63.41
1999	69.70	113.33	247.18	25.53	69.70	69.70	69.70
2000	76.24	121.43	266.59	25.64	76.24	76.24	76.24

Source: Alaska Sea Grant Program

have been most common. The average crew size is three and the season has extended from December through April.

As the domestic groundfish fishery develops there are expected to continue to be distinct small and large boat fleets, however, both fleets may include several gear types. A number of gear types will be experimental, with attempts to find gear types that will allow salmon and shellfish boats to profitably participate in the groundfish fishery when they are not participating in the traditional fisheries. Since the small boat fleet is expected to consist of vessels that will be more closely associated with other fisheries and, therefore, accounted for elsewhere, the following projection of the numbers of boats and fishermen exclude the small boat fleet.

The annual groundfish harvest is projected to increase from 24 metric tons (53,000 pounds) in 1980 to 31,136 metric tons (68.6 million pounds) in 2000 and its real value is expected to increase from $6,500 to .$5.5 million (Table 3.109). The resulting percentage increases are reported in Table 3.110. In considering the projection of the number of boats or fishermen, it should be remembered that they are projections of full-time equivalents; that is, they indicate the number of full-time boats and fishermen it would take to harvest the projected catch.

The relative importance of the groundfish fishery in terms of all Prince William Sound fisheries is projected to increase dramatically during the forecast period and to vary greatly depending on whether the relative importance is measured in terms of pounds, value, or the number of landings

TABLE 3.109

PROJECTED HARVESTING ACTIVITY
PRINCE WILLIAM SOUND GROUNDFISH FISHERY 1980-2000

	CATCH				EX-VESSEL PRICE		NUMBER OF		
	WEIGHT		VALUE ($1 ,000)		($/Pound)				
Year	POUNDS (1 ,000)	METRIC TONS	Nomi na 1	Rea l[1]	Nominal	Real	Boats	Landings	Fishermen
1980	53	24	7	6	0.14	O*12	o	1	0
1981	75	34	10	9	O*14	0.12	0	1	0
1982	105	48	15	12	0.14	0.12	0	1	0
1983	149	68	22	17	0.15	0.11	0	2	0
1984	211	96	32	23	0.15	0.11	0	2	0
1985	300	136	47	32	0,16	0.11	0	3	0
1986	427	194	69	45	0.16	0010	0	4	0
1987	608	276	101	62	0.17	O*1O	0	6	1
1988	866	393	148	87	O*L7	O*1O	0	8	1
1989	1237	561	218	121	0.18	0.10	0	10	1
1990	1768	802	322	169	0.18	0.10	o	14	1
1991	2532	1149	476	237	0.19	0.09	0	19	2
1992	3631	1647	705	333	0.19	0.09	1	26	3
1993	5216	2366	1047	469	0.20	0.09	1	36	4
1994	7503	3403	1560	662	0.21	0.09	1	49	5
1995	10809	4903	2327	936	0.22	O*O9	1	67	7
1996	15596	7075	3480	1328	0.22	0.09	2	92	9
1997	22538	10223	5252	1899	0.23	0.08	3	126	13
1998	32620	14796	7836	2686	0.24	0.08	3	174	17
1999	47283	21447	117'36	3832	0.25	0.08	5	241	24
2000	68642	31136	17802	548?	0.26	0.08	7	333	33

Source: Alaska Sea Grant Program.

[1] The real values and prices are in terms of 1978 dollars.

TABLE 3.110

PROJECTED PERCENTAGE CHANGE FROM 1980,
PRINCE WILLIAM SOUND GROUNDFISH FISHERY

Year	CATCH		EX-VESSEL PRICE		NUMBER OF		
	Weight	Real Value	Nominal	Real	Boats	Landings	Fishermen
198(-J	0	0	0	o	0	0	0
1981	41.187	37.285	2.584	-2.764	34.464	34.464	34.464
1982	99.603	89.067	5.427	-5.279	81.046	81.046	81.046
1983	182.571	160.557	8.276	-7.790	144.095	144.095	144.095
1984	300.575	259.974	11.326	-10.136	229*554	229.554	229.554
1985	468.650	398.439	14*559	'12.347	345.552	345.552	345.552
1986	708.385	591.503	17.948	-14.459	5030230	503.230	503.230
1987	1050.833	860.796	21.447	'16.513	717.875	717.875	717.875
1988	1540.715	1238.359	25.187	-18.428	1010.500	1010.500	1010.500
1989	2242.544	S767.478	29.074	-20.280	1410.025	1410.025	1410.025
1990	3249.520	2513.023	33.256	-21.988	1956.314	1956.315	1956.315
1991	4696.483	3561.693	37.574	'23.659	2704.404	2704.405	2704.405
1992	6778.821	5046.042	42.229	-?5.190	3730.385	3730.385	3730.385
1993	9780.072	7143.863	47.059	-26.682	5139.613	5139.613	5139.(513
1994	14112.315	10124.665	52,236	-28.058	7078.184	7078.185	7078.185
1995	20375.337	14359.333	57.654	-29.382	9748.987	9748.987	97413.987
1996	29443.427	20398.165	63.416	-30.617	13434.183	13434.184	13434.185
1997	42592.888	29221.430	70.656	-31.320	18526.765	18526.766	18526.766
1998	61689.601	41368.436	75.933	-32.888	25574.855	25574.855	25574.856
1999	89465.320	59069.636	82.707	-33.937	35344.039	35344.041	35344.041
2000	129925.190	84542.691	89.938	-34.'?03	48905.126	489050,28	48905.128

Source: Alaska Sea Grant Program.

or boats, or fishermen. For example, the groundfish catch as a percentage of total catch is expected to increase from 0.13 percent in 1980 to 56.2 percent in 2000; whereas the value of the groundfish catch as a percent of the value of the total' catch is expected to increase from 0.02 percent in 1980 to 8.4 percent in 2000 (Table 3.111). The significant difference between the relative importance of the groundfish fishery measured by weight and value is due to the large ex-vessel price differential between groundfish and other finfish or shellfish. Projections of catch by species are provided in Table 3.112.

King Crab

In recent years, the Prince William Sound king crab fleet has ranged in size from 10 to 21 boats. The boats are typically 10.7 to 13.7 meters (35 to 45 feet) in length and have a crew of four. The season has extended from August through March, but in the two most recent years, 1977 and 1978, the season was from October through March. Although the annual harvest has been as high as 134 metric tons (296,000 pounds), the sustainable yield is not thought to exceed 45 metric tons (100,000 pounds). Recent harvests have approached this figure and favorable market conditions are expected to maintain harvests at this level throughout the forecast period. The real value of the projected harvest is expected to increase from $98,000 in 1980 to $130,000 in 2000 (Table 3.113). This is a 32 percent increase in real value (Table 3.114).

TABLE 3.111

PROJECTIONS OF PRINCE WILLIAM SOUND GROUNDFISH HARVESTING ACTIVITY AS A PERCENTAGE OF TOTAL PRINCE WILLIAM SOUND HARVESTING ACTIVITY

Year	CATCH Weight	CATCH Value	NUMBER OF Boats	NUMBER OF Landings	NUMBER OF Fishermen
1980	0.13	0.02	0.00	0.00	0.00
1981	0.19	0.03	0.00	0.01	0.00
1982	0.26	0.04	0.00	0.01	0.00
1983	0.37	0.05	0.00	0.01	0.01
1984	0.52	0.07	0.00	0.01	0.01
1985	0.73	0.10	0.00	0.02	0.01
1986	1.01	0.13	0.01	0.02	0.01
1987	1.42	0.17	0.01	0.03	0.02
1988	1.97	0.23	0.01	0.04	0.03
1989	2.75	0.30	0.02	0.05	0.04
1990	3.82	0.41	0.02	0.07	0.05
1991	5.29	0.55	0.03	0.10	0.07
1992	7.30	0.74	0.04	0.13	0.09
1993	9.99	1.00	0.06	0.18	0.12
1994	13.56	1.35	0.08	0.24	0.17
1995	18.16	1.84	0.11	0.32	0.23
1996	23.91	2.49	0.15	0.44	0.31
1997	30.83	3.41	0.21	0.60	0.43
1998	38.76	4.59	0.28	0.81	0.59
1999	47.37	6.23	0.39	1.11	0.81
2000	56.18	8.41	0.54	1.51	1.12

Source: Alaska Sea Grant Program.

TABLE 3.112

CORDOVA GROUNDFISH PROJECTED CATCH BY SPECIES 1980-2000

YEAR	WEIGHT (Metric tons)					REAL VALUE[1] ($1,000)				
	POLLOCK	PACIFIC COD	SABLEFISH	OTHER	TOTAL	POLLOCK	PACIFIC COD	SABLEFISH	OTHER	TOTAL
1980	2	8	0	13	24	0	2	0	3	6
1981	4	11	1	19	34	0	3	1	4	9
1982	5	15	1	27	48	1	4	1	6	12
1983	8	20	1	38	68	1	6	2	9	17
1984	12	27	2	55	96	2	7	2	12	23
1985	19	36	3	78	136	2	10	4	17	32
1986	29	49	5	111	194	4	13	5	23	45
1987	44	66	7	159	276	5	17	8	32	62
1988	66	90	11	226	393	8	22	12	45	87
1989	100	121	17	323	561	11	29	18	63	121
1990	152	164	26	460	802	17	39	26	87	169
1991	231	221	40	657	1149	25	51	40	121	237
1992	351	299	61	937	1647	37	68	59	169	333
1993	533	404	93	1336	2366	55	89	89	236	469
1994	809	546	143	1906	3403	81	118	134	329	662
1995	1227	738	220	2718	4903	121	156	201	459	936
1996	1862	998	337	3877	7075	179	206	302	640	1328
1997	2827	1349	518	5530	10223	268	274	457	900	1899
1998	4290	1823	795	7888	14796	396	360	682	1248	2686
1999	6511	2464	1221	11252	21447	588	477	1024	1743	3832
2000	9882	3330	1875	16049	31136	875	632	1541	2435	5482

[1] Value in terms of 1978 dollars.

TABLE 3.113

PROJECTED HARVESTING ACTIVITY
PRINCE WILLIAM SOUND KING CRAB FISHERY 1980-2000

	CATCH								
	WEIGHT		VALUE ($1,000)		EX-VESSEL PRICE ($/Pound)		NUMBER OF		
Year	POUNDS (1,000)	METRIC TONS	Nominal	Real[1]	Nominal	Real	Boats	Landings	Fishermen
1980	100	45	109	98	1.09	0.98	17	86	68
1981	100	45	118	101	1.18	1.01	17	86	68
1982	100	45	128	103	1.28	1.03	17	86	68
1983	100	45	138	106	1.38	1.06	17	86	68
1984	100	45	149	108	1.49	1.08	17	86	68
1985	100	45	160	110	1.60	1.10	17	86	68
1986	100	45	172	112	1.72	1.12	17	86	68
1987	100	45	185	114	1.85	1.14	17	86	68
1988	100	45	198	116	1.98	1.16	17	86	68
1989	100	45	213	118	2.13	1.18	17	86	68
1990	100	45	227	120	2.27	1.20	17	86	68
1991	100	45	243	121	2.43	1.21	17	86	68
1992	100	45	259	122	2.59	1.22	17	86	68
1993	100	45	276	124	2.76	1.24	17	86	68
1994	100	45	294	125	2.94	1.25	17	86	68
1995	100	45	313	126	3.13	1.26	17	86	68
1996	100	45	332	127	3.32	1.27	17	86	68
1997	100	45	353	128	3.53	1.28	17	86	68
1998	100	45	375	128	3.75	1.28	17	86	68
1999	100	45	397	129	3.97	1.29	17	86	68
2000	100	45	421	130	4.21	1.30	17	86	68

Source: Alaska Sea Grant Program.

[1]The real values and prices are in terms of 1978 dollars.

TABLE 3.114

PROJECTED PERCENTAGE CHANGE FROM 1980,
PRINCE WILLIAM SOUND KING CRAB FISHERY

Year	CATCH		EX-VESSEL PRICE		NUMBER OF		
	Weight	Real Value	Nominal	Real	Boats	Landings	Fishermen
1980	0	0	0	0	0	0	0
1981	0	2.76	8.41	2.76	0	0	0
1982	0	5.40	17.32	5.40	0	0	0
1983	0	7.84	26.63	7.84	0	0	0
1984	0	10.12	36.42	10.12	0	0	0
1985	0	12.23	46.68	12.23	0	0	0
1986	0	14.53	57.92	14.53	0	0	0
1987	0	16.64	69.68	16.64	0	0	0
1988	0	18.54	81.93	18.54	0	0	0
1989	0	20.40	94.94	20.40	0	0	0
1990	0	22.03	108.44	22.03	0	0	0
1991	0	23.59	122.72	23.59	0	0	0
1992	0	24.97	137.59	24.97	0	0	0
1993	0	26.20	153.12	26.20	0	0	0
1994	0	27.35	169.49	27.35	0	0	0
1995	0	28.43	186.73	28.43	0	0	0
1996	0	29.34	204.63	29.34	0	0	0
1997	0	30.24	223.63	30.24	0	0	0
1998	0	31.00	243.40	31.00	0	0	0
1999	0	31.65	264.10	31.65	0	0	0
2000	0	32.26	285.90	32.26	0	0	0

Source: Alaska Sea Grant Program.

Tanner Crab

The Prince William Sound Tanner crab fishery has included up to 54 boats in the last several years. Although a vessel over 35 meters (115 feet) in length has participated in this fishery, the typical boat is 10.7 to 19.8 meters (35 to 65 feet) in length and has a crew of four. In 1977 and 1978 the season was from November through May. The Tanner crab fishery is like many other fisheries, in that the record catch far exceeds what is thought to be the sustainable yield. The sustainable yield is not expected to exceed 2,268 metric tons (5 million pounds), but favorable market conditions are expected to result in the resources being harvested at that level throughout the forecast period. The real value of the annual harvest is projected to decrease from $2.7 million in 1980 to $2.4 million in 2000; this is a 13 percent decrease in real value (Tables 3.115 and 3.116).

Dungeness Crab

The Prince William Sound Dungeness crab fleet has ranged in size from less than nine boats to more than 49 boats. The typical boat is between 7.6 and 19.8 meters (25 feet and 65 feet) in length and has a crew of two. In 1978 the fishery was active from January through December. The harvest, however, was concentrated from May through December.

In 1978 the fishery was more than fully utilized, that is, the catch of 931 metric tons (2.1 million pounds) exceeded what is thought to be the sustainable yield. The favorable market conditions that resulted in the record catch are expected to exist during the forecast period and the

TABLE 3.115

PROJECTED HARVESTING ACTIVITY
PRINCE WILLIAM SOUND TANNER CRAB FISHERY 1980-2000

	CATCH								
	WEIGHT		VALUE ($1,000)		EX-VESSEL PRICE ($/Pound)		NUMBER OF		
Year	POUNDS (1,000)	METRIC TONS	Nominal	Real[1]	Nominal	Real	Boats	Landings	Fishermen
1980	5000	2268	3031	2724	0.61	0.54	34	459	135*
1981	5000	2268	3140	2674	0.63	0.53	34	459	135.
1982	5000	2268	3257	2629	0.65	0.53	34	459	1350
1983	5000	2268	3382	2588	0.68	().52	34	459	135.
1984	5000	2268	3516	2550	(-).70	0.51	34	459	136.
1985	5000	2268	3659	2515	0.73	0.50	34	459	136.
1986	5000	2268	3813	2485	().76	0.50	34	459	136.
1987	5000	2268	3978	2457	0.80	0.49	34	459	136.
1988	5000	2268	4155	2433	0.83	0.49	34	459	136.
1989	5000	2268	4345	2411	0.87	0.48	34	459	136.
1990	5000	2268	4550	2393	0.91	0.48	34	459	136.
1991	5000	2268	4769	2378	0.95	0.48	34	459	136.
1992	5000	2268	5006	2366	1.(-in	0.47	34	459	136.
1993	5000	2268	5260	2356	1.05	0.47	34	459	136.
1994	5000	2268	5533	2349	1.11	0.47	34	459	136.
1995	5000	2268	5826	2345	1.17	0 047	34	459	136.
1996	5000	2268	6143	2343	1.23	0.47	34	459	136.
1997	5000	2268	6483	2344	1.30	0.47	3/,	459	136.
1998	5000	2268	6849	2347	1.37	0.47	34	459	136.
1999	5000	2268	7244	2353	1.45	0.47	34	459	136.
2000	5000	2268	766[illegible]	2361	1.53	0.47	34	459	136.

Source: Alaska Sea Grant Program.

[1]The real values and prices are in terms of 1978 dollars.

TABLE 3.1 6

PROJECTED PERCENTAGE CHANGE FROM 1980,
PRINCE WILLIAM SOUND TANNER CRAB FISHERY

Year	Weight	Real Value	EX-VESSEL PRICE Nominal	EX-VESSEL PRICE Real	NUMBER OF Boats	NUMBER OF Landings	NUMBER OF Fishermen
1980	0	0	0	0	0	0	0
1981	0	-1.80	3.60	-1.80	0.10	0	0.10
1982	0	-3.47	7.44	-3.47	0.18	0	0.18
1983	0	-4.99	11.56	-4.99	0.25	0	0.25
1984	0	-6.38	15.98	-6.38	0.31	0	0.31
1985	0	-7.64	20.71	-7.64	0.36	0	0.36
1986	0	-8.78	25.78	-8.78	0.41	0	0.41
1987	0	-9.79	31.23	-9.79	0.46	0	0.46
1988	0	-10.69	37.07	-10.69	0.49	0	0.49
1989	0	-11.46	43.35	-11.46	0.53	0	0.53
1990	0	-12.13	50.10	-12.13	0.56	0	0.56
1991	0	-12.69	57.34	-12.69	0.59	0	0.59
1992	0	-13.15	65.13	-13.15	0.62	0	0.62
1993	0	-13.50	73.51	-13.50	0.64	0	0.64
1994	0	-13.75	82.52	-13.75	0.67	0	0.67
1995	0	-13.91	92.20	-13.91	0.69	0	0.69
1996	0	-13.96	102.64	-13.96	0.71	0	0.71
1997	0	-13.93	113.86	-13.93	0.72	0	0.72
1998	0	-13.81	125.95	-13.81	0.74	0	0.74
1999	0	-13.60	138.96	-13.60	0.76	0	0.76
2000	0	-13.30	152.98	-13.30	0.77	0	0.77

Source: Alaska Sea Grant Program.

average annual harvest is projected to equal the sustainable harvest of 567 metric tons (1.25 million pounds). The real value of the harvest is expected to increase from just over $0.9 million in 1980 to over $1.1 million in the year 2000 (Table 3.117). This represents a 22 percent increase in real value (Table 3.118).

Shrimp

The shrimp resources of Prince William Sound have historically been under-utilized. The pot and trawl fisheries have been sporadic, and prior to the 1978 harvest of 203 metric tons (448,000 pounds), the annual harvests had been well below the sustainable yield of approximately 227 metric tons (500,000 pounds). Favorable market conditions, including the decline in the Kodiak shrimp fishery and an increasing real ex-vessel price, are expected to result in the resources being fully utilized during the forecast period. The average annual harvest is thus projected at the sustainable yield of 227 metric tons (500,000 pounds) and its real value is expected to increase from $112,000 in 1980 to $297,000 in 2000 (Table 3.119). This is a 165 percent increase in real value (Table 3.120).

The small number of trawlers that participate in this fishery are expected to have a crew of three and exceed 19.8 meters (65 feet) in length. The pot boats are expected to have a crew of two and typically be under 13.7 meters (45 feet) in length. During the record catch year of 1978, the shrimp fishery was active all twelve months, but over 95 percent of the catch was taken in September and October. This indicates that if the maximum sustainable

TABLE 3.117

PROJECTED HARVESTING ACTIVITY
PRINCE WILLIAM SOUND DUNGENESS CRAB FISHERY 1980-2000

	CATCH								
	WEIGHT		VALUE ($1,000)		EX-VESSEL PRICE ($1,000)		NUMBER OF		
Year	POUNDS (1,000)	METRIC TONS	Nominal	Real[1]	Nominal	Real	Boats	Landings	Fishermen
1980	1250	567	1010	907	0.81	0.73	66	837	132
1981	1250	567	1085	924	0.87	0.74	66	837	132
1982	1250	567	1164	940	0.93	0.75	66	837	132
1983	1250	567	1247	954	1.00	0.76	66	837	132
1984	1250	567	1334	968	1.07	0.77	66	837	132
1985	1250	567	1426	980	1.14	0.78	66	837	132
1986	1250	567	1526	994	1.22	0.80	66	837	132
1987	1250	567	1631	1007	1.30	0.81	66	837	132
1988	1250	567	1740	1019	1.39	0.82	66	837	132
1989	1250	567	1857	1030	1.49	0.82	66	837	132
1990	1250	567	1978	1041	1.58	0.83	66	837	132
1991	1250	567	2107	1051	1.69	0.84	66	837	132
1992	1250	567	2241	1059	1.79	0.85	66	837	132
1993	1250	567	2382	1067	1.91	0.85	66	837	132
1994	1250	567	2531	1075	2.03	0.86	66	837	132
1995	1250	567	2689	1082	2.15	0.87	66	837	132
1996	1250	567	2852	1088	2.28	0.87	66	837	132
1997	1250	567	3027	1094	2.42	0.88	66	837	132
1998	1250	567	3208	1100	2.57	0.88	66	837	132
1999	1250	567	3399	1104	2.72	0.88	66	837	132
2000	1250	567	3601	1109	2.88	0.89	66	837	132

Source: Alaska Sea Grant Program

[1]The real values and prices are in terms of 1978 dollars.

TABLE 3.118

PROJECTED PERCENTAGE CHANGE FROM 1980,
PRINCE WILLIAM SOUND DUNGENESS CRAB FISHERY

	CATCH		EX-VESSEL PRICE		NUMBER OF		
Year	Weight	Real Value	Nominal	Real	Boats	Landings	Fishermen
1980	0	0	0	0	0	0	0
1981	0	1.82	7.42	1.82	0	0	0
1982	0	3.59	15.30	3.59	0	0	0
1983	0	5.18	23.51	5.18	0	0	0
1984	0	6.68	32.15	6.68	0	0	0
1985	0	8.08	41.25	8.08	0	0	0
1986	0	9.62	51.14	9.62	0	0	0
1987	0	11.03	61.51	11.03	0	0	0
1988	0	12.33	72.39	12.33	0	0	0
1989	0	13.59	83.91	13.59	0	0	0
1990	0	14.72	95.96	14.72	0	0	0
1991	0	15.81	108.71	15.81	0	0	0
1992	0	16.78	122.02	16.78	0	0	0
1993	0	17.65	135.98	17.65	0	0	0
1994	0	18.49	150.74	18.49	0	0	0
1995	0	19.29	166.31	19.29	0	0	0
1996	0	19.96	182.53	19.96	0	0	0
1997	0	20.65	199.78	20.65	0	0	0
1998	0	21.23	217.80	21.23	0	0	0
1999	0	21.74	236.70	21.74	0	0	0
2000	0	22.25	256.69	22.25	0	0	0

Source: Alaska Sea Grant Program.

TABLE 3.119

PROJECTED HARVESTING ACTIVITY
PRINCE WILLIAM SOUND SHRIMP FISHERY 1980-2000

	CATCH								
	WEIGHT		VALUE ($1,000)		EX-VESSEL PRICE ($/Pound)		NUMBER OF		
Year	POUNDS (1,000)	METRIC TONS	Nominal	Real[1]	Nominal	Real	Boats	Landings	Fishermen
1980	500	227	125	112	0.25	0.22	5	30	90
1981	500	227	138	118	0.28	0.24	5	30	90
1982	500	227	153	123	0.31	0.25	5	30	90
1983	500	2?7	169	130	0.34	0.26	5	30	90
1984	500	227	188	136	0.38	0.27	5	30	90
1985	500	2?7	208	143	0.42	0.29	5	30	90
1986	500	277	230	150	0.46	0.30	5	30	90
1987	500	2?7	255	158	0.51	0.32	5	30	90
1988	500	227	283	165	0.57	0.33	5	30	90
1989	500	.?27	313	174	0.63	0.35	5	30	90
1990	500	227	347	182	0.69	0.36	5	30	90
1991	500	227	384	192	0.77	0.3s	5	30	90
1992	500	227	425	2[)1	0.85	0.40	5	30	90
1993	500	227	471	211	0.94	0.42	5	30	90
1994	500	227	522	222	1.04	O*44	5	30	90
1995	500	227	578	233	1.16	0.47	5	30	9()
1996	500	227	641	244	1.28	0.49	5	30	90
1997	500	227	710	257	1●42	0.51	5	30	90
1998	500	2?7	786	269	1.5-?	0.54	5	30	90
1999	500	227	871	283	1.74	0.57	5	30	90
2000	500	227	965	297	1.93	0.59	5	30	90

Source: Alaska Sea Grant Program.

[1] The real values and prices are in terms of 1978 dollars.

TABLE 3.120

PROJECTED PERCENTAGE CHANGE FROM 1980.
PRINCE WILLIAM SOUND SHRIMP FISHERY

	CATCH		EX-VESSEL		NUMBER OF		
Year	Weight	Real Value	Nominal	Real	Boats	Landings	Fishermen
1980	0	0	0	0	0	0	0
1981	0	5.00	10.77	5.00	0	0	0
1982	0	10.25	22.71	10.25	0	0	0
1983	0	15.76	35.93	15.76	0	0	0
1984	0	21.55	50.58	21.55	0	0	0
1985	0	27.63	66.80	27.63	0	0	0
1986	0	34.01	84.78	34.01	0	0	0
1987	0	40.71	104.69	40.71	0	0	0
1988	0	47.75	126.74	47.75	0	0	0
1989	0	55.13	151.17	55.13	0	0	0
1990	0	62.89	178.24	62.89	0	0	0
1991	0	71.03	208.22	71.03	0	0	0
1992	0	79.59	241.43	79.59	0	0	0
1993	0	88.56	278.22	88.56	0	0	0
1994	0	97.99	318.97	97.99	0	0	0
1995	0	107.89	364.12	107.89	0	0	0
1996	0	118.29	414.12	118.29	0	0	0
1997	0	129.20	469.52	129.20	0	0	0
1998	0	140.66	530.89	140.66	0	0	0
1999	0	152.69	598.87	152.69	0	0	0
2000	0	165.33	674.17	165.33	0	0	0

Source: Alaska Sea Grant Program.

yield is approximately 500,000 pounds, the fishery can be fully utilized by a small number of trawlers in a short period of time.

It should be noted that, although there are indications that the sustainable yield does not exceed 227 metric tons (500,000 pounds), the shrimp resources of Prince William Sound have not been explored and/or surveyed sufficiently to know with a high degree of confidence what level of catch can be sustained. It would, therefore, not be surprising if the harvest forecasts prove to be off by a factor of three or more.

Razor Clams

Adverse market and/or environmental conditions have held the Prince William Sound razor clam fishery well below the record levels of activity which occurred between 1900 and 1950, In recent years activity has been minimal, with boats and fishermen from other fisheries participating in the razor clam fishery on a casual and supplemental basis. The predominant gear type is still a clam shovel, since mechanized harvesting methods have not yet proven to be feasible. The feasibility of both mechanical harvesting and an expansion of the fishery are limited by a low level of state funding for Paralytic Shellfish Poisoning (PSP) monitoring and beach certification, and limited markets for razor clams.

The market conditions that have limited interest in this fishery during the past 15 years have permitted increases in the resource that will increase the profitability of the fishery. This, together with improving market conditions including decreases in the clam resources on the East

Coast, and the prospect of sustained high levels of activity in the Dungeness crab fishery, is expected to result in a continued recovery of the razor clam fishery. The level of activity of the Dungeness crab fishery is of importance because razor clams are used as bait in that fishery.

The razor clam season is expected to be from April through August and participation in the fishery is expected to be supplemented with very few fishermen or boats participating solely in the razor clam fishery. The optimistic projections are that the annual catch will increase from 54 metric tons (120,000 pounds) in 1980 to 508 metric tons (1.1 million pounds) in 2000, and that the real value of the harvest will increase from $129,000 to $1.1 million (see Table 3.121). This would be a 833 percent increase in catch or real value during the forecast period (see Table 3.122) and a significantly larger increase over the catches that occurred in the late 1970s. Even if this rapid recovery of the razor clam fishery does occur, the razor clam fishery will remain a relatively unimportant fishery, and to the extent it remains a supplemental fishery, it will not result in more fishermen or boats participating in the Prince William Sound fisheries as a whole.

Summation of Harvesting Activity Projections

This section consists of the presentation and analysis of the projections of harvesting activity of the Cordova commercial fishing industry as a whole. The tables presented in this section include summations of pro-

TABLE 3.121

PROJECTED HARVESTING ACTIVITY
PRINCE WILLIAM SOUND RAZOR CLAM FISHERY 1980-2000

	CATCH				EX-VESSEL PRICE		NUMBER OF		
	WEIGHT		VALUE $1,000)[1]		($/Pound)				
Year	POUNDS (1,000)	METRIC TONS	Nominal	Real[1]	Nominal	Real	Boats	Landings	Fishermen
1980	120	54	134	120	1.11	1*OO	49	670	98
1981	170	77	2(30	170	1.17	1.00	54	900	108
1982	220	100	273	220	1.24	1*OO	58	1120	116
1983	270	122	353	270	1.31	1.00	62	1310	124
1984	320	145	441	320	1.38	1.00	66	1480	132
1995	370	168	538	370	1.45	1.00	69	1630	138
1986	420	191	645	420	1.53	1.00	71	1770	142
1987	470	213	761	470	1.62	1.00	74	1880	148
1988	520	236	888	520	1.71	1.00	76	1980	152
1989	570	259	1027	570	1.80	1.00	77	2070	154
1990	620	281	1179	62(7	1.90	1.00	79	2150	158
1991	670	304	1344	670	2.01	1.00	80	2210	160
1992	720	327	1524	720	2*12	1.00	81	2260	162
1993	770	349	1719	770	2.23	1*OO	82	2300	164
1994	820	372	1931	820	2.36	1.00	83	2340	166
1995	870	395	2162	870	2.48	1.00	83	2360	166
1996	920	417	2412	920	2.62	1.00	84	2380	168
1997	970	440	2683	970	2.77	1.00	84	2390	168
1998	1020	463	2976	1020	2.92	1.00	84	2390	168
1999	1070	485	3294	1070	3.08	1.00	84	2390	168
2000	1120	508	3637	1120	3.25	1.00	84	2390	168

Source: Alaska Sea Grant Program.

[1]The real values and prices are in terms of 1978 dollars.

TABLE 3.122

PROJECTED PERCENTAGE CHANGE FROM 1980,
PRINCE WILLIAM SOUND RAZOR CLAM FISHERY

	CATCH		EX-VESSEL PRICE		NUMBER OF		
Year	Weight	Real Value	Nominal	Real	Boats	Landings	Fishermen
1980	0	0	0	0	0	0	0
1981	41.667	41.667	5.50(-)	0	10.204	34.328	10*204
1982	83.333	83.333	11.303	0	18.367	67.164	18.367
1983	125.000	1250000	17.424	0	26.531	95.522	26.531
1984	166.667	166.667	23.882	0	34.694	120.896	34.694
1985	208.333	208.333	30.696	0	40.816	143.284	40.816
1986	250.000	250.000	37.884	0	44.898	164.179	44.898
1987	291.667	2910667	45.468	0	51.020	180.597	51.020
1988	333*333	333.333	53.469	0	55.1(32	195.522	55.102
1989	375.000	375.000	61.909	0	57.143	208.955	57.143
1990	416.667	416.667	70.814	0	61.224	220.896	61.224
1991	45[{.333	458.333	80.209	0	63.265	229.851	63.265
1992	500.000	500.000	90.121	0	65.306	237.313	65.306
1993	5410667	541.667	100.577	0	67.347	243.284	67.347
1994	583.333	583.333	111.609	0	69.388	249.254	69.388
1995	625.000	625.000	123.248	0	69.388	252.239	69.388
1996	666.667	666.667	135.526	0	71.429	255.224	71.429
1997	708.333	708.333	148.480	0	71.429	256.716	71.429
1998	750.000	750.000	162.147	0	71.429	256.716	71.429
1999	791.667	791.667	176.565	0	71.429	256.716	71.429
2000	833.333	833.333	191.776	0	71.429	256.716	71.429

Source: Alaska Sea Grant Program.

jetted harvesting activity and projections of the relative importance of each fishery.

Total catch is projected to increase from 17,846 metric tons (39.3 million pounds) in 1980 to 55,425 metric tons (122.2 million pounds) in 2000, and its real value is expected to increase from $27.3 million to $65.2 million (Table 3.123). The associated percentage increases are 211 percent and 139 percent respectively (Table 3.124). Excluding groundfish, catch is expected to increase from 17,822 metric tons (39.3 million pounds) in 1980 to 24,289 metric tons (53.5 million pounds) in 2000 and its real value is expected to increase from $27.3 million to $59.7 million (Table 3.125). This amounts to a 36.3 percent increase in weight and a 119 percent increase in real value (Table 3.126). Due to both the excess harvesting capacity that exists in many fisheries and the large catches projected per boat and fisherman in the groundfish fishery, the numbers of boats and fishermen are not expected to increase significantly in the fisheries as a whole or in the traditional fisheries (Tables 3.123 through 3.126).

In addition to significant changes in harvesting activity, there are expected to be notable changes in the relative importance of individual fisheries. The largest change is, of course, expected in the relative importance of the groundfish fishery which is just beginning to develop.

As a percentage of total catch, the groundfish catch is expected to increase from less than one percent in 1980 to over 56 percent in 2000 (Table 3.127). The value of the groundfish catch is expected to in-

TABLE 3.123

PROJECTED HARVESTING ACTIVITY
PRINCE WILLIAM SOUND ALL FISHERIES 1980-2000

Year	CATCH: WEIGHT: POUNDS (1,000)	CATCH: WEIGHT: METRIC TONS	CATCH: VALUE ($1,000): Nominal	CATCH: VALUE ($1,000): Real[1]	EX-VESSEL PRICE ($/Pound): Nominal	EX-VESSEL PRICE ($/Pound): Real[1]	NUMBER OF: Boats	NUMBER OF: Landings	NUMBER OF: Fishermen
1980	39343	17846	30397	27310	0.77	0.69	1190	16806	2845
1981	396134	18001	33660	28665	0.85	0.72	1195	17099	2855
1982	40039	18161	36993	29861	0.92	0.75	1199	17382	2863
1983	40411	18330	40740	31171	1.01	0.77	1203	17636	2871
1984	40807	18510	44707	32424	1.10	0.79	1207	17872	2079
1985	41233	18703	48998	33683	1.19	0.82	1210	18089	2886
1986	42053	19075	54020	35199	1.28	0.84	1212	18386	2891
1987	42934	19475	59508	36754	1.39	0.86	1215	18656	2899
1988	43912	19919	65422	38300	1.49	O*87	1218	18921	2904
1989	45024	20423	71878	39886	1.60	0.89	1219	19181	2908
1990	46318	21010	79(-)70	41589	1.71	0.90	1221	19437	2914
1991	47868	21713	86994	433-?'?	1.82	O*91	1223	19679	2919
1992	49776	22578	95435	45100	1.92	0.91	1224	19917	2923
1993	52193	23675	104812	46949	2.01	O*9O	1226	20153	2928
1994	55337	25101	115156	48893	2.08	0.88	1227	20397	2933
1995	59527	27001	]26746	51008	2.13	0.86	1228	20632	?937
1996	65223	29585	139617	53259	2.14	0.82	1230	20879	2943
1997	73102	33159	154140	55734	2.11	0.76	1231	21131	2949
1998	84149	38170	170566	58458	2.03	0.69	1232	21392	2956
1999	99806	4527?	189391	61526	1.90	0.6?	1234	21677	2965
2000	122190	55425	211804	65220	1*73	0.53	1236	21994	2976

Source: Alaska Sea Grant Program.

[1] The real values and prices are in terms of 1978 dollars.

TABLE 3.124

PROJECTED PERCENTAGE CHANGE FROM 1980,
PRINCE WILLIAM SOUND ALL FISHERIES

	CATCH		EX-VESSEL PRICE		NUMBER OF		
Year	Weight	Real Value	Nominal	Real	Boats	Landings	Fishermen
1980	0	0	0	0	0	0	0
1981	0.87	4.96	9.78	4.06	0.42	1.74	0.36
1982	1.77	9.34	19.58	7.44	0.76	3.42	0.64
1983	2.72	14.14	30.48	11.12	1.10	4.94	0.93
1984	3.72	18.72	41.80	14.46	1.44	6.34	1.22
1985	4.80	23.34	53.80	17.68	1.70	7.63	1.43
1986	6.89	28.89	66.26	20.58	1.89	9.40	1.63
1987	9.13	34.58	79.40	23.32	2.16	11.01	1.89
1988	11.61	40.24	92.83	25.65	2.35	12.58	2.10
1989	14.44	46.05	106.63	27.62	2.47	14.13	2.23
1990	17.73	52.28	120.95	29.35	2.66	15.65	2.44
1991	21.67	58.81	135.22	30.53	2.78	17.09	2.59
1992	26.52	65.14	148.15	30.52	2.90	18.51	2.75
1993	32.66	71.91	159.92	29.58	3.03	19.91	2.92
1994	40.65	79.03	169.34	27.28	3.16	21.37	3.10
1995	51.30	86.77	175.58	23.44	3.22	22.76	3.23
1996	65.78	95.01	177.06	17.63	3.37	24.23	3.46
1997	85.81	104.08	172.91	9.83	3.46	25.73	3.66
1998	113.89	114.05	162.35	0.08	3.57	27.28	3.90
1999	153.68	125.28	145.60	-11.19	3.71	28.98	4.21
2000	210.58	138.81	124.35	-23.11	3.90	30.87	4.62

Source: Alaska Sea Grant Program.

TABLE 3.125

PROJECTED HARVESTING ACTIVITY
PRINCE WILLIAM SOUND TRADITIONAL FISHERIES 1980-2000

Year	CATCH: WEIGHT: POUNDS (1,000)	CATCH: WEIGHT: METRIC TONS	CATCH: VALUE ($1,000): Nominal	CATCH: VALUE ($1,000): Real[1]	EX-VESSEL PRICE ($/Pound): Nominal	EX-VESSEL PRICE ($/Pound): Real	NUMBER OF: Boats	NUMBER OF: Landings	NUMBER OF: Fishermen
1980	39290	17822	30390	27304	0.77	0.69	1190	16806	2845
1981	39610	17967	33649	28656	0.85	0.72	1195	17098	2855
1982	39933	18114	36978	29849	0.93	0.75	1199	17381	2863
1983	40262	18263	40718	31154	1.01	()*77	1203	17635	2871
1984	40595	18414	44675	32400	1.10	0.80	1207	17870	2879
1985	40933	18567	48951	33651	1.20	0.82	1210	18086	2885
1986	41627	18882	53951	35155	1.30	0.84	1212	18382	2891
1987	42326	19199	59407	36692	1.40	0.87	1215	18651	2898
1988	43046	19526	65274	38213	1.52	0.89	1218	18914	2904
1989	43787	19862	71660	39765	1.64	0.91	1219	19171	2907
1990	44550	20208	78748	41420	1.77	0.93	1221	19423	2913
1991	45336	20564	86518	43135	1.91	0.95	1222	19660	2917
1992	4’6144	20931	9473(3	44766	2.05	0.97	1224	19891	2920
1993	46977	21309	103765	46480	2.21	0.99	1225	20117	2924
1994	47834	21698	113596	48231	2.37	1.01	1226	20348	2928
1995	48718	22098	124419	50072	2.55	1.03	1227	20565	2930
1996	496?7	22511	136137	51932	2.74	1.05	1228	20787	2934
1997	50564	22936	148888	53835	2.94	1.06	1228	21004	?936
1998	51529	?3373	162730	55772	3.16	1.08	1229	21217	2938
1999	52523	23824	177594	57694	3.38	1.10	1229	21436	2941
2000	53547	24289	194001	59738	3.62	1.12	1230	21661	2943

Source: Alaska Sea Grant Program.

[1]The real values and prices are in terms of 1978 dollars.

TABLE 3.126

PROJECTED PERCENTAGE CHANGE FROM 1980,
PRINCE WILLIAM SOUND TRADITIONAL FISHERIES

	CATCH		EX-VESSEL PRICE		NUMBER OF		
Year	Weight	Real Value	Nominal	Real	Boats	Landings	Fishermen
1980	0	0	0	0	0	0	0
1981	0.81	4.95	9.83	4.11	0.42	1.74	0.36
1982	1.64	9.32	19.72	7.56	0.76	3.42	0.64
1983	2.47	14.10	30.75	11.35	1.10	4.93	0.93
1984	3.32	18.67	42.28	14.85	1.44	6.33	1.21
1985	4.18	23.25	54.61	18.30	1.69	7.62	1.42
1986	5.95	28.75	67.57	21.53	1.88	9.38	1.61
1987	7.73	34.38	81.46	24.74	2.15	10.98	1.88
1988	9.56	39.96	96.05	27.74	2.34	12.54	2.07
1989	11.45	45.64	111.58	30.68	2.45	14.08	2.20
1990	13.39	51.70	128.53	33.79	2.64	15.57	2.40
1991	15.39	57.98	146.73	36.91	2.75	16.98	2.53
1992	17.45	63.96	165.41	39.60	2.86	18.36	2.66
1993	19.56	70.23	185.57	42.38	2.97	19.70	2.79
1994	21.75	76.65	207.03	45.09	3.08	21.08	2.93
1995	23.99	83.39	230.18	47.90	3.11	22.37	3.00
1996	26.31	90.20	254.66	50.58	3.22	23.69	3.14
1997	28.69	97.17	280.69	53.21	3.25	24.98	3.21
1998	31.15	104.27	308.29	55.75	3.28	26.25	3.29
1999	33.68	111.30	337.15	58.07	3.31	27.55	3.37
2000	36.29	118.79	368.41	60.54	3.34	28.89	3.45

Source: Alaska Sea Grant Program.

TABLE 3.127

PERCENTAGE OF CATCH BY WEIGHT BY PRINCE WILLIAM SOUND
FISHERY INCLUDING GROUNDFISH, 1980-2000

Year	Sal mon	Hal i but	Herring	King Crab	Tanner Crab	Dungeness Crab	Shrimp	Razor Clams	Groundfish
1980	55.113	0.559	26.478	0.254	12.709	3.177	1.271	0.305	0.134
1981	55.318	0.554	26.?50	0.252	12.600	3.150	1.260	0.428	0.188
1982	55.512	0.549	26.017	0.250	12.488	3.122	1.249	0.549	0.263
1983	55.690	0.544	25.778	0.247	12.373	3.093	1.237	0.668	0.369
1984	55.844	0.539	25.52/3	0.245	12.253	3.063	1.225	0.784	0.518
1985	55.964	00534	25.264	0.243	12.126	3.032	1.213	0.897	0.728
1986	56.384	0.543	24.771	0.238	11.890	2.972	1.189	0.999	1.015
1987	56.720	0.553	24.263	0.233	11.646	2.911	1.165	10095	1*415
1988	56.961	0.561	23.722	0.228	11.386	2.847	1*139	1.184	1.972
1989	57.068	0.568	23.137	0.222	11.105	2.776	1.111	1.266	2.747
1990	56.991	0.574	22.490	0.216	10*795	2.699	1.079	1.339	3.818
1991	56.662	00577	21.762	().2()9	10.445	2.611	1.045	1.400	5.290
1992	55*993	0.576	20.928	0.201	10.045	2.511	1.005	1.446	7.296
1993	54.878	00570	19.959	0.192	9.580	2.395	0.958	1.475	9*993
1994	53.198	0.559	18.825	0.181	9.035	2.259	0.904	1.482	13.558
1995	50.833	0.539	17.500	0.168	8.400	2*1OO	0.840	1.462	18.159
1996	47.692	0.511	15.971	(-).153	7.666	1.916	0.767	1.411	23.912
199-7	43.748	0.474	14.250	0.13"7	6.840	1.710	0.684	1.327	30.831
1998	39.077	0.427	12.379	0.119	5.942	1.485	0.594	1.212	38.764
1999	33.878	().374	10.437	0.100	5.010	1.252	0.501	1.072	47.375
2000	28.458	0.317	8.525	0.082	4.092	1.023	0.409	0.917	56.177

Source: Alaska Sea Grant Program.

crease from 0.02 percent to 8.4 percent of the value of the total catch (Table 3.128),

The large difference between the importance of groundfish as measured by weight and value is due to the significant ex-vessel price differentials between groundfish and the traditional species. The relative importance of each fishery with respect to the number of boats, fishermen, or landings is expected to remain relatively constant (Tables 3.129 through 3.131); the one exception is the groundfish fishery.

Within the traditional fisheries, the projected changes in relative importance are more modest. The salmon fishery, which has been the leading traditional fishery in terms of harvest weight or value, is projected to increase its dominance (Tables 3.132 and 3.133). In terms of the number of boats, fishermen, or landings, the relative importance of individual fisheries among the traditional fisheries is expected to be quite stable (Tables 3.134 through 3.136).

As is mentioned in Chapter II, the summation of the number of boats or fishermen over all fisheries results in double counting since a fisherman or boat is counted once for each fishery participated in. The method used to reduce this problem is also discussed in Chapter II and the results of that adjustment method are presented in Table 3.137, which includes adjusted and unadjusted projections of the number of boats and fishermen for the Cordova commercial fishing industry as a whole.

TABLE 3. 28

PERCENTAGE OF VALUE BY PRINCE WILLIAM SOUND FISHERY INCLUDING GROUNDFISH, 1980-2000

Year	Salmon	Halibut	Herring	King Crab	Tanner Crab	Dungeness Crab	Shrimp	Razor Clams	Groundfish
1980	54.88	1.39	29.20	0.36	9.97	3.32	0.41	0.44	0.02
1981	56.62	1.36	28.08	0.35	9.33	3.22	0.41	0.59	0.03
1982	57.97	1.33	27.21	0.35	8.80	3.15	0.41	0.74	0.04
1983	59.35	1.30	26.32	0.34	8.30	3.06	0.42	0.87	0.05
1984	60.53	1.27	25.54	0.33	7.86	2.98	0.42	0.99	0.07
1985	61.62	1.24	24.82	0.33	7.47	2.91	0.42	1.10	0.10
1986	62.82	1.25	23.97	0.32	7.06	2.82	0.43	1.19	0.13
1987	63.95	1.26	23.18	0.31	6.68	2.74	0.43	1.28	0.17
1988	64.94	1.28	22.45	0.30	6.35	2.66	0.43	1.36	0.23
1989	65.85	1.29	21.76	0.30	6.05	2.58	0.44	1.43	0.30
1990	66.75	1.30	21.07	0.29	5.75	2.50	0.44	1.49	0.41
1991	67.58	1.30	20.40	0.28	5.48	2.42	0.44	1.54	0.55
1992	68.24	1.32	19.80	0.27	5.25	2.35	0.45	1.60	0.74
1993	68.83	1.32	19.20	0.26	5.02	2.27	0.45	1.64	1.00
1994	69.31	1.33	18.61	0.26	4.80	2.20	0.45	1.68	1.35
1995	69.69	1.33	18.01	0.25	4.60	2.12	0.46	1.71	1.84
1996	69.89	1.34	17.41	0.24	4.40	2.04	0.46	1.73	2.49
1997	69.86	1.33	16.80	0.23	4.21	1.96	0.46	1.74	3.41
1998	69.59	1.33	16.17	0.22	4.02	1.88	0.46	1.74	4.59
1999	68.92	1.32	15.51	0.21	3.82	1.79	0.46	1.74	6.23
2000	67.85	1.29	14.77	0.20	3.62	1.70	0.46	1.72	8.41

Source: Alaska Sea Grant Program.

TABLE 3.129

PERCENTAGE OF BOATS BY PRINCE WILLIAM SOUND
FISHERY INCLUDING GROUNDFISH, 1980-2000

Year	Salmon	Halibut	Herring	King Crab	Tanner Crab	Dungeness Crab	Shrimp	Razor Clams	Groundfish
1980	71.359	00500	130784	1.425	2.840	5.552	0.420	4.118	0.001
1981	71.058	0.498	13.726	1.419	2.831	5.529	0.418	4.520	0.002
1982	70.819	0.496	13.680	1.415	2.824	5.510	0.417	4.838	00002
1983	“70.581	0.494	13.634	1.410	2.816	5.491	0.416	5,154	0.003
1984	70.346	0.493	13.589	1.405	2.808	5.473	0.414	5.469	().004
1985	70.169	0.491	13.554	1.402	2.803	5.459	0.413	5.703	0.005
1986	70.038	0.509	13.529	1.399	2.799	5.449	0.412	5.857	0.007
1987	69.849	0.528	13.493	1.395	2.793	5.434	0.411	6.088	0.009
1988	69.717	0.547	13.467	1.393	2.788	5.424	0.411	6.241	0.012
1989	69.641	0.567	13.452	1.391	2.786	5.418	(--I.41O	6.316	0.017
1990	69.507	0.588	13.427	1.388	2.782	5.408	0.409	6.468	0.023
1991	69.428	0.610	130411	1.387	2.780	5.402	0.409	6.542	0.031
1992	69.347	0.633	13.396	1.385	2.777	5.395	00408	6.614	0.042
1993	69.262	0.656	13.379	1.384	2.774	5.389	0.408	6.690	0.058
1994	690173	0.681	13.362	1.382	2.771	5.382	0.407	6.762	0.079
1995	69.134	0.706	13.355	1.381	2.770	5.379	0.407	6.759	0.109
1996	699(}31	().733	13.335	1.379	2.767	5.371	0.407	6.830	0.149
1997	68.972	0.760	13.323	1.378	2.765	5.346	0.406	6.824	0.205
1998	68.898	0.789	13.309	1.376	2.762	5.361	0.406	6.817	0.283
1999	68.803	0.818	13.291	1.374	2.759	5.353	0.405	6.807	0.390
2000	68.678	0.848	13.266	1.372	2.755	5.343	0.404	6.795	0.538

Source: Alaska Sea Grant Program.

TABLE 3.130

PERCENTAGE OF FISHERMEN BY PRINCE WILLIAM SOUND
FISHERY INCLUDING GROUNDFISH, 1980-2000

Year	Salmon	Halibut	Herring	King Crab	Tanner Crab	Dungeness Crab	Shrimp	Razor Clams	Groundfish
1980	61.374	1.254	18.982	2.385	4.751	4.644	3.164	3.445	0.002
1981	61.156	1.250	18.914	2.376	4.739	4.627	3.152	3.783	00003
1982	60.982	1.246	18.860	2.369	4.729	4.614	3*143	4.051	00004
1983	60.809	1.242	18.807	2.363	4.719	4.601	3.134	4.319	0.006
1984	60.637	1.239	18.754	2.356	4.709	4.588	3.126	4.584	0.008
1985	60.508	1.236	18.714	2.351	4.701	4.578	3.119	4.782	0.010
1986	60.392	1.281	18.678	2.346	4.694	4.570	3.113	4.912	0.014
1987	60.233	1.327	18.629	2.340	4,684	4.557	3.105	5.106	0.019
1988	60.114	1.376	18.592	2.336	4.677	4.549	3.099	5.233	0.026
1989	60.034	1.427	18.567	2.333	4.672	4.542	3.095	5*295	0.035
1990	59*91O	1*479	18.529	2.328	4.664	4.533	3.088	5.421	0.048
1991	59.824	1.533	18.502	2.324	4.658	4.527	3.084	5.482	0.065
1992	59*733	1.590	18.474	2.321	4.653	4.520	3.079	5.542	0.089
1993	59.635	1.648	18.444	2.317	4.646	4.512	3.074	5.601	0.121
1994	59.529	1.709	18.411	2.313	4.639	4.504	3.069	5.660	0.166
1995	59*453	1.772	18.388	2.310	4.634	4.498	3.065	5.652	0.228
1996	59.321	1.837	18.347	2,305	4.625	4.489	3.058	5.708	0.312
1997	59.209	1.904	18.312	2.300	4*617	4.480	3.(352	5.697	0.429
1998	59.070	1.972	18.269	2.295	4.607	4.469	3.045	5.684	0.590
1999	58.892	2.042	18.214	2.288	4.593	4.456	3.036	5.667	0.811
2000	58.664	2.112	18.143	2.279	4.576	4.439	3.024	5.645	1.118

Source: Alaska Sea Grant Program.

TABLE 3.131

PERCENTAGE OF THE NUMBER OF LANDINGS BY PRINCE WILLIAM SOUND FISHERY INCLUDING GROUNDFISH, 1980-2000

Year	Salmon	Hal ibut	Herring	King Crab	Tanner Crab	Dungeness Crab	Shrimp	Razor Clams	Groundfish
1980	83.211	0.142	4.260	0.511	2,730	4.977	0.179	3.987	0.004
1981	82.152	0.139	4.187	0.502	2.683	4.892	0.175	5.264	0.005
1982	81.175	C)*137	4.119	0.494	2.639	4.812	0.173	6.443	0.007
1983	80.367	0.135	4.060	0.487	2*601	4.743	0.170	7.428	0.009
1984	79.671	0.133	4.006	0.480	2.567	4.681	0.168	8.281	0.013
1985	79.081	0*131	3.958	00475	2.536	4.624	0.166	9.011	0.017
1986	78.647	00134	3.894	0.467	?.495	4.550	0.163	9.627	0.022
1987	78.354	0.137	3.838	0.460	2.459	4.484	0.161	10.077	0.030
1988	78.113	00141	3.784	0.454	2.425	4.421	0.159	10.464	0.040
1989	77.921	().144	3.733	0.448	2.392	4.361	0.156	10.792	0.053
1990	77.775	0.148	3.684	0.442	2.360	4.304	0.154	11.061	0.072
1991	77.712	0.152	3.638	0.436	2.331	4.251	0.152	11.230	().097
1992	77.687	0.156	3.595	0.431	2.303	4.200	0.151	11.347	0.131
1993	77.696	0.160	3.553	0.426	2.276	4.151	0.149	11.413	0.176
1994	“?7.6$)7	0.164	3.51(-I	0.421	2.249	4.101	0.147	11.472	0.239
1995	77.759	0.168	3.47(-1	0.416	2.224	4.054	0.145	11.439	0.324
1996	77.800	0.173	3.429	0.411	2.197	4.007	(-).144	11.399	0.440
1997	77.847	0.177	3.388	0.406	2.171	3.959	0.142	11.311	0.598
1998	77.887	0.182	3.347	0.401	2.145	3.910	0.140	11.173	0.815
1999	77.865	00186	3.303	0.3?6	2.116	3.859	0.138	11.026	1.110
2000	77.759	0.191	3.255	0.390	2.086	3.803	0.136	10.867	1.512

Source: Alaska Sea Grant Program.

TABLE 3.132

PERCENTAGE OF CATCH BY WEIGHT BY PRINCE WILLIAM SOUND FISHERY EXCLUDING GROUNDFISH, 1980-2000

Year	Salmon	Halibut	Herring	King Crab	Tanner Crab	Dungeness Crab	Shrimp	Razor Clam
1980	55.187	0.560	26.513	0.255	12.726	3.181	1.273	0.305
1981	55.422	0.555	26.299	0.252	12.623	3.156	1.262	0.429
1982	55*659	00551	26.086	0.250	12.521	3.130	1.252	0.551
1983	55.896	0.546	25.873	0.248	12.419	3.105	1.242	0.671
1984	560135	0.542	25.661	0.246	12.317	3.079	1.232	0.788
1985	56*375	().537	25.449	00244	12.215	3.054	1.222	0.904
1986	56.962	0.549	25.025	0.240	120012	3.003	1.201	1.009
1987	57.534	(30561	24.611	0.236	11.813	2.953	1.181	1.110
1988	58.107	0.572	24.200	0.232	110615	2.904	1.162	1.208
1989	58.680	0.584	23.790	0.228	11.419	2.855	1.142	1.302
1990	59.253	0.596	23.383	0.224	11.223	2.806	1.122	1.392
1991	59.826	0.609	22.978	0.221	11.029	2.75”7	1.103	10478
1992	60.399	0.621	22.575	0.217	10.836	2.709	1.084	1.56(-I
19’?3	60.971	0.634	22.175	().213	10.644	2.661	1.064	1.639
1994	61.542	().646	21.777	0.209	10.453	2.613	19045	1.714
1995	62.112	0.659	21.382	0.205	10.263	2.566	1.026	1.786
1996	62.681	().672	20.991	0.202	10*O75	2.519	1.008	1.854
1997	63.248	0.685	20.602	0.198	9.888	2.472	0.989	1.918
1998	63.813	0.698	20.216	0.194	9.703	2.426	0.970	1.979
1999	64.377	0.71.1	19.833	0.190	9.520	2.380	0.952	2.037
2000	64.938	().724	19.454	0.187	9.338	2.334	0.934	2.092

Source: Alaska Sea Grant Program.

TABLE 3.133

PERCENTAGE OF VALUE BY PRINCE WILLIAM SOUND FISHERY EXCLUDING GROUNDFISH, 1980-2000

Year	Salmon	Halibut	Herring	King Crab	Tanner Crab	Dungeness Crab	Shrimp	Razor Clam
1980	54.90	1.39	29.21	0.36	9.98	3.32	O*41	(-).44
1981	56.64	1.36	28.09	0.35	9.33	3.22	0.41	0.59
1982	57.99	1.33	27.22	0.35	8.81	3.15	0.41	0.74
1983	59.38	1.30	26.33	0.34	8.31	3.06	0.42	0.87
1984	60.57	1.27	25.56	0.33	7.87	2.99	0.42	0.99
1985	61.67	1.24	24.84	0.33	7.47	2.91	0.42	1.10
1986	67*9(-)	1.26	24.0(-)	0.32	7.07	2.83	(-).43	1.19
1987	64.05	1.27	?3.22	0.31	6.70	2.74	0.43	1.28
1988	65.09	1.28	?2.50	0.30	6.37	2.67	0.43	1.36
1989	66.06	1.29	21.83	0.30	6.06	2.59	0.44	1.43
1990	67.02	1.30	21.16	0.29	5.78	2.51	0.44	1.5(-I
1991	67.95	1.31	20.51	0.28	5.51	2.44	0.44	1.55
1992	68.74	1.32	19.95	0.27	5.28	2.37	0.45	1.61
1993	69.53	1.34	19.40	0.27	5.07	?.30	0.45	1.66
1994	70.27	1.35	18.87	0.26	4.87	2.23	0.46	1.70
1995	71.00	1.36	18.35	0.25	4.68	2.16	0.46	1.74
1996	71.68	1.37	17.86	0.?4	4.51	2.10	0.47	1.77
1997	72.33	1.38	17.39	0.24	4.3'5	2.03	0.48	1.80
1998	72*?4	1.39	16.94	0.23	4.21	1.97	0.48	1.83
1999	73.50	1.4(1	16.54	0.22	4.08	1.91	0.49	1.85
2000	74.07	1.41	16.12	0.22	3.95	1.86	().50	1.87

Source: Alaska Sea Grant Program.

TABLE 3.134

PERCENTAGE OF BOATS BY PRINCE WILLIAM SOUND
FISHERY EXCLUDING GROUNDFISH, 1980-2000

Year	Salmon	Halibut	Herring	King Crab	Tanner Crab	Dungeness Crab	Shrimp	Razor Clam
1980	71.359	0.500	13.784	1.425	2.840	5.552	0.420	4.119
1981	71.059	0.498	13.726	1.419	2.831	5.529	0.418	4.520
1982	70.820	0.496	13.680	1.415	2.824	5.510	0.417	4.838
1983	70.583	09494	13.634	1.410	2.816	5.492	0.416	5.154
1984	70.348	(-)*493	13.589	1.405	2.809	5.473	0.414	5.469
1985	70.173	0.491	13.555	1.402	2.803,	5.460	0.413	5.703
1986	70.043	0.509	13.530	1.399	2.799	5.450	0.413	5.858
1987	69.855	0.528	13.494	1.395	2.793	5*435	0.411	6.089
1988	69.726	0.547	13.469	1.393	2.789	5.425	0.411	6.242
1989	69.653	0.567	13.455	1.391	2.787	5.419	0.410	6.317
1990	69.523	0.588	13.430	1.389	2.783	5.409	0.409	6.469
1991	69.450	0.610	13.416	10387	2.780	5.403	0.409	6.544
1992	69.376	0.633	13.401	1.386	2.778	5.398	0.409	6.619
1993	69.302	0.657	13.387	1.384	2*776	5.392	0.408	6.694
1994	69.228	0.681	13.373	1.383	2.774	5.386	0.408	6.768
1995	69.209	0.707	13.369	1.383	2.773	5.385	0.408	6.766
1996	69.134	0.734	13.354	103R1	2.771	5.379	0.407	6.840
1997	69.114	0.762	13.351	1.381	2.771	5*377	00407	6.838
1998	69.093	().791	13.347	1.380	2.770	5.376	0.407	6.836
1999	(59.072	0.821	13.343	1.380	2.770	5*374	0.407	6.834
?000	69.050	0.852	13.338	1*379	2.769	5.372	00407	6.832

Source: Alaska Sea Grant Program.

TABLE 3.135

PERCENTAGE OF FISHERMEN BY PRINCE WILLIAM SOUND
FISHERY EXCLUDING GROUNDFISH, 1980-2000

Year	Salmon	Halibut	Herring	King Crab	Tanner Crab	Dungeness Crab	Shrimp	Razor Clam
1980	61.375	1.254	18.982	2.385	4.751	4.644	3.164	3.445
1981	61.158	1.250	18.915	2.376	4.739	4.627	3.152	3.783
1982	60.984	1.246	18.861	2.369	4.729	4.614	3.144	4.052
1983	60.813	1.243	18.808	2.363	4.719	4.601	3.135	4.319
1984	60.642	1.239	18.755	2.356	4.709	4.588	3.126	4.585
1985	60.514	1.236	18.716	2.351	4.702	4.579	3.119	4.783
1986	60.400	1.282	18.680	2.347	4.695	4.570	3*113	4.912
1987	60.*244	1.328	18.632	2.341	4.685	4.558	3.105	5*107
1988	60.129	1.376	18.597	2.336	4.678	4.550	3.099	5.235
1989	60.055	1.427	18.574	2.333	4.674	4.544	3.096	5.297
1990	59.939	1.479	18.538	2.329	4.666	4.535	3.090	5.424
1991	59.863	10534	18.514	2.326	4.662	4.530	3.086	5.486
1992	59.786	1.591	18.490	2.323	4.657	4.524	3.082	5.547
1993	59.708	1.650	18.466	2.320	4.652	4.518	3.078	5.608
1994	59.628	1.712	18.442	2.317	4.647	4.512	3.074	5.669
1995	59.589	1.776	18.429	2.315	4.645	4.509	3.072	5.665
1996	59.507	1.842	18.404	2.312	4.639	4.503	3.067	5.726
1997	59.464	1.912	18.391	2.310	4.637	4.499	3.065	5.722
1998	59.420	1.984	18.377	2.309	4.634	4.496	3.063	5.717
1999	59.374	2.059	18.363	?.307	4.631	4.493	3.061	5.713
2000	59.327	2.136	18.348	2.305	4.628	4.489	3.058	5.708

Source: Alaska Sea Grant Program.

TABLE 3.136

PERCENTAGE OF THE NUMBER OF LANDINGS BY PRINCE WILLIAM SOUND FISHERY EXCLUDING GROUNDFISH, 1980-2000

Year	Salmon	Halibut	Herring	King Crab	Tanner Crab	Dungeness Crab	Shrimp	Razor Clam
1980	83.215	0.142	4.260	0.511	2.730	4.977	00179	3.987
1981	82.156	0.139	4.188	0.502	2.683	4.892	00175	5.264
1982	81.181	00137	4.120	0.494	2.640	4.813	0.173	6.444
1983	80.374	0.135	4.060	0.487	2.601	4*743	0.170	7.429
19$34	79.681	0.133	4.007	0.480	2.567	4.681	00168	8.282
1985	79.095	0.132	30?59	0.475	2.537	40625	0.166	9.013
1986	78.665	0.134	3.895	0.467	2.496	40551	0.163	9.629
1987	78.378	0.138	3.839	0.460	2.460	4.485	0.161	10.080
1988	78.144	0.141	3.786	0.454	2.426	4.423	0.159	10.469
1989	77.963	0.144	3.735	0.448	2.393	40363	0.156	10*797
1990	77.831	0.148	3.686	(3.442	2.362	4.307	0.154	11.069
1991	77.787	0.152	3.642	0.437	2.334	4.255	0.153	11.241
1992	77.788	0.156	3.600	0.432	2.306	4.205	0.151	11.362
1993	77.833	0.160	3*559	().427	2.280	4.158	0.149	11*433
1994	77.883	0.164	3.519	0.422	2.255	4,111	0.147	11.500
1995	78.012	(-).169	3.482	0.417	2.231	4.068	0.146	11.476
1996	78.144	0.173	3.445	0.413	2.207	4.024	0.144	11.450
1997	78.316	0.178	3.409	0.409	2.184	3.983	0.143	11.379
1998	78.527	(-).183	3.375	0.4(-)5	2.162	3.943	0.141	11.264
1999	78.739	0.188	3.340	0.401	2.140	3.902	0.140	11.149
2000	78.953	0.194	3.305	0.396	2.118	3.862	0.138	11.034

Source: Alaska Sea Grant Program.

TABLE 3.137

ADJUSTED PROJECTIONS OF THE NUMBER OF BOATS
FOR THE CORDOVA COMMERCIAL FISHING INDUSTRY 1980-2000

Year	SALMON FISHERIES Unadjusted	SALMON FISHERIES Adjusted	SHELLFISH FISHERIES Unadjusted	SHELLFISH FISHERIES Adjusted	TRADITIONAL FISHERIES Unadjusted	TRADITIONAL FISHERIES Adjusted	ALL FISHERIES Unadjusted	ALL FISHERIES Adjusted
1980	849	719	122	92	1190	817	1190	817
1981	849	719	122	92	1195	817	1195	817
1982	849	719	122	92	1199	817	1199	817
1983	849	719	122	92	1203	817	1203	817
1984	849	719	122	92	1207	817	1207	817
1985	849	719	122	92	1210	$117	1210	817
1986	849	719	122	92	1212	817	1212	817
1987	.849	719	122	92	1215	818	1215	818
1988	849	“r19	122	92	1218	818	1218	818
1989	849	719	122	92	121.9	818	1219	818
1990	849	719	122	92	1221	818	1221	819
1991	849	719	122	92	1222	819	1 2 2 3	819
1992	849	719	122	92	1224	819	1224	819
1993	849	719	122	92	1225	819	1226	820
1994	849	719	122	92	1226	820	1,227	821
1995	849	719	122	92	1227	820	1228	821
1996	849	719	122	92	1228	820	1230	822
1997	849	719	122	92	1228	821	1231	823
1998	849	719	122	92	1229	821	1232	824
1999	849	719	122	92	]229	821	1234	826
2000	849	719	122	92	1230	822	1236	828

Source: ‘Alaska Sea Grant Program.

TABLE 3.137 (Continued)

ADJUSTED PROJECTIONS OF THE NUMBER OF FISHERMEN
FOR THE CORDOVA COMMERCIAL FISHING INDUSTRY 1980-2000

	SALMON FISHERIES		SHELLFISH FISHERIES		TRADITIONAL FISHERIES		ALL FISHERIES	
Year	Unadjusted	Adjusted	Unadjusted	Adjusted	**Unadjusted**	Adjusted	Unadjusted	Adjusted
1980	1746	1480	425	320	2845	1835	2845	1835
1981	1746	1480	425	320	2855	1835	2855	1835
1982	1746	1480	425	320	2863	1835	2863	1835
1983	1746	1480	425	320	2871	1835	2871	11335
1984	1746	1480	426	320	2879	1835	2879	1836
1985	1746	1480	426	320	2885	1835	2886	1836
1986	1746	1480	426	320	2891	1$337	2891	1837
1987	1746	1480	426	320	2898	1838	2899	1839
1988	1746	1480	426	320	2904	1840	2904	1841
1989	1746	1480	426	320	2907	1841	2908	1842
1990	1746	1480	426	320	2913	1843	2914	1844
1991	1746	1480	426	320	2917	1845	2919	1847
1992	1746	1480	426	320	2920	1846	2923	1849
1993	1746	1480	426	320	2924	1848	2928	1852
1994	1746	1480	426	320	2928	1850	2933	1855
1995	1746	1480	426	320	2930	1R52	2937	1859
1996	1746	1480	426	320	2934	1854	2943	1863
1997	1746	1480	426	320	2936	1856	2949	1869
1998	1746	1480	426	320	2938	1858	2956	1876
1999	1746	1480	426	320	2941	1861	2965	1885
2000	1746	1480	426	320	2943	1863	2976	1896

Source: Alaska Sea Grant Program.

Local Harvesting Effort

The difficulties of defining and measuring local harvesting effort are addressed in Chapter II and a method of approximating local effort is developed. The results of that method of approximation are presented in this section. As the values of the local harvesting factors indicate, the degree to which a Prince William Sound fishery can be considered a local Cordova fishery varies greatly among fisheries (Table 3.138). For example, the salmon fisheries are principally local and the halibut fisheries are not.

PROCESSING

The projections of processing plant activity presented in this section are based on the projections of industry-wide catch discussed in a preceding section. The measures of activity are in terms of processing plant input requirements and processing plant payrolls or income. Four sets of projections are presented for each measure of processing activity; the four sets are the traditional fisheries with and without increased efficiency and all fisheries with and without increased efficiency.

Water

In 1976 and 1977, the peak water usage by Cordova processing plants was approximately 5.7 million liters (1.5 million gallons) per day. Using this as the base peak load, peak load is projected to be between 4.5 to 7.9 million liters (1,2 and 2.1 million gallons) per day by 2000 (Table 3.139).

TABLE 3.138
LOCAL HARVESTING FACTOR FOR CORDOVA, 1976

Prince William Sound:	LPO	TP	P	LPO/TP = P
King crab small boat pots	16	38	.421	
King crab large boat pots		6	.667	
Salmon purse seine	19;	282	.681	
Salmon drift gill net	378	539	.701	
Salmon set gill net	17	28	.607	

$$P = [(PF/TP) \cdot LPO]/B$$

Statewide:	PF	TP	LPO	B	P
Halibut span boat long line	95	1,323	31	92	.024
Halibut large boat long line	256	1,112	16		
Halibut hand troll	1	43	1		
Sablefish small boat long line	NA	NA	1		
Sablefish large boat long line	NA	NA	-0-		
Dungeness crab small boat pots	43	240	34	5	1.0 *
Dungeness crab large boat pots	12	43	8	3	.744
Herring purse seine	129	251	37	67	.284
Herring set gill net	109	249	-0-		
Herring pound	3	6	-0-		
Herring roe on kelp	407	1,529	523	279	.499
Bottomfish small boat long line	3	66	5	23	.010
Bottomfish large boat long line	8	59	1	4	.034
Bottomfish otter trawl	12	40	4	3	.400
Bottomfish small boat pots	1	7	-0-		
Bottomfish beam trawl	NA	6	-0-		
Shrimp otter trawl	129	218	1	1	.592
Shrimp beam trawl	22	69	2		
Shrimp small boat pots	33	281	4	1	.470
Shrimp large boat pots	4	30	-0-	-0-	-0-
Razor clams shovel	8	174	64	9	.327
Razor clams dredge	NA	5	2		
Razor clams other	NA	4	-0-		
Salmon hand troll	1,239	2,746	1	-0-	-0-
Salmon power troll	742	999	1		
Tanner crab small boat pots	166	295	29	27	.604
Tanner crab large boat pots	224	341	13	11	,776

P = Estimate of the, proportion of fishing effort that is local

LPO = Number of local permit owners

TP = Total number of permits

PF = Number of permits fished

B = Number of boats participating in the fishery

*P=l when calculated value exceeds 1 -

Source: ADF&G and CFEC data files.

TABLE 3.139

PROJECTED PEAK CORDOVA PROCESSING REQUIREMENTS FOR WATER

Year	1000 GALLONS/DAY				PERCENTAGE INCREASE*			
	Traditional Fisheries		All Fisheries		Traditional Fisheries		All Fisheries	
	1	2	1	2	1	2	1	2
1980	1422	1366	1422	1366	-5.20	-8.95	-5.18	-8.94
1981	1434	1349	1434	1350	-4.43	-10.05	-4.41	-10.03
1982	1445	1333	1446	1333	-3.64	-11.12	-3.62	-11.10
1983	1457	1317	1458	1318	-2.85	-12.18	-2.82	-12.16
1984	1469	1302	1470	1302	-2.05	-13.23	-2.00	-13.19
1985	1482	1286	1482	1287	-1.23	-14.26	-1.17	-14.21
1986	1507	1282	1508	1283	0.44	-14.55	0.53	-14.48
1987	1532	1277	1534	1279	2.13	-14.85	2.25	-14.75
1988	1558	1273	1561	1275	3.87	-15.13	4.04	-14.99
1989	1585	1269	1589	1272	5.66	-15.40	5.90	-15.20
1990	1612	1265	1618	1269	7.50	-15.65	7.85	-15.37
1991	1641	1262	1648	1268	9.39	-15.88	9.90	-15.49
1992	1669	1258	1680	1266	11.27	-16.14	12.00	-15.6[illegible]
1993	1700	1256	1716	1267	13.35	-16.28	14.39	-15.51
1994	1731	1253	1754	1269	15.42	-16.46	16.92	-15.37
1995	1763	1251	1796	1274	17.55	-16.62	19.71	-15.09
1996	1796	1249	1843	1281	19.75	-16.76	22.86	-14.60
1997	1830	1247	1898	1293	22.01	-16.89	26.50	-13.82
1998	1865	1245	1963	1310	24.33	-16.99	30.84	-12.65
1999	1901	1244	2043	1336	26.74	-17.08	36.17	-10.91
2000	1938	1243	2144	1374	29.21	-17.16	42.91	-8.37

Source: Alaska Sea Grant Program.

[1] Requirement without increased efficiency.

[2] Requirement with a 2 percent annual decrease in input requirements per unit produced.

*Projected percentage increase since the late 1970s.

Electricity

Based on a base peak load requirement of 0.624 million kilowatt hours of electricity per month, the projected peak use of electricity by processing plants in the year 2000 is projected to range from 0.517 to 2.1 million kilowatt hours per month (Table 3.140).

Employment

Using the Alaska Department of Labor estimate of average monthly employment in Cordova processing plants in 1977 as the base, the projections of average monthly employment for the year 2000 range from 212 to 509 (Table 3.141).

Income

Using corresponding data of the annual payroll of processing plants, the annual real income for the year 2000 is projected to range from $3.7 million to $8.9 million (Table 3.141). The corresponding projected percentage increases since the base period are presented in Table 3.142.

Number of Plants

The number of plants can vary greatly due to changes in average plant size and is, therefore, not a significant measure of processing activity. Since many Cordova plants have either excess capacity or the capability of increasing their capacity, the number of plants is expected to remain

TABLE 3.140

PROJECTED PEAK CORDOVA PROCESSING REQUIREMENTS FOR ELECTRICITY

	1000 KWH/MONTH				PERCENTAGE INCREASE*			
	Traditional Fisheries		All Fisheries		Traditional Fisheries		All Fisheries	
Year	1	2			1	2	1	2
1980	592	568	593	569	-5.2o	-8.95	-5.03	-8.79
1981	596	561	598	543	-4.43	-10.05	-4.20	-9.83
1982	601	555	603	556	-3.64	-11.12	-3.32	-10.83
1983	606	548	609	551	-2.85	-12.18	-2.39	-11.77
1984	611	541	615	545	-2.05	-13.23	-1.40	-12.66
1985	616	535	622	54a	-1.23	-14.26	-0.32	-13.46
1986	627	533	635	540	0.44	-14.55	1.75	-13.44
1987	637	531	649	541	2.13	-14.85	3.99	-13.30
1988	648	530	665	543	3.87	-15.13	6.51	-12.97
1989	659	528	683	547	5.66	-15.4(3	9.43	-12.37
1990	671	526	704	553	7.50	-15.65	12.90	-11.41
1991	683	525	731	562	9.39	-15.88	17.13	-9.93
1992	694	523	764	575	11.27	-16.14	22.37	-7.78
1993	707	522	807	596	13.35	-16.28	29.29	-4.51
1994	720	521	863	625	15.42	-16.46	38.35	O*13
1995	734	520	940	666	17*55	-16.62	50.58	6.81
1996	747	519	1045	726	19.75	-16.76	67.40	16.37
1997	761	519	1191	811	22*O1	-16.89	90.87	30.03
1998	776	518	1398	933	24.33	-16.99	124.00	49.54
1999	791	517	1692	1107	26.74	-17.08	171.20	77.44
2000	806	517	2115	1356	29.21	-17.16	238.94	117.32

Source: Alaska Sea Grant Program.

[1] Requirement without increased efficiency.

‘Requirement with a 2 percent annual decrease in input requirements per unit produced.

*Projected percentage increase since the late 1970s.

TABLE 3.141

PROJECTED CORDOVA PROCESSING EMPLOYMENT AND INCOME, 1980-2000

	TRADITIONAL FISHERIES						ALL FISHERIES					
	WITHOUT INCREASED EFFICIENCY			WITH INCREASED EFFICIENCY			WITHOUT INCREASED EFFICIENCY			WITH INCREASED EFFICIENCY		
Year	Employ-merit[1]	Nominal Income[2]	Real Income[3]	Employ-ment	Nominal Income	Real Income	Employ-ment	Nominal Income	Real Income	Employ-ment	Nominal Income	Real Income
1980	243	3923	3524	?33	3767	3385	243	3927	3528	233	3771	3388
1981	245	4212	3587	23o	3964	3376	245	4217	3592	231	3970	3381
1982	247	4522	3650	228	4171	3367	247	4531	3657	228	4180	3374
1983	249	4856	3715	225	4389	3358	249	4868	3725	225	4402	3368
1984	251	5214	3781	222	4619	3350	252	5232	3795	223	4637	3363
1985	253	5599	3849	219	4861	3341	254	5626	3868	221	4888	3360
1986	257	6064	3951	219	5159	3362	259	6104	3977	220	5199	3387
1987	261	6567	4(356	218	5475	3382	264	6625	4092	220	5533	3410
1988	266	7113	4164	217	5812	3402	269	7199	4214	220	5898	3453
1989	270	7705	4276	217	6170	3424	275	7832	4346	221	6297	3494
1990	275	8349	4392	216	6552	3446	281	8537	4490	222	6739	3545
1991	280	9049	4511	215	6959	3469	289	9326	4650	224	7236	3608
1992	285	9802	4632	215	7387	3491	297	10214	4827	227	7799	3686
1993	290	10635	4764	214	7855	3518	307	11246	5038	231	8466	3792
1994	295	11533	4897	214	8347	3544	319	12442	5283	237	9257	3930
1995	3(11	12509	5034	213	8873	3571	334	13864	5580	246	10228	4116
1996	307	13571	5177	213	9434	3599	352	15593	5948	259	11455	4370
1997	312	14726	53?5	213	10032	3627	376	17746	6417	277	13052	4719
1998	318	15982	5478	?12	1067(.I	3657	408	20503	7027	303	15190	5206
1999	324	17350	5636	212	11351	3688	451	24125	7837	339	18126	5889
2000	331	18838	5901	212	12078	3719	509	29008	8932	391	22248	6851

Source: Alaska Sea Grant Program.

[1]Average monthly employment.

‘Annual payroll in $1,000.

[3]Income in 1978 dollars in ($1,000).

TABLE 3.142

PROJECTED PERCENTAGE CHANGE* IN CORDOVA
PROCESSING EMPLOYMENT AND INCOME 1980-2000

	TRADITIONAL FISHERIES						ALL FISHERIES					
	WITHOUT INCREASED EFFICIENCY			WITH INCREASED EFFICIENCY			WITHOUT INCREASED EFFICIENCY			WITH INCREASED EFFICIENCY		
Year	Employ-ment[1]	Nominal Income[2]	Real Income[3]	Employ-ment	Nominal Income	Real Income	Employ-ment	Nominal Income	Real Income	Employ-ment	Nominal Income	Real Income
1980	-5.20	7*53	-3.39	-8.95	3.27	-7.22	-5.10	7.64	-3.29	-8.85	3.38	-7.12
1981	-4*43	15*45	-1.68	-10.05	8.66	-7.46	-4.29	15.61	-1.55	-9.91	8.82	-7.33
1982	-3.64	23.96	0.06	-11.12	14.34	-7.71	-3.46	24.19	0.25	-10.94	14.57	-7.52
1983	-2.85	33.1(-I	1.84	-12.18	20.32	-7.94	-2.60	33.45	2*11	-11.93	20.66	-7.68
1984	-2.05	42.93	3.66	-13.23	26.61	-8.18	-1*7O	43.43	4.02	-12.88	27.12	-7.81
1985	-1.23	5394?	5.51	-14.26	33.24	-8.4(-)	-0.76	54.22	6.02	-13.78	33.98	-7.90
1986	0.44	66*23	8.32	-14.55	41.42	-7.85	1.10	67.32	9.02	-13.89	42.51	-7.14
1987	2.13	80.01	11.19	-14.85	50.08	-7.30	3.04	81.61	12.17	-13.94	51.68	-6.3.?
1988	3.87	94.97	14.14	-15.13	59.31	-6.74	5.12	97.33	15.52	-13.88	61.66	-5.36
1989	5.66	111.22	17.21	-15.4('I	69.13	-6.15	7040	114.70	19*14	-13.66	72.61	-4.22
1990	7.50	128.87	20.38	-15.65	79.60	-5.53	?*91	134.01	23.09	-13.23	84.74	-2.83
1991	9.39	148.04	23.66	-15.88	90.75	-4.90	12.75	155.66	27.46	-12.52	98.36	-1.10
1992	11.27	168.71	26.98	-16.14	102.51	-4.30	15.95	179.99	32.32	-11.47	113.80	1.03
1993	13.35	191.53	30.58	-16.28	115.31	-3.55	19.87	208.29	38.09	-9.76	132.C8	3.96
1994	15.42	216.14	34.23	-16.46	128.82	-2.85	24.52	241.08	44.81	-7.35	153.76	7.74
1995	17.55	242.90	38.00	-16.62	143.23	-2.11	30.29	280.05	52.95	-3.88	180.37	12.84
1996	19.75	272.01	41.91	-16*76	158.60	-1.35	37.59	327.43	63.o5	1.08	214.C2	19.79
1997	22.01	303.67	45.96	-16.89	174.99	-0.57	47*O3	386.47	75.90	8.14	257.79	29.37
1998	24.33	3313.11	50.15	-16.99	192.49	0.24	59.50	4(52.02	92.62	18.17	316.40	42.71
1999	26.74	375.60	54.50	-17.08	211.16	1.08	76.22	561.32	114.84	32.41	396.88	61.42
2000	29.21	416.39	59.01	-17.16	231.09	1.95	98.96	695.16	144.85	52.60	509.87	87.79

Source: Alaska Sea Grant Program.

*1977 is the base period.

[1] Average monthly employment.

[2] Annual payroll "in $1,000.

[3] Income in 1978 dollars in ($1,000).

relatively constant and perhaps include four or five large plants and a few small plants, The plants will typically process a variety of species. Since the projected development of the groundfish industry is more speculative and more significant than that of the traditional fisheries, a summary of projected groundfish processing activity, including the number of plants, is presented in Table 3.143.

Local Processing Effort

On the basis of information provided by the industry, it is estimated that 40 percent of the summer employment and almost 100 percent of the winter employment in Cordova fish processing plants utilize full-time residents.

THE FEASIBILITY OF THE PROJECTED GROWTH

In this section, the feasibility of the projected growth of the Cordova commercial fishing industry is evaluated in terms of the projected input requirements and projected input availability. The inputs that are considered include small boat harbor facilities, port facilities, labor, land, electric power, water, and processing plant facilities. Projections of the availability of port facilities, labor, land, electric power, and water are drawn from the following Studies Program reports.

- Technical Report Number 31, Northern Gulf of Alaska Petroleum Development Scenarios Transportation Systems Impacts
- Technical Report Number 33, Northern Gulf of Alaska Petroleum Development Scenarios Local Socioeconomic Impacts

TABLE 3.143

PROJECTED CORDOVA GROUNDFISH PROCESSING ACTIVITY, 1980-2000

Year	CATCH (MT)	NUMBER OF PLANTS[1]	EMPLOYMENT (man years)	LAND (hectares)	ELECTRICITY (million KWH/year)	WATER (million gallons/year)
1980	24	0	0	0	0	0
1981	34	0	0	0	0	0
1982	48	0	0	0	0	0
1983	68	0	1	0	0	0
1984	96	0	1	0	0	0
1985	136	0	1	0	0	0
1986	194	0	2	0	0	0
1987	276	0	2	0	0	0
1988	393	0	3	0	0	1
1989	561	0	4	0	0	1
1990	802	0	6	0	0	1
1991	1149	0	Y	0	0	2
199?	1647	0	12	0	0	2
1993	2366	0	17	0	0	3
1994	3403	0	23	0	0	4
1995	4903	0	33	0	0	6
1996	7075	0	46	0	0	9
1997	10223	0	64	0	1	13
1998	14796	0	90	0	1	20
1999	21447	0	127	1	1	28
2000	31136	1	179	1	2	41

Source: Alaska Sea Grant Program.

[1]The number of full-time groundfish plants.

NOTE : The values are rounded to the nearest whole number, therefore a “()” indicates a value of less than 0.5.

These reports were prepared by Alaska Consultants, Inc., and Peter Eakland and Associates, respectively. Projections of input requirements are based on forecasts of harvesting and processing activity presented in previous sections, and the projections of input availability that are not available from other Studies Program reports are developed in this section.

Small Boat Harbor

The Cordova small boat harbor has been used well beyond its design capacity for a number of years. The inadequacy of this facility is demonstrated by the long waiting lists for permanent slips, the rafting of vessels that is often required, and the inability of very large fishing vessels to use the small boat harbor. An enlargement of the existing facility is being planned. The projected increases in the harvesting activity of the traditional fisheries can probably occur without major improvements to the small boat harbor; however, to the extent that the development of the groundfish industry is dependent on harbor facilities for large fishing vessels, the existing facility will be a constraint.

Port Facilities

Technical Report Number 31 indicates that a 245 percent increase in usage could occur before the current capacity of the Cordova port facilities is fully utilized. Since total harvest is projected to increase by just over 200 percent by 2000 and since the volume of fish products shipped from Cordova will increase less rapidly due to the relatively low recovery factor for groundfish, the projected growth of the Cordova commercial fishing industry is not expected to be hampered by the port facilities.

Labor, Electric Power, and Water

The projected growth of the commercial fishing industry is feasible only if the corresponding rates of increase in input requirements can be met or surpassed by the rates of increase in input availability. The rates of increase of input requirements can be derived from the projections of input requirements developed in the previous section and the rates of increase in input availability can be inferred from information included in Technical Report Number 40. The report presents projections of community requirements for labor, electric power, and water for each of the OCS petroleum scenarios and indicates that the requirements can be met. The rates of increase in community-wide input requirements corresponding to the projections of community-wide input requirements are, therefore, considered to only include rates of increase that do not exceed feasible rates of increase in input availability. The highest rates of increase are associated with the high find case, therefore, the rates of increase in input requirements for the commercial fishing industry are compared to the rates of increase in community-wide input requirements/availability of the high find case to determine if the former are feasible. The projected rates of increase in input availability and requirements are presented in Table 3.144.

The record projected rate of growth of the water supply greatly exceeds the largest percentage increase in water usage projected for the fishing industry; and with the exception of the case which includes groundfish but

TABLE 3.144

COMPARATIVE RATES OF GROWTH, HIGH FIND CASE AND THE CORDOVA FISHING INDUSTRY

PERCENTAGE CHANGE

	'MATER					ELECTRIC POWER					POPU-LATION	EMPLOYMENT				
	OCS	Fishing Industry Case				Ocs	Fishing Industry Case				Ocs	Ocs	Fishing Industry Case			
Year	Case	1	2	3	4	Case	1	2	3	4	Case	Case	1	2	3	4
1981	4.6	0.8	-1.2	0.8	-1.2	7*O	0.8	-1.2	0.9	-1*1	4*9	4*9	0.8	-1.2	0.8	-1.2
1982	1.7	0.8	-1.2	0.8	-1.2	4.0	0.8	-1.2	O*9	-1.1	2.1	2.1	0.8	-1.2	0.9	-1.1
1983	1.7	0.8	-1.2	0.8	-1.2	3.8	0.8	-1.2	1.0	-1.1	2.0	2.0	0.8	-1*2	0.9	-1.1
1984	1.8	0.8	-1.2	0.8	-1.2	3*9	0.8	-1*2	1*O	-1.0	2*O	2.0	0.8	-1.2	0.9	-1.1
1985	1.6	0.8	-1.2	0.8	-1.2	3.4	0.8	-1.2	1.1	-0.9	1.6	1.6	0.8	-1.2	1.0	-1.0
1986	1.7	1.7	-0.3	1.7	-0.3	3.3	1.7	-0.3	2.1	O*O	1*5	1.5	1.7	-0.3	1.9	-0.1
1987	2.3	1.7	-0.4	1.7	-O*3	5.9	1*7	-0.4	2.2	0.2	4.1	4.1	1.7	-0.4	1.9	-0.1
1988	2.4	1.7	-0.3	1.7	-0.3	6.4	1.7	-0.3	2.4	0.4	4.6	4.6	1.7	-0.3	2.0	0.1
1989	4.2	1.7	-0.3	1.8	-0.2	12.2	1*7	-0.3	2.7	0.7	12.2	12.2	1.7	-0.3	2.2	0.3
1990	6.2	1.7	-0,3	1.8	-(-).2	19.9	1.7	-0.3	3.2	1.1	19.9	19*9	1*7	-0*3	2.3	0.5
1991	1.8	1.8	-().3	1.9	-0.1	1.4	1.8	-.0.3	3.7	1.7	1.4	1.4	1.8	-0.3	2.6	0.8
1992	1.6	1.7	-0.3	1.9	-0.1	0.4	1.7	-0.3	4.5	2.4	0.4	O*4	1.7	-0.3	2.8	1.2
1993	1.8	1.9	-0.2	2.1	0.1	1.5	1.9	-0.2	5*7	3*5	1.5	1.5	1.9	-0.2	3.4	1.9
1994	2.2	1.8	-0.2	2*2	().2	2.5	1.8	-0.2	7.0	4.9	2.5	2.4	1.8	-0.2	3.9	2.7
1995	2.1	1.8	-0.2	2.4	0.3	2.1	1.8	-0.2	8.8	6*7	2.1	2*2	1.8	-0.2	4,6	3.7
1996	2.0	1.9	-0.2	2.6	0.6	1.8	1.9	-0.2	11.2	8.9	1.8	1.8	1.9	-O*2	5.6	5.2
1997	2.1	1.9	-0.2	3.0	0.9	1.7	1.9	-0.2	14.0	11*7	1.7	1.7	1.9	-0.2	6.9	7.0
1998	2.0	1.9	-O*1	3.4	1.4	1.7	1.9	-0.1	17.4	15.0	1.7	1.6	1.9	-0.1	8.5	9.3
1999	2.0	1.9	-O*1	4.1	?.0	1.6	1.9	-0.1	21.1	18.7	1.6	1.6	1.9	-0,1	10.5	12.0
2000	2.1	1.9	-0.1	4.9	2.8	1.5	1.9	-0.1	25.0	22.5	1.5	1.5	1.9	-0.1	12.9	15.2

Source: Alaska Sea Grant Program.

1) Traditional fisheries without increased efficiency.
2) Traditional fisheries with increased efficiency.
3) All fisheries without increased efficiency.
4) All fisheries with increased efficiency.

does not allow for increased processing efficiency, the annual projected rate of increase in supply exceeds the projected increase in fishing industry usage. The projected rate of increase in the use of electric power is below the record rate of increase in electric power capacity prior to 1999, and until the 1990s the annual rate of growth in fishing industry demand is less than the rate of growth in supply. The record projected rates of increase in population and employment exceed the largest projected increase in fishing industry employment and the annual rates of increase in population and employment are typically greater than the projected increases in fishing industry employment; this suggests that the labor force and the required housing facilities can increase rapidly enough to meet the projected growth of the fishing industry.

It, therefore, appears that the projected rates of growth of the fishing industry requirements for water, electric power, and labor, can be met.

Processing Facilities

Within a year, processing capacity can change significantly as the capacity of existing plants changes, as new plants are built, or as old plants become unusable. The ability to rapidly increase processing capacity, when the long-run prognosis indicates that it is profitable to do so, suggests that processing plant capacity will not be a constraint on the growth that is projected for the processing sector of the commercial fishing industry. The comparison of current processing capacity and the projected harvests for 2000, which is summarized in Table 3.145, also indicates that physical processing capacity is not expected to constrain the project growth.

TABLE 3.145

CORDOVA PROCESSING CAPACITY

Species	Current Daily Processing Capacity	Harvest by 2000	Days Required to Produce 2000 Harvest with Current Capacity
Salmon	655,000 lbs	34,500,000 lbs	52.7 days
Crab	575,000 lbs	6,728,000 lbs	11.7 days
Herring	320,000 lbs	6,173,000 lbs	19.3 days

Land

Due to the existence of excess capacity in several processing plants, the requirements for additional land are not expected to be sufficient to constrain the projected growth.

Conclusion

The conclusion is that the long-term growth which is projected for the Cordova commercial fishing industry appears to be feasible in terms of the long-term availability of inputs. This does not mean that, during the next 20 years, temporary shortages of labor or water or other inputs will not prevent the level of activity of the fishing industry from being as high as it might otherwise be. What it means is that the long-term growth projected for the industry appears to be feasible despite the occasional shortages that will occur.

The Yakutat Commercial Fishing Industry

Yakutat is located on the eastern shore of the Gulf of Alaska approximately halfway between Cape Suckling to the north and Cape Fairweather to the south; as such, it is at the geographic center of commercially important fisheries. This area will be referred to as the Yakutat management area. The commercial fisheries in this area are the salmon, halibut, groundfish, king crab, Dungeness crab, Tanner crab, shrimp, and scallop fisheries. The absolute and relative importance of each of these fisheries in terms of pounds harvested are summarized in Table 3.146. Although much of the harvesting activity and subsequent processing activity is not associated with Yakutat, enough of it is that the Yakutat commercial fishing industry is the dominant element of the local economy,

The local importance of the Yakutat commercial fishing industry can be measured in a number of ways. It can be measured in absolute terms such as the income of Yakutat fishermen or the number of fishermen who reside in Yakutat (see Tables 3.147 and 3.148), or it can be measured in relative terms. For example, in 1976, out of a population-of 550, there were 49 residents with commercial fishing licenses; that is, about nine percent of the local residents were commercial fishermen. perhaps a more significant measure of the local importance of the Yakutat commercial fishing industry is provided by an estimate of the proportion of the economic base that is attributable to the industry. The Yakutat Comprehensive Development Plan indicates that out of 137 full-time equivalent base sector employees in 1976, 70 were employed in the two basic sectors that consist almost exclusively of harvesting and processing of seafood products. The

TABLE 3.146
YAKUTAT FISHERIES
1973-1977

Catch in 1000 pounds

YEAR	SALMON	HALIBUT	KING CRAB	TANNER CRAB	DUNGENESS CRAB	SCALLOPS	SHELLFISH	TOTAL OF FISHERIES INCLUDED IN THIS STUDY
1973	1,473	228	0	207	2,347	174	2,728	4,429
1974	1,481	155	0	1,872	1,632	357	3,861	5,497
1975	1,253	128	7	2,021	541	139	2,708	4,089
1976	1,577	221	0	1,714	529	190	2,433	4,231
1977	2,740	128	3	1>016	124	22	1,165	4,033
Mean .	1,705	172	2	1,366	1,035	176	2,579	4,456

PERCENTAGE OF TOTAL CATCH

YEAR	SALMON	HALI BUT	KING CRAB	TANNER CRAB	DUNGENESS CRAB	SCALLOPS	SHELLFISH
1973	33.2581	5.1478	0	4.673	52.9916	3.928	61.5
1974	26.9420	2.8197	0	34.054	29.6889	6.494	70.2
1975	30.6432	3.1303	0.171	49.425	13.2306	3.399	66.2
1976	37.2725	5.2233	0	40.5105	12.5030	4.490	57.5
1977	67.9395	3.1738	0.074	25.1922	3.074	0.545	28.8

Source: ADF&G Annual Catch and Production Reports and Salmon and Shellfish Catch Reports, IPHC Annual Reports.

TABLE 3.147
ESTIMATED GROSS EARNINGS OF YAKUTAT[1] FISHERMEN 1969 - 1976

YEAR	GEAR OPERATORS	GROSS EARNINGS
1969	20	222,000
1970	23	283,000
1971	02	262,000
1972	21	351,000
1973	58	834,000
1974	53	965,000
1975	05	544,000
1976	24	978,000

[1] Yakutat - Skagway

Source: Alaska Commercial Fisheries Entry Commission, Distribution of Income from Alaska Fisheries, July, 1978

TABLE 3.148
NUMBER OF YAKUTAT* RESIDENTS HOLDING A COMMERCIAL FISHERMAN'S LICENSE
1969 - 1976

1969	21	1973	29
1970	11	1974	26
1971	19	1975	25
1972	31	1976	49

*A Yakutat resident is anyone who uses a Yakutat address when applying for a license.

Source: Commercial Fisheries Entry Commission, Commercial License File.

implication is that approximately one-half of the economic activity in Yakutat is generated directly or indirectly by the commercial fishing industry. The following brief description of the projected growth of this industry indicates that the Yakutat commercial fishing industry will be a source of increasing economic activity in Yakutat.

During the next 20 years, the development of a domestic groundfish fishery and the expansion of the traditional fisheries are expected to result in significant growth in the Yakutat commercial fishing industry. Total catch is expected to increase from 2,086 metric tons (4.6 million pounds) in 1980 to 62,280 metric tons (137 million pounds) in 2000, and its real value is projected to increase from $4.0 million to $22.5 million. The traditional fisheries are expected to exhibit less dramatic yet substantial growth; catch is expected to increase from 2,046 metric tons (4.5 million pounds) to 3,922 metric tons (8.6 million pounds) and its real value is projected to increase from $4.0 million to $12.0 million. Processing activity is also expected to increase from current " evels; however, due to the increases in processing efficiency that will be possible, processing activity is expected to increase less rapidly than catch. It is projected that processing employment and real income will exceed current levels by ?,070 percent and 1,340 percent respectively. Without allowing for increased processing efficiency, the corresponding projected percentage increases in employment and real income would be 1,140 percent and 1,425 percent respectively. The projections on which this summary is based are presented in the following sections.

HARVESTING

Projections of harvesting activity and limited historical data are presented by species or species group in this section. The detailed historical data which are referred to in this section, and which serve as a basis for the projections, are presented in tabular form in Appendix C. The models used in making the projections are discussed in Chapter II.

Salmon

There are two distinct salmon fleets in the Yakutat management area, a set gillnet fleet and a troll fleet. The set gillnet fleet consists primarily of Yakutat boats that are less than 7.6 meters (25 feet) in length, have a crew of one, and participate in the fishery from June through September. Prior to 1975, the troll fleet consisted principally of hand trollers; it is now almost exclusively a power troll fleet. Power trollers are typically 10.7 to 13.7 meters (35 to 45 feet) in length, have a crew of two or three, are much less likely to be Yakutat boats than are the set gillnet boats, and participate in the fishery from May through September.

Recent record salmon harvests, together with continually improving resource management, enhancement, and rehabilitation programs, suggest that the Yakutat salmon resources will tend to increase during the forecast period. Catch is projected to increase from 774 metric tons (1,7 million pounds) in 1980 to 1,679 metric tons (3.7 million pounds) in 2000, and its real value is expected to increase from less than $2.2 million to over

$8.6 million (Table 3.149). The corresponding percentage increases are 117 percent by weight and 298 percent by real value (Table 3.150). Due to the excess harvesting capacity that exists and/or changing gear restrictions, an increase in the number of boats and/or fishermen will not be necessary to allow the projected harvests. Projections of catch by species are reported in Table 3.151.

Halibut

The growth of the Yakutat halibut fishery is expected to parallel that of the halibut fisheries of other Gulf of Alaska communities. Growth is expected to occur after the first quarter of the forecast period. During the period as a whole, catch is expected to increase from 50 metric tons (1 10,000 pounds) to 88 metric tons (194,000 pounds) and its real value is expected to increase from $190,000 to $421,000 (Table 3.152). These are increases of 76 percent by weight and 121 percent by value (Table 3.153). The small boat fleet is included in the catch and value projections but not the other projections, since this fleet" is accounted for elsewhere.

Groundfish

Due to its proximity to known groundfish resources, Yakutat has been identified in the State of Alaska Program for the Development of the Bottomfish Industry as one of five communities in which to concentrate development efforts. The fishery that develops is expected to include both large and small boat fleets, each of which will include a variety of gear types. The small boat fleet would allow local entry into the fishery with a more modest investment than large boats would require.

TABLE 3.119

PROJECTED HARVESTING ACTIVITY
YAKUTAT SALMON FISHERY 1980-2000

Year	CATCH				EX-VESSEL PRICE ($/Pound)		NUMBER OF		
	WEIGHT		VALUE ($1,000)						
	POUNDS (1,000)	METRIC TONS	Nominal	Real[1]	Nominal	Real	Boats	Landings	Fishermen
1980	1707	774	2408	2163	1.41	1.27	164	3034	328
1981	1827	829	2956	2432	1.56	1.33	164	3130	328
1982	1959	888	3311	2673	1.69	1.36	164	3235	328
1983	2105	955	3910	2992	1.86	1.42	164	3351	328
1984	2267	1028	4532	3287	2.00	1.45	164	3481	328
1985	2447	1110	5327	3662	2.18	1.50	164	3625	328
1986	2514	1141	6007	3914	2.39	1.56	164	3678	328
1987	2583	1172	6777	4186	2.62	1.6[illegible]	164	3733	328
1988	2654	1204	7591	4444	2.86	1.67	164	3789	328
1989	2727	1237	8509	4721	3.12	1.73	164	3847	328
1990	2802	1271	9540	5018	3.40	1.79	164	3907	328
1991	2880	1306	10692	5331	3.71	1.85	164	3969	328
1992	2960	1343	11907	5627	4.02	1.9[illegible]	164	4033	328
1993	3043	1380	13320	5967	4.38	1.96	164	4099	328
1994	3128	1419	14816	6290	4.74	2.01	164	4167	328
1995	3216	1459	16535	6654	5.14	2.07	164	4237	328
1996	3307	1500	18422	7027	5.57	2.1[illegible]	164	4310	328
1997	3401	1543	20490	7409	6.02	2.18	164	4385	328
1998	3498	1587	22750	7797	6.50	2.23	164	4462	328
1999	3598	1632	25214	8191	7.01	2.28	164	4542	328
2000	3701	1679	27[illegible]30	8616	7.56	2.33	164	4624	328

Source: Alaska Sea Grant Program.

[1] The real values and prices are in terms of 1978 dollars.

TABLE 3.150

PROJECTED PERCENTAGE CHANGE FROM 1980.
YAKUTAT SALMON FISHERY

	CATCH		EX-VESSEL PRICE		NUMBER OF		
Year	Weight	Real Value	Nominal	Real	Boats	Landings	Fishermen
1980	o	0	0	o	0	0	0
1981	7.004	12.436	10.857	5.077	0	3.141	0
1982	14.740	23.560	19.858	7.687	o	6.610	0
1983	23.305	38.301	31.705	12.161	o "	10.451	0
1984	32.809	51*943	41*731	14.407	0	14.712	0
1985	43*379	69.291	54*317	18.073	0	19.452	0
1986	4?.303	80.922	69.353	22.823	0	21.212	0
1987	51.320	93.479	85.996	27.861	0	23.013	0
1988	55.465	105.426	102.788	32.137	0	24.871	0
1989	59*741	118.253	I210216	36.629	0	26.789	0
1990	64.154	131..955	141.366	41.303	o	28.768	0
1991	48.707	146.410	163.209	46.057	0	30*810	o
1992	73.406	160.100	185.171	49*995	0	32.917	0
1993	78.255	175.814	210.354	54.730	0	35.091	C
1994	83.258	190.781	235.766	58.673	0	37.335	0
1995	88.422	207.607	264.462	63.254	0	39.650	o
1996	930750	224.845	294.888	67.662	0	42.039	o
1997	99..?49	242.468	327.087	71.880	0	44.505	0
1998	104.924	260.421	361.063	7s.880	0	47.050	0
1999	1100781	278.632	396.800	79.633	o	49.676	0
7000	116.826	298.264	435.931	83.679	0	52.387	0

Source: Alaska Sea Grant Program,

TABLE 3.151

PROJECTED YAKUTAT SALNON CATCH BY SPECIES, 1980-2000
(1 ,000 Pounds)

Year	Ki ng	Red	Pink	Chum	Silver	Total
1980	67	816	148	66	610	1707
1981	67	889	176	70	624	1827
1982	67	969	210	74	638	1959
1983	67	1057	249	79	653	2105
1984	67	1152	297	83	668	2267
1985	67	1256	353	88	683	2447
1986	67	1300	354	9(I	702	2514
1987	67	1345	356	93	722	2583
1988	67	1392	357	95	742	2654
1989	67	1440	359	98	763	2727
199(3	67	1489	360	101	785	2802
1991	67	1541	362	104	807	2880
1992	67	1594	363	106	830	2960
1993	67	1649	364	109	853	3043
1994	67	1706	366	112	877	3128
1995	67	1765	367	115	902	3216
1996	67	1825	369	119	927	3307
1997	67	1888	370	122	954	3401
1998	67	1954	372	125	980	3498
1999	67	2021	373	129	100PI	3598
2000	67	2091	375	132	1037	3701

Source: Alaska Sea Grant Program.

TABLE 3.152

PROJECTED HARVESTING ACTIVITY
YAKUTAT HALIBUT FISHERY 1980-2000

	CATCH								
	WEIGHT		VALUE ($1,000)		EX-VESSEL PRICE ($/Pound)		NUMBER OF		
Year	POUNDS (1,000)	METRIC TONS	Nominal	Real[1]	Nominal	Real	Boats	Landings	Fishermen
1980	110	50	212	190	1.92	1.73	3	12	18
1981	110	50	228	194	2.07	1.77	3	12	18
1982	110	50	246	199	2.24	1.81	3	12	18
1983	110	50	264	202	2.40	1.84	3	12	18
1984	110	50	284	206	2.58	1.87	3	12	18
1985	110	50	305	209	2.77	1.90	3	12	18
1986	114	52	339	221	2.96	1.93	3	12	19
1987	119	54	376	232	3.17	1.96	3	13	19
1988	123	56	417	244	3.39	1.98	3	13	20
1989	128	58	463	257	3.62	2.01	3	14	21
1990	133	60	513	270	3.86	2.03	4	14	22
1991	138	63	568	283	4.11	2.05	4	15	22
1992	143	65	628	297	4.38	2.07	4	15	23
1993	149	68	693	311	4.66	2.09	4	16	24
1994	155	70	756	325	4.96	2.10	4	17	25
1995	160	73	845	340	5.27	2.12	4	17	26
1996	167	76	932	356	5.59	2.13	5	18	27
1997	173	79	1028	372	5.94	2.15	5	19	28
1998	180	82	1133	388	6.30	2.16	5	19	29
1999	187	85	1247	405	6.68	2.17	5	20	30
2000	194	88	1367	421	7.05	2.17	5	21	31

Source: Alaska Sea Grant Program.

[1]The real values and prices are in terms of 1978 dollars.

TABLE 3.153

PROJECTED PERCENTAGE CHANGE FROM 1980,
YAKUTAT HALIBUT FISHERY

	CATCH		EX-VESSEL PRICE		NUMBER OF		
Year	Weight	Real Value	Nominal	Real	Boats	Landings	Fishermen
1980	0	0	0	0	0	0	0
1981	0	2.23	7.86	2.23	0	0	0
1982	0	4.43	16.23	4.43	0	0	0
1983	0	6.41	24.96	6.41	0	0	0
1984	0	8.32	34.18	8.32	0	0	0
1985	0	10.10	43.90	10.10	0	0	0
1986	3.85	16.07	54.11	11.77	3.85	3.85	3.85
1987	7.85	22.19	64.80	13.29	7.85	7.85	7.85
1988	12.00	28.53	76.12	14.76	12.00	12.00	12.00
1989	16.31	35.08	88.04	16.14	16.31	16.31	16.31
1990	20.79	41.92	100.55	17.41	20.79	20.79	20.79
1991	25.44	48.94	113.83	18.65	25.44	25.44	25.44
1992	30.27	55.98	127.64	19.74	30.27	30.27	30.27
1993	35.29	63.34	142.18	20.74	35.29	35.29	35.29
1994	40.49	71.01	157.58	21.72	40.49	40.49	40.49
1995	45.90	78.95	173.82	22.65	45.90	45.90	45.90
1996	51.52	87.01	190.70	23.42	51.52	51.52	51.52
1997	57.35	95.50	208.72	24.24	57.35	57.35	57.35
1998	63.41	104.15	227.50	24.93	63.41	63.41	63.41
1999	69.70	113.03	247.18	25.53	69.70	69.70	69.70
2000	76.24	121.43	266.59	25.64	76.24	76.24	76.24

Source: Alaska Sea Grant Program

Catch is projected to increase from 41 metric tons (90,000 pounds) in 1980 to 58,358 metric tons (129 million pounds) in 2000, and its real value is expected to increase from $11,000 to $10.5 million (see Table 3.154). The associated percentage increases are presented in Table 3.155 and the projections of catch by species are reported in Table 3.156. As the Yakutat groundfish fishery develops, its relative importance is expected to increase dramatically. For example, the groundfish catch is expected to account for under 2 percent of the total Yakutat management area catch in 1980-but almost 94 percent of the catch by 2000 (see Table 3.157). The projected change in the relative importance of groundfish in terms of value is less significant; the value of the groundfish catch as a percentage of the value of total catch is projected to increase from 0.3 percent in 1980 to over 46 percent in 2000.

King Crab

The harvesting of king crab in the Yakutat management area has been very sporadic; during the past 10 years, the fishery has been inactive in more years than it has been active. It appears that the king crab resources are not sufficient to maintain an active fishery. This fishery is expected to remain, at most, marginally active. The average annual catch is projected to increase from less than a metric ton in 1980 to approximately three metric tons by 2000, and the real value of the catch is expected to increase from under $2,000 in 1980 to $8,550 in 2000 (see Table 3.158). The re-rulting percentage increase exceeds 200 percent (see Table 3.159). This level of activity is not sufficient to support one boat on more than a part-time basis.

TABLE 3.154

PROJECTED HARVESTING ACTIVITY
YAKUTAT GROUNDFISH FISHERY 1980-2000

	CATCH								
	WEIGHT		VALUE ($1 ,000)		EX-VESSEL PRICE ($/Pound)		NUMBER OF		
Year	POUNDS (1,000)	METRIC TONS	Nominal	Real[1]	Nominal	Real	Boats	Landings	Fishermen
1980	9()	41	12	11	0*13	0.12	o	1	0
1981	128	58	18	15	0.14	0.12	0	2	0
1982	182	83	26	?1	0.14	0.11	0	2	o
1983	260	118	38	29	0.15	0.11	0	3	0
1984	371	168	56	40	0.15	0.11	0	4	o
1985	530	241	82	56	0.15	0.11	0	5	1
1986	759	344	121	79	0.16	0.10	0	7	1
1987	1087	493	179	111	0.16	0.10	0	10	1
1988	1559	707	265	155	0.17	0.10	0	14	1
1989	2238	1015	394	218	0.18	0.10	0	19	2
1990	3216	1459	585	308	0018	0.10	1	25	3
1991	4627	2099	871	434	0.19	O*O9	1	35	3
1992	6664	3023	1301	615	0.20	0.09	1	48	5
1993	9610	4359	1944	871	0.20	0.09	1	66	7
1994	13872	6292	2912	1236	0.21	0.09	2	90	9
1995	20049	9094	4369	1758	0.22	0.09	2	124	12
1996	29009	13158	6567	2505	0.23	0.09	3	171	17.
1997	420?2	19061	9959	3601	0,24	0.09	5	236	24
1998	60945	27645	14925	5115	0.24	0.08	7	326	33
1999	88496	40142	22559	7329	0.25	0.08	9	450	45
2000	128656	58358	34174	10523	0.27	0.08	12	623	62

Source: Alaska Sea Grant Program.

[1]The real values and prices are in terms of 1978 dollars.

TABLE 3.155

PROJECTED PERCENTAGE CHANGE FROM 1980,
YAKUTAT GROUNDFISH FISHERY

Year	CATCH Weight	CATCH Real Value	EX-VESSEL PRICE Nominal	EX-VESSEL PRICE Real	NUMBER OF Boats	NUMBER OF Landings	NUMBER OF Fishermen
1980	0	0	0	0	0	0	0
1981	42.384	38*735	2.796	-2.563	35.604	35.604	35.604
1982	102.934	93.028	5.869	-4.881	84.067	84.067	84.067
1983	189.520	168.668	8.967	-7.202	150.098	150.098	150.098
1984	313.467	274.763	12.286	-9.361	240.161	240.161	240.161
1985	491.080	423.752	15.809	-11.391	363s127	363.127	363.127
1986	745.863	633.141	19.510	-13.326	531.196	531.196	531*196
1987	1111*731	927.425	23.342	-15.210	761.155	761.155	761.155
1988	1637.687	1342*974	27.440	-16.960	1076.135	1076.135	10760135
1989	2394.602	1929.308	31.710	-18.652	1508.043	1508.043	1508.042
1990	3485.098	2760.733	36.302	-20.205	2100.939	2100*939	2100.939
1991	5(-157.947	3937.306	41.056	-21.726	2915,745	2915*745	2915.745
1992	7329.(-)70	5612.042	46.179	-23.112	4036.784	4036.785	4036.784
1993	10612.225	7991.498	51.506	-24.46S	5580.922	5580.922	5580.922
1994	15363.872	11388.978	57.216	-25.704	7710.306	7710.307	7710.3C6
1995	22248.875	16237.603	63.200	-26.897	10650.191	10650.192	1065C.191
1996	32236*816	23180.866	69.567	-20.005	14713.869	14713.869	14713.868
1997	46743*376	33362.052	77.499	-28.566	20337.611	203370612	20337.610
1998	67838.057	47434.714	83.418	-30.032	28129.667	28129.668	28129.666
1999	98549.849	68002.800	90.926	-3(3.965	38939.098	38939.100	38939.096
2000	143317.439	97686.795	98.942	-31.817	53952.528	53952,529	53952.525

Source: Alaska Sea Grant Program.

TABLE 3.156

YAKUTAT GROUNDFISH PROJECTED CATCH BY SPECIES 1980-2000

YEAR	WEIGHT (Metric Tons) POLLOCK	PACIFIC COD	SABLEFISH	OTHER	TOTAL	REAL VALUE[1] $1,000) POLLOCK	PACIFIC COD	SABLEFISH	OTHER	TOTAL
1980	4	7	1	29	41	1	2	1	7	11
1981	6	10	1	41	58	1	3	1	10	15
1982	9	13	2	59	83	1	4	2	14	21
1983	14	18	3	84	118	2	5	3	19	29
1984	21	24	4	119	168	3	7	5	26	40
1985	32	33	6	170	241	4	9	7	36	56
1986	48	44	10	243	344	6	12	11	51	79
1987	73	60	15	346	493	9	15	16	71	111
1988	110	81	23	494	707	13	20	24	98	155
1989	167	109	35	704	1015	19	26	36	137	218
1990	254	147	53	1004	1459	28	35	55	190	308
1991	385	199	82	1433	2099	42	46	82	265	434
1992	585	269	125	2043	3023	62	61	123	369	615
1993	888	364	193	2915	4359	91	80	184	515	871
1994	1348	491	296	4158	6292	136	106	277	718	1236
1995	2045	664	454	5930	9094	201	140	415	1001	1758
1996	3104	898	697	8459	13158	299	185	624	1397	2505
1997	4711	1214	1071	12066	19061	447	247	944	1963	3601
1998	7150	1640	1644	17210	27645	660	324	1408	2723	5115
1999	10852	2217	2524	24549	40142	980	429	2117	3802	7329
2000	16470	2997	3875	35016	58358	1458	568	3184	5312	10523

[1] Value in terms of 1978 dollars.

TABLE 3.157

PROJECTIONS OF YAKUTAT GROUNDFISH HARVESTING ACTIVITY AS A PERCENTAGE OF TOTAL YAKUTAT HARVESTING ACTIVITY

Year	CATCH		NUMBER OF		
	Weight	Value	Boats	Landings	Fishermen
1980	1.950	0.268	0.013	0.037	0.031
1981	2.558	0.337	0.017	0.048	0.041
1982	3.346	0.431	0.024	0.063	0.055
1983	4.360	0.545	0.032	0.083	0.074
1984	5.657	0.697	0.043	0.108	0.100
1985	7.303	0.886	0.058	0.141	0.135
1986	9.983	1.182	0.079	0.190	0.183
1987	13.529	1.577	0.108	0.255	0.249
1988	18.095	2.112	0.147	0.343	0.339
1989	23.792	2.825	0.201	0.461	0.462
1990	30.632	3.773	0.274	0.620	0.629
1991	38.467	5.026	0.375	0.835	0.857
1992	46.971	6.705	0.512	1.124	1.168
1993	55.677	8.873	0.701	1.513	1.592
1994	64.068	11.712	0.959	2.035	2.168
1995	71.698	15.290	1.313	2.735	2.950
1996	78.273	19.763	1.796	3.670	4.006
1997	83.662	25.331	2.455	4.912	5.425
1998	87.962	31.611	3.353	6.553	7.315
1999	91.244	38.867	4.567	8.698	9.805
2000	93.702	46.680	6.200	11.470	13.036

Source: Alaska Sea Grant Program.

TABLE 3.158

PROJECTED HARVESTING ACTIVITY
YAKUTAT KING CRAB FISHERY 1980-2000

	CATCH				EX-VESSEL PRICE ($/Pound)	
	WEIGHT		VALUE ($1,000)			
Year	POUNDS (1,000)	METRIC TONS	Nominal	Real[1]	Nominal	Real
1980	2.0	0.9	2.2	2.0	1.09	0.98
1981	2.1	1.0	2.5	2.1	1.18	1.01
1982	2.3	1.0	2.9	2.3	1.28	1.03
1983	2.4	1.1	3.3	2.5	1.38	1.06
1984	2.5	1.2	3.8	2.7	1.49	1.08
1985	2.7	1.2	4.3	3.0	1.60	1.10
1986	2.9	1.3	4.9	3.2	1.72	1.12
1987	3.0	1.4	5.6	3.5	1.85	1.14
1988	3.2	1.5	6.4	3.7	1.98	1.16
1989	3.4	1.6	7.3	4.0	2.13	1.18
1990	3.6	1.6	8.3	4.3	2.27	1.20
1991	3.9	1.7	9.4	4.7	2.43	1.21
1992	4.1	1.9	10.6	5.0	2.59	1.22
1993	4.3	2.0	12.0	5.4	2.76	1.24
1994	4.6	2.1	13.6	5.8	2.94	1.25
1995	4.9	2.2	15.3	6.2	3.13	1.26
1996	5.2	2.4	17.3	6.6	3.32	1.27
1997	5.5	2.5	19.5	7.0	3.53	1.28
1998	5.9	2.7	21.9	7.5	3.75	1.28
1999	6.2	2.8	24.7	8.0	3.97	1.29
2000	6.6	3.0	27.8	8.6	4.21	1.30

Source: Alaska Sea Grant Program.

[1]The real values and prices are in terms of 1978 dollars.

TABLE 3.159

PROJECTED PERCENTAGE CHANGE FROM 1980,
YAKUTAT KING CRAB FISHERY

	CATCH		EX-VESSEL PRICE	
Year	Weight	Real Value	Nominal	Real
1980	0	0	0	0
1981	6.150	9.075	8.407	2.755
1982	12.678	18.768	17.31P	5.405
1983	19.608	28.982	26.628	7.838
1984	26.964	39.814	36.420	10*121
1985	34.772	51.259	46.684	12.233
1986	43.061	63.851	57.923	149533
1987	51.859	7“?.134	69.679	16.644
1988	61.198	91.092	81.929	18.545
1989	71.112	106.019	94.940	20.400
1990	81.635	121.649	108.444	22.030
1991	92.806	138.293	122.725	23.592
1992	104.663	155.762	137.588	24.967
1993	117.250	174.160	153.119	26.195
1994	130.611	193.691	169.492	27.354
1995	144.794	214.398	186.726	28.434
1996	159.848	236.085	204.627	29.339
1997	175.829	259.249	223.629	30.243
1998	192.793	283.548	243.403	30.997
1999	210.799	30’).174	264.104	31.652
2000	229.913	3361.’341	285.901	32.259

Source: Alaska Sea Grant Program.

Tanner Crab

The Yakutat Tanner crab fishery has become an active fishery in the last few years. However, the fishery has not been in existence long enough, nor have the resources been sufficiently explored and/or surveyed, to adequately determine the maximum sustainable yield of the fishery. The limited stock assessment data that are available indicate that a sustainable yield of 1,361 metric tons (3 million pounds) is possible. Favorable market conditions are expected to increase harvest to this level by 1985 and resource abundance is expected to hold catch at that level through the remainder of the forecast period. The real value of the catch is projected to increase from $0.9 million in 1980 to $1.4 million in 2000 (see Table 3.160). The projected percentage increases in catch by weight and real value are 81 percent and 57 percent respectively (see Table 3.161).

Dungeness Crab

The Yakutat Dungeness crab fishery has been active and relatively stable since 1960, with the exception of abnormally low harvests in 1975 through 1977. The favorable market conditions that are expected to buoy the Dungeness crab fisheries elsewhere in the Gulf of Alaska are expected to provide growth in the Yakutat fishery until catch is constrained by resource abundance. Catch is, therefore, projected to increase from 470 metric tons (1.0 million pounds) in 1980 to 792 metric tons (1.7 million pounds) in 2000, and its real value is projected to increase from $0.8 million to $1.5 million (Table 3.162). The associated percentage changes are 69 percent by weight and 106 percent by real value (Table 3.163). The

TABLE 3.160

PROJECTED HARVESTING ACTIVITY
YAKUTAT TANNER CRAB FISHERY 1980-2000

Year	CATCH								
	WEIGHT		VALUE ($1,000)		EX-VESSEL PRICE ($/Pound)		NUMBER OF		
	POUNDS (1,000)	METRIC TONS	Nominal	Real[1]	Nominal	Real	Boats	Landings	Fishermen
1980	1656	751	1004	902	0.61	0.54	5	39	19
1981	1864	845	1171	997	0.63	0.53	5	43	22
1982	2098	952	1366	1103	0.65	0.53	6	49	25
1983	2361	1071	1597	1222	0.68	0.52	7	55	28
1984	2657	1205	1868	1355	0.70	0.51	8	62	31
1985	2991	1357	2189	1505	0.73	0.50	9	70	35
1986	3000	1361	2288	1491	0.76	0.50	9	70	35
1987	3000	1361	2387	1474	0.80	0.49	9	70	35
1988	3000	1361	2493	1460	0.83	0.49	9	70	35
1989	3000	1361	2607	1447	0.87	0.48	9	70	35
1990	3000	1361	2730	1436	0.91	0.48	9	70	35
1991	3000	1361	2862	1427	0.95	0.48	9	70	35
1992	3000	1361	3003	1419	1.00	0.47	9	70	35
1993	3000	1361	3156	1414	1.05	0.47	9	70	35
1994	3000	1361	3320	1409	1.11	0.47	9	70	35
1995	3000	1361	3496	1407	1.17	0.47	9	70	35
1996	3000	1361	3686	1406	1.23	0.47	9	70	35
1997	3000	1361	3890	1406	1.30	0.47	9	70	35
1998	3000	1361	4110	1408	1.37	0.47	9	70	35
1999	3000	1361	4346	1412	1.45	0.47	9	70	35
2000	3000	1361	4601	1417	1.53	0.47	9	70	35

Source: Alaska Sea Grant Program.

[1]The real values and prices are in terms of 1978 dollars.

TABLE 3.16

PROJECTED PERCENTAGE CHANGE FROM 1980,
YAKUTAT TANNER CRAB FISHERY

Year	CATCH		EX-VESSEL PRICE		NUMBER OF		
	Weight	Real Value	Nominal	Real	Boats	Landings	Fishermen
1980	0	0	0	0	0	0	0
1981	12.55	10.52	3.60	-1.80	12.55	12.55	12.55
1982	26.68	22.28	7.44	-3.47	26.68	26.68	26.68
1983	42.57	35.45	11.56	-4.99	42.57	42.57	42.57
1984	60.47	50.23	15.98	-6.38	60.47	60.47	60.47
1985	80.60	66.80	20.71	-7.64	80.60	80.60	80.60
1986	81.16	65.26	25.78	-8.78	81.16	81.16	81.16
1987	81.16	63.43	31.23	-9.79	81.16	81.16	81.16
1988	81.16	61.80	37.07	-10.69	81.16	81.16	81.16
1989	81.16	60.39	43.35	-11.46	81.16	81.16	81.16
1990	81.16	59.19	50.10	-12.13	81.16	81.16	81.16
1991	81.16	58.17	57.34	-12.69	81.16	81.16	81.16
1992	81.16	57.34	65.13	-13.15	81.16	81.16	81.16
1993	81.16	56.71	73.51	-13.50	81.16	81.16	81.16
1994	81.16	56.25	82.52	-13.75	81.16	81.16	81.16
1995	81.16	55.97	92.20	-13.91	81.16	81.16	81.16
1996	81.16	55.86	102.64	-13.96	81.16	81.16	81.16
1997	81.16	55.92	113.86	-13.93	81.16	81.16	81.16
1998	81.16	56.14	125.95	-13.81	81.16	81.16	81.16
1999	81.16	56.53	138.96	-13.60	81.16	81.16	81.16
2000	81.16	57.07	152.98	-13.30	81.16	81.16	81.16

Source: Alaska Sea Grant Program.

TABLE 3.162

PROJECTED HARVESTING ACTIVITY
YAKUTAT DUNGENESS CRAB FISHERY 1980-2000

	CATCH				EX-VESSEL PRICE		NUMBER OF		
	WEIGHT		VALUE ($1,000) [1]		$/Pound)				
Year	POUNDS (1,000)	METRIC TONS	Nominal	Real	Nominal	Real	Boats	Landings	Fishermen
1980	1035	469	836	751	0.81	0.73	6	58	1-3
1981	1062	482	922	785	0.87	0.74	6	59	13
1982	1091	495	1016	820	0.93	0.75	7	61	13
1983	1119	508	1117	854	1.00	0.76	7	62	14
1984	1149	521	1227	890	1.07	0.77	7	64	14.
1985	1180	535	1346	925	1.14	0.78	7	66	14
1986	1211	549	1478	963	1.22	0.80	7	67	15
1987	1243	564	1621	1001	1.30	0.81	8	69	15
1988	1276	579	1776	1040	1.39	0.82	8	71	15
1989	1310	594	1945	1080	1.49	0.82	8	73	16
1990	1344	610	2128	1119	1.58	0.83	8	75	16
1991	1380	626	2326	1160	1.69	0.84	8	77	17
1992	1417	643	2540	1200	1*79	0.85	9	79	17
1993	1454	660	2772	1241	1.91	0.85	9	81	1&.
1994	1493	677	3023	1283	2.03	0.86	9	83	in
1995	1532	695	3296	1326	2015	0.87	9	85	19
1996	1573	713	3589	1369	2.28	0.87	10	87	19
1997	1615	732	3909	1413	2.42	0.88	10	90	20
1998	1657	752	4254	1458	2.57	().fill	10	92	20
1999	1701	772	4626	1503	?.7?	0.88	10	95	21
2000	1746	792	5031	1549	2.88	0.89	11	97	21.

Source: Alaska Sea Grant Program.

[1] The real values and prices are in terms of 1978 dollars.

TABLE 3.163

PROJECTED PERCENTAGE CHANGE FROM 198?, YAKUTAT DUNGENESS CRAB F=SHIERY

Year	CATCH		EX-VESSEL PRICE		NUMBER OF		
	Weight	Real Value	Nominal	Real	Boats	Landings	Fishermen
1980	0	0	0	0	0	0	0
1981	2.65	4.52	7.42	1.82	2.65	2.65	2.65
1982	5.37	9.15	15.30	3.59	5.37	5.37	5.37
1983	8.16	13.77	23.51	5.18	8.16	8.16	8.16
1984	11.03	18.44	32.15	6.68	11.03	11.03	11.C3
1985	13.97	23.17	41.25	8.08	13.97	13.97	13.97
1986	16.99	28.24	51.14	9.62	16.99	16.99	16.99
1987	20.09	33.33	61.51	11.03	20.09	2C.09	20.C9
1988	23.27	33.47	72.39	12.33	23.27	23.27	23.27
1989	26.54	43.74	83.91	13.59	26.54	26.54	26.54
1990	29.89	49.01	95.96	14.72	29.89	29.89	29.89
1991	33.34	54.42	108.71	15.91	33.34	33.34	33.34
1992	36.87	59.93	122.02	16.78	36.87	36.87	36.87
1993	40.50	65.30	135.98	17.65	40.50	40.50	40.50
1994	44.22	70.39	150.74	18.49	44.22	44.22	44.22
1995	48.04	76.60	166.31	19.29	48.04	48.04	48.C4
1996	51.96	82.29	182.53	19.96	51.96	51.96	51.96
1997	55.99	88.29	199.78	20.65	55.99	55.99	55.99
1998	60.13	94.12	217.80	21.23	60.13	60.13	60.13
1999	64.37	100.11	236.70	21.74	64.37	64.37	64.37
2000	68.72	106.24	256.69	22.25	68.72	68.72	68.72

Source: Alaska Sea Grant Program.

record catch exceeds the projection for the year 2000; harvesting capacity is, therefore, not expected to be a binding constraint.

Shrimp

Since 1960 the Yakutat shrimp fishery has been active fewer years than the king crab fishery. The lack of activity, even when efforts are being increased to find shrimp resources to offset dramatic declines in resource abundance in traditionally heavily fished areas of the Gulf of Alaska, suggests that the shrimp resources in the Yakutat area cannot support a commercial fishery on a sustained basis. For this reason, no projections have been made for the Yakutat shrimp fishery.

Scallops

The Yakutat scallop fishery had a burst of activity between 1968 and 1977. During this period, the harvesting of a virgin resource resulted in a profitable fishery. The resulting decline in resource abundance and adverse market conditions have rendered this fishery inactive in . the past two years. It is not known when, or if, the fishery will become active again. If it does, it is not expected to be capable of supporting more than one or two boats. Due to both the uncertainty as to when the fishery will again be active and the minimal fishery that is expected to be feasible, no projections have been made for the Yakutat scallop fishery.

Summation of Harvesting Activity Projections

This section consists of the presentation and analysis of the projections of harvesting activity of the Yakutat commercial fishing industry as a whole. The tables presented in this section include summations of projected harvesting activity and projections of the relative importance of individual fisheries.

Total catch is projected to increase from 2,086 metric tons (4,6 million pounds) in 1980 to 62,280 metric tons (137 million pounds) in 2000, and its real value is expected to increase from $4.0 million to $22.5 million (Table 3.164). The corresponding percentage increases are 2,885 percent by weight and 461 percent by real value (see Table 3.165). Excluding groundfish, catch is projected to increase from 2,046 metric tons (4.5 million pounds) to 3.923 metric tons (8.6 million pounds), and its real value is expected to increase from $4.0 million to $12.0 million (Table 3.166). This amounts to a 92 percent increase by weight and a 200 percent increase by real value for the traditional fisheries (see Table 3.167). As is indicated by the projections presented in Tables 3.165 and 3.167, the growth of the fisheries in terms of the number of boats or fishermen is expected to be much more modest than the growth in catch.

The significant projected changes in the level of harvesting activity are matched by changes in the relative importance of individual fisheries. For example, while in terms of harvest weight the groundfish fishery is expected to account for less than two percent of the total catch in 1980,

TABLE 3.104

PROJECTED HARVESTING ACTIVITY
YAKUTAT ALL FISHERIES 1980-2000

	CATCH								
	WEIGHT		VALUE ($1,000)		EX-VESSEL PRICE ($/Pound)		NUMBER OF		
Year	POUNDS (1,000)	METRIC TONS	Nominal	Real[1]	Nominal	Real	Boats	Landings	Fishermen
1980	4600	2086	4474	4019	0.97	0.87	178	3143	378
1981	4993	2265	5197	4426	1.04	0.89	179	3245	381
1982	5441	2468	5968	4817	1.10	0.89	180	3358	384
1983	5957	2702	6929	5302	1.16	0.89	181	3483	387
1984	6557	2974	7971	5781	1.22	0.88	182	3622	391
1985	7261	3293	9253	6361	1.27	0.88	183	3777	396
1986	7601	3448	10237	6671	1.35	0.88	183	3835	397
1987	8035	3644	11346	7007	1.41	0.87	184	3894	399
1988	8615	3908	12550	7347	1.46	0.85	184	3957	400
1989	9406	4266	13925	7727	1.48	0.82	185	4022	402
1990	10499	4762	15504	8155	1.48	0.78	185	4091	404
1991	12029	5456	17328	8639	1.44	0.72	186	4165	406
1992	14188	6436	19389	9163	1.37	0.65	186	4245	408
1993	17260	7829	21897	9808	1.27	0.57	187	4331	412
1994	21652	9821	24850	10551	1.15	0.49	188	4427	415
1995	27963	12684	28556	11492	1.02	0.41	189	4534	420
1996	37061	16811	33214	12670	0.90	0.34	190	4656	426
1997	50216	22778	39295	14208	0.78	0.28	192	4799	435
1998	69286	31428	47193	16174	0.68	0.23	194	4969	445
1999	96988	43994	58017	18848	0.60	0.19	197	5176	459
2000	137304	62281	73180	22534	0.53	0.16	201	5435	478

Source: Alaska Sea Grant Program.

[1] The real values and prices are in terms of 1978 dollars.

TABLE 3.165

PROJECTED PERCENTAGE CHANGE FROM 1980,
YAKUTAT ALL FISHERIES

	CATCH		EX-VESSEL PRICE		NUMBER OF		
Year	Weight	Real Value	Nominal	Real	Boats	Landings	Fishermen
1980	0	0	0	0	0	0	0
1981	8.54	10.11	7.03	1.45	0.44	3.25	0.75
1982	18.30	19.86	12.77	1.32	0.93	6.84	1.58
1983	29.52	31.91	19.59	1.85	1.47	10.81	2.51
1984	42.55	43.82	24.99	0.89	2.07	15.23	3.56
1985	57.85	53.25	31.03	0.25	2.74	20.15	4.73
1986	65.25	65.36	38.48	0.43	2.95	21.99	5.09
1987	74.68	74.35	45.19	-0.19	3.16	23.89	5.45
1988	87.29	82.80	49.78	-2.40	3.38	25.87	5.85
1989	104.48	92.26	52.23	-5.98	3.62	27.95	6.29
1990	128.26	102.90	51.84	-11.11	3.89	30.16	6.80
1991	161.51	114.96	48.13	-17.80	4.20	32.51	7.38
1992	208.46	127.98	40.52	-26.09	4.55	35.04	8.07
1993	275.24	144.05	30.45	-34.96	4.96	37.79	8.90
1994	370.73	162.52	18.01	-44.23	5.45	40.82	9.91
1995	507.92	185.94	5.01	-52.96	6.06	44.23	11.19
1996	705.71	215.34	-7.85	-60.87	6.81	48.12	12.83
1997	991.73	253.51	-19.54	-67.62	7.78	52.66	14.95
1998	1406.32	302.41	-29.97	-73.29	9.04	58.07	17.75
1999	2008.58	368.90	-38.50	-77.76	10.69	64.68	21.49
2000	2885.06	449.59	-45.20	-81.22	12.90	72.91	26.53

Source: Alaska Sea Grant Program.

TABLE 3.166

PROJECTED HARVESTING ACTIVITY
YAKUTAT TRADITIONAL FISHERIES 1980-2000

	CATCH								
	WEIGHT		VALUE $1,000)		EX-VESSEL PRICE ($/Pound)		NUMBER OF		
Year	POUNDS (1,000)	METRIC TONS	Nominal	Real[1]	Nominal	Real[1]	Boats	Landings	Fishermen
1980	4510	2046	4462	4008	0.99	0.89	178	3142	37$
1981	4865	2207	5179	4411	1.06	0.91	179	3244	381
1982	5259	2386	594?	4797	1*13	0.91	180	3356	384
1983	5698	25R4	6892	5273	1.21	0.93	181	3480	387
1984	6186	2806	7915	5740	1.28	0.93	182	3618	391
1985	6731	3053	9171	6304	1.36	0.94	183	3772	395
1986	6842	3104	10116	6592	1.48	0.96	183	3827	396
1987	6948	3151	111.67	6897	1.61	().99	184	3884	398
1988	7056	3201	12284	7192	1.74	1.02	184	3943	399
1989	7168	3251	13531	7509	1.89	1,05	184	4004	400
1990	7?83	3304	14919	7847	2.05	1.08	185	4066	401
1991	7402	3357	16457	8205	2.22	1.11	185	4131	402
1992	75?4	3413	18088	8548	2.40	1.14	185	419?	404
1993	7650	3470	19953	8938	2.61	1.17	186	4266	405
1994	7780	3529	21938	9314	2.82	1.20	186	4337	406
1995	7914	3590	24187	9734	3.06	1.23	186	4410	408
1996	8052	3652	26646	10165	3*31	1.26	187	4485	409
1997	8194	3717	29336	10607	3.58	1.29	187	4563	411
1998	8341	3783	32268	11059	3.87	1.33	188	4643	413
1999	8492	3852	35458	11519	4.18	1.36	188	4726	414
2000	8648	3923	39007	12011	4.51	1.39	189	4812	416

Source: Alaska Sea Grant Program.

[1] The real values and prices are in terms of 1978 dollars.

TABLE 3.167

PROJECTED PERCENTAGE CHANGE FROM 1980
YAKUTAT TRADITIONAL FISHERIES

Year	Weight	Real Value	Ex-Vessel Price: Nominal	Ex-Vessel Price: Real	Number of: Boats	Number of: Landings	Number of: Fishermen
1980	0	0	0	0	0	0	0
1981	7.87	10.04	7.62	2.01	0.44	3.23	0.74
1982	16.61	19.66	14.21	2.62	0.92	6.81	1.55
1983	26.33	31.55	22.27	4.12	1.45	10.76	2.47
1984	37.16	43.20	29.34	4.40	2.04	15.15	3.48
1985	49.24	57.27	37.73	5.39	2.70	20.03	4.62
1986	51.72	64.44	49.45	8.39	2.88	21.80	4.93
1987	54.05	72.06	62.47	11.69	3.06	23.61	5.22
1988	56.45	79.41	75.99	14.67	3.24	25.48	5.52
1989	58.93	87.32	90.83	17.86	3.43	27.41	5.84
1990	61.49	95.76	107.07	21.22	3.62	29.40	6.16
1991	64.12	104.68	124.75	24.72	3.82	31.45	6.49
1992	66.83	113.25	143.02	27.82	4.02	33.57	6.84
1993	69.63	122.97	163.65	31.45	4.23	35.76	7.19
1994	72.51	132.37	185.04	34.70	4.45	38.01	7.56
1995	75.48	142.84	208.95	38.39	4.68	40.34	7.95
1996	78.54	153.58	234.52	42.03	4.91	42.74	8.34
1997	81.69	164.62	261.89	45.64	5.15	45.21	8.75
1998	84.94	175.89	291.06	49.18	5.40	47.77	9.17
1999	88.30	187.36	322.07	52.61	5.65	50.41	9.61
2000	91.75	199.64	355.95	56.27	5.91	53.13	10.07

Source: Alaska Sea Grant Program.

by 2000 it is expected to account for over 93 percent of the total catch (see Table 3.168), and its share of total value is projected to increase from 0.3 percent to 46.7 percent (Table 3.169). As indicated by Tables 3.170 through 3.172, the changes in relative importance measured in terms of the number of boats, fishermen, or landings are much less substantial.

The changes in the relative importance of individual fisheries among the traditional fisheries are not expected to be dramatic. In terms of harvest weight, the salmon and Tanner crab fisheries are expected to vie for dominance until the salmon fishery pulls ahead in the mid-1990s (Table 3.173). In terms of value, the salmon fishery is projected to maintain its dominance, and the Dungeness crab fishery is expected to replace the Tanner crab fishery as the premier crab fishery in the early 1990s (Table 3.174). Tables 3.175 through 3.177 contain projections of the relative importance of individual traditional fisheries in terms of the number of boats, fishermen, and landings respectively.

In the Yakutat management area, a minimal amount of double counting occurs. When boats are summed over all fisheries to calculate the number of boats in the Yakutat commercial fishery industry as a whole it is not necessary to adjust the projections of the number of boats.

Local Harvesting "Effort

The difficulties associated with defining and measuring local fishing effort are discussed and a method of approximating local effort is developed in Chapter II. The results of that method of measuring

TABLE 3.168

PERCENTAGE OF CATCH BY WEIGHT BY YAKUTAT
FISHERY INCLUDING GROUNDFISH, 1980-2000

Year	Salmon	Hal ibut	King Crab	Tanner Crab	Dungeness Crab	Groundfish
1980	37*11	2.39	O*O4	36.00	22.50	1.95
1981	36.58	2.20	O*O4	37.33	21.28	2.56
1982	36.00	2.02	0.04	38.55	20.04	3.35
1983	35*33	1.85	0.04	39.63	18079	4,36
1984	34.57	1.68	0,04	40.53	17.53	5.66
1985	33*71	1.51	0.04	41*19	16.25	7.30
1986	33.08	1.50	0.04	39.47	15.93	9.98
1987	32.15	1.48	0004	37.34	15.47	13.53
1988	30.80	1.43	0.04	34.82	14.81	18.09
1989	28.99	1036	0.04	31.90	13.92	23,79
1990	26. 69	1.27	0.03	28.57	12.80	30.63
1991	23.94	1.15	0.03	24.94	11.47	38.47
1992	20.86	1001	0.03	21.14	9*98	46.97
1993	17.63	0.86	0.03	17.38	8.43	55.68
1994	14.45	0.71	0.02	13.86	6.89	64.07
1995	11.50	0.57	0.02	10.73	5.48	71.70
1996	8.92	0,45	O*O1	8.09	4.24	78.27
1997	6.77	0.34	0001	5.97	3.22	83.68
1998	5.05	0.26	O*O1	4.33	2.39	87.96
1999	3*71	0.19	0.01	3.09	1.75	91.24
2000	2.70	0014	O*OO	2.18	1.27	93.70

Source: Alaska Sea Grant Program.

TABLE 3.169

PERCENTAGE OF VALUE BY YAKUTAT
FISHERY INCLUDING GROUNDFISH, 1980-2000

Year	Salmon	Halibut	King Crab	Tanner Crab	Dungeness Crab	Groundfish
1980	53.82	4.73	0.05	22.44	18.69	0.2?
1981	54.96	4*39	0.05	??.53	17.74	0.34
1982	55.49	4.12	0.05	22.90	17.02	0.43
1983	56.43	3.82	0.05	23.05	16.12	0.55
1984	56.86	3.56	0.05	23.44	15.39	0.70
1985	57.58	3.29	0.05	23.65	14.54	0.89
1986	58.67	3.31	0.05	?2.35	14.44	1.18
1987	59.73	3*3?	0.05	21.04	14.29	1.58
1988	60.49	3.33	0005	19.87	14.16	2.11
1989	61.10	3.32	0.05	18.72	13.97	2.83
1990	61.53	3.31	0.05	17.61	13.72	3.78
1991	61.70	3.28	0.05	16.51	13.42	5.03
1992	61.41	3.?4	0.05	15.49	13.10	6.71
1993	60.83	3.17	0.05	14.41	12.66	8.88
1994	59.6?	3.08	0.05	13.36	12.16	11.72
1995	57.90	2.96	0.05	12.24	11.54	15.30
1996	55.47	2.81	0.05	11.in	10.81	19.77
1997	52.14	2.62	0.05	9.90	9.95	25.34
1998	48.21	2.40	0.05	8.71	9.01	31.63
1999	43.46	2.15	0.04	7.49	7.97	38.88
2000	38.23	1.87	0.04	6.29	6.87	46.70

Source: Alaska Sea Grant Program.

TABLE 3.170

PERCENTAGE OF BOATS BY YAKUTAT
FISHERY INCLUDING GROUNDFISH, 1980-2000

Year	Salmon	Halibut	King Crab	Tanner Crab	Dungeness Crab	Groundfish
1980	92.(]63	1.669	()	2.734	3.521	0.013
1981	91.658	1.662	0	3.064	3.599	0.017
1982	91.215	1.654	0	3.432	3.676	0.024
1983	90.728	1.645	0	3.842	3.753	0.032
1984	90.193	1.635	0	4.298	3.830	0.043
1985	89.605	1.624	0	4.806	3.906	0,058
1986	89.424	1.683	0	4.811	4.001	0.079
1987	89.246	1.745	0	4.802	4.099	0.108
1988	89.054	1.808	0	40791	4.199	0.147
1989	88.846	1.873	0	4.780	4.300	0.201
1990	}38.615	1.940	()	4.768	4.403	0.274
1991	88.356	2.009	o	4.754	4.506	0.375
1992	88.060	2.080	0	4.738	4.610	0.512
1993	87.715	2.151	0	4.719	4.714	00701
1994	87.304	2.224	0	4.697	4.816	0.959
1995	86.806	2.296	0	4.670	40915	1.313
1996	86.190	2.367	0	4.637	5.010	1.79A
1997	85.416	2.436	0	4.596	50096	2.455
1998	84.433	2.501	0	4.543	50171	3*353
1999	83.171	2.559	0	4*475	5.229	4.567
2000	81.545	2.605	0	4.387	5.262	6.200

Source: Alaska Sea Grant Program.

TABLE 3.171

PERCENTAGE OF FISHERMEN BY YAKUTAT
FISHERY INCLUDING GROUNDFISH, 1980-2000

Year	Salmon	Halibut	King Crab	Tanner Crab	Dungeness Crab	Groundfish
1980	86.777	4.719	()	5.154	3.319	0.031
1981	86.135	4.684	o	5.758	3.382	0.041
1982	85.428	4.646	0	6.428	3.443	0.055
1983	84.651	4.604	()	7.169	3.502	0.074
1984	83.797	4.557	o	7.987	3.559	0.100
1985	82.858	4.506	0	8.889	3.612	0.135
1986	82.573	4.664	o	8.885	3.695	0.183
1987	82.29[)	4.826	0	8.855	3.780	0.249
1988	81.981	4.993	0	8.821	3.865	0.339
1989	81.638	5.164	0	8*785	3*951	0.462
1990	81.254	5.338	0	8.743	4*037	0.629
1991	80.813	5.513	0	8.696	4,121	0.857
1992	[10.299	5.689	0	8.640	4.204	1.168
1993	79.688	5.863	0	8.575	4.282	1.592
]994	78.949	6.032	0	8.495	4*355	2.168
1995	78.041	6.19?	0	8.398	4.419	2.95(7
1996	76.910	6.338	0	8.276	4.47(-)	4.006
1997	75.488	6.460	0	8.123	4.504	5.425
1998	73.693	6.549	o	7.930	40513	7*315
1999	71.427	6.592	0	7.686	4.490	9.805
2000	68.585	6.573	0	7.380	4.426	13.036

Source: Alaska Sea Grant Program.

TABLE 3.172

PERCENTAGE OF NUMBER OF LANDINGS BY YAKUTAT
FISHERY INCLUDING GROUNDFISH, 1980-2000

Year	Salmon	Halibut	King Crab	Tanner Crab	Dungeness Crab	Groundfish
1980	96.531	0.378	0	1.225	1.829	0.037
1981	96.431	0.366	0	1.336	1.819	0.048
1982	96.326	0.354	0	1.453	10804	0.063
1983	96.214	0.341	0	1.576	1*785	0.083
1984	96.095	0.328	0	1.706	1.763	0.108
1985	95.967	0.315	0	1.842	1.735	0.141
1986	95.914	0.322	0	1.819	1.754	0.190
1987	95.851	0.329	0	1.792	1.773	0.255
1988	95.766	().337	0	1.763	1.792	00343
1989	95.651	0.344	0	1.735	1.809	0.461
1990	95.498	0.351	0	1.705	1.825	0.620
1991	95.291	0.358	0	1.675	1.841	00835
1992	950013	0.365	0	1.644	1.854	1.124
1993	94.640	0.371	0	10611	1.865	1.513
1994	94.138	0.377	0	1.576	1.873	2.035
1995	93.466	0.383	0	1.539	1.878	2.735
1996	92.568	0.387	0	1.498	10877	3.670
1997	91.375	0.390	0	1.454	10869	4.912
1998	89.799	0.391	0	1.404	1.853	6.553
1999	87.738	0.390	0	1.348	1.826	8.698
2000	85.075	0.386	0	1.284	1.785	11.470

Source: Alaska Sea Grant Program.

TABLE 3.173

PERCENTAGE OF CATCH BY WEIGHT BY YAKUTAT
FISHERY EXCLUDING GROUNDFISH, 1980-2000

Year	Salmon	Halibut	King Crab	Tanner Crab	Dungeness Crab
1980	37.849	2.439	00044	36,718	22.949
1981	37. s45	2.261	0.044	38.312	21.839
1982	37.242	2.092	0.043	39.887	20.737
1983	36.942	1.931	0.042	41.438	19.648
1984	36.648	1.778	0.041	42.957	18.576
1985	36.364	1.634	0.040	44,436	17.526
1986	36.748	1.670	0.042	43.844	17.696
1987	37.178	1.708	0.044	43.180	17.890
1988	37.610	1.746	0.046	42.516	18.082
1989	38.042	1.785	0.048	41.854	18.272
1990	38.475	1.824	0.050	41.192	18.459
19?1	38.908	1,864	0.052	40.531	18.645
1992	39.341	1.905	0.054	39.872	18.828
1993	39.775	1.945	0.057	39.215	19.008
1994	40.208	1.986	0.059	38.560	19.186
1995	40.641	2.028	0.062	37,908	19.361
1996	41.074	2.070	0.065	37.258	19.533
1997	41.507	2.112	0.067	36.611	19.703
1998	41.938	2.155	0.070	35.967	19.869
1999	42.369	2.198	0.073	35.327	20.033
2000	42.799	2.242	0.076	34.690	20.193

Source: Alaska Sea Grant Program.

TABLE 3.174

PERCENTAGE OF VALUE BY YAKUTAT
FISHERY EXCLUDING GROUNDFISH, 1980-2000

Year	Salmon	Halibut	King Crab	Tanner Crab	Dungeness Crab
1980	53.97	4.74	0.05	22.50	18.74
1981	55.14	4.41	0.05	22.60	17.80
1982	55.73	4.14	0.05	23.00	17.09
1983	56.74	3.84	0.05	23.17	16.20
1984	57.26	3.59	0.05	23.61	15.50
1985	58.09	3.32	0.05	23.87	14.67
1986	59.38	3.35	0.05	22.62	14.61
1987	60.69	3.37	O*O5	21.37	14.52
1988	61.79	3.4(-I	0.05	20.29	14.46
1989	62.88	3.42	0.05	19.27	14.38
1990	63.95	3*44	0.06	18.30	14.26
1991	64.97	3.45	0.06	17.39	14.14
1992	65.82	3.47	0.06	16.60	14.04
1993	66.76	3.47	0.06	15.82	13.89
1994	67.54	3.49	0.06	15.13	13.78
1995	68.36	3.50	0.06	14.45	13.63
1996	69.14	3.50	0.06	13.83	13.47
1997	69.84	3.50	0.07	13.26	13.33
1998	70.50	3.51	0.07	12.74	13.18
1999	71.11	3.52	0.07	12.26	13,05
2000	71.73	3.51	0.07	11.80	12.90

Source: Alaska Sea Grant Program.

TABLE 3.175

PERCENTAGE OF BOATS BY YAKUTAT
FISHERY EXCLUDING GROUNDFISH, 1980-2000

Year	Salmon	Hal i but	King Crab	Tanner Crab	Dungeness Crab
1980	92.075	1.669	0	2.734	3.522
1981	91.675	1.662	0	3.064	3.599
1982	91.237	1.654	0	3.432	3.677
1983	90.757	1.645	0	3.843	3.755
1984	90.232	1.636	0	49300	3.832
1985	89.657	1.6?5	0	4.809	3.908
1986	89.495	1.685	0	4.815	4.005
1987	89.343	1.747	0	4.807	4.1(')4
1988	89.186	1.811	0	4.798	4.205
1989	89.024	1.877	0	40790	4.309
1990	88.859	1.946	0	4*781	4.415
1991	88.689	2.017	0	4.772	4.5?3
1992	88.514	2.090	0	4.762	4.634
1993	88,334	2.166	0	4,753	4.747
1994	88.150	2.245	1--1	4.743	4.862
1995	87.960	2.326	o	4.732	4.981
1996	87.766	2.411	0	4.722	5.101
1997	87.566	2.498	0	40711	5.225
1998	87.361	2.588	o	4.700	5.350
1999	87.151	2.681	0	4.689	5*479
2000	86.935	2.777	0	4.677	5.610

Source: Alaska Sea Grant Program.

TABLE 3.176

PERCENTAGE OF FISHERMEN BY YAKUTAT
FISHERY EXCLUDING GROUNDFISH, 1980-2000

Year	Salmon	Hal i but	King Crab	Tanner Crab	Dungeness Crab
1980	86.803	4.721	o	5.156	3.320
19[4 1	86.170	4.686	0	5.761	3.383
1982	85.475	4.648	0	6.431	3.445
1983	84.714	4.607	o	7.174	3.505
1984	83.881	4.562	0	7.995	3.562
1985	82.970	4.512	0	8.901	3.617
1986	82.725	4.672	0	8.902	3.702
1987	82.495	4.839	0	8.877	3.789
1988	82.260	5*010	0	8.851	3.879
1989	82.017	5.188	0	8.825	3.970
1990	81.768	5.371	0	8.799	4.062
1991	81.511	5.561	0	8.771	4.157
1992	81.248	5.756	0	8.743	4.253
1993	80.977	5.958	0	8.713	4.352
1994	80.699	6.166	0	8.684	4.452
1995	80.413	6.381	0	8.653	4.553
1996	8(-).120	6.602	0	8.621	4.657
1997	79.818	6.830	0	8.589	4.762
1998	79.509	7.066	0	8.555	4.870
1999	79.191	7.309	0	8.521	4.979
.?000	78.865	7.559	0	8.486	5.090

Source: Alaska Sea Grant Program.

TABLE 3.177

PERCENTAGE OF NUMBER OF LANDINGS BY YAKUTAT
FISHERY EXCLUDING GROUNDFISH, 1980-2000

Year	Salmon	Halibut	King Crab	Tanner Crab	Dungeness Crab
1980	96.566	0.378	0	1.226	1.830
1981	96.478	0.367	0	1.336	1.820
1982	96.387	0.354	0	1.454	1.805
1983	96.294	0.342	0	1.578	1.787
1984	96.199	0.329	0	1.708	1.764
1985	96.103	0.315	0	1.844	1.738
1986	96.097	0.323	0	1.823	1.758
1987	96.096	0.330	0	1*796	1.778
1988	96.095	0.338	0	1.769	1.798
1989	96.094	1-).345	0	10743	1.817
1990	96.094	0.353	0	1.716	1.837
1991	96.094	0.361	0	1.689	1.856
1992	96.094	0.369	0	1.662	1.875
1993	96.094	0.377	0	1.636	1.894
1994	96.094	0.385	0	1,609	1.912
1995	96.094	(-).393	0	1.582	1.930
1996	96.095	0.402	0	1.556	1.948
1997	96.095	0.410	0	1.529	1.966
1998	96.096	0.419	0	1.503	1.983
1999	96.097	0.427	0	1.476	2.000
2000	96.098	0.436	0	1.450	2.016

Source: Alaska Sea Grant Program.

local effort are presented in this section. As the values of the local harvesting factors reported in Table 3.178 indicate, the degree to which a Yakutat fishery can be considered a local fishery varies greatly. For example, the salmon set gillnet fishery is primarily a local fishery and the salmon power troll fishery is primarily a non-local fishery.

PROCESSING

The projections of Yakutat processing plant activity presented in this section are based on the projections of industry-wide catch discussed in a preceding section. The 'measures of activity are in terms of processing plant input requirements and processing plant payrolls or income. Four sets of projections are presented for each measure of processing activity; the four sets are the traditional fisheries with and without increased efficiency and all fisheries with and without increased efficiency.

Water

In 1976 and 1977, the peak water usage in Yakutat processing plants was approximately 413,000 liters (125,000 gallons) per day. Using this as the base peak load, the peak load is projected to be between 590,000 and 2,377,000 liters (156,000 and 628,000 gallons) per day by 2000 (Table 3.179).

TABLE 3.178
LOCAL HARVESTING FACTOR FOR YAKUTAT, 1976

	LPO	TP	P	P=LPO/TP
Salmon (Yak)				
Set gill net	131	159	.824	
King Crab (S. E.)				
Small boat pots	-0-	47	-0-	
Large boat pots	-0-	12	-0-	

Others (Statewide) P = [(PF/TP) · LPO]/B

	PF	TP	LPO	B	P
Halibut, hand troll	1	43	1		
Halibut, sm. boat, long line	95	1,323	15		
Halibut, large boat, long line	2 56	1,112	5		
Dungeness crab small boat pots	43	240	2		
Dungeness crab large boat pots	12	43	-0-		
Herring, purse seine	129	251	-0-		
Herring, roe on kelp	407	1,529	2		
Bottomfish, small boat long line	3	66	-0-	1	0
Shrimp, small boat, pots	33	281	3		
Shrimp, large boat, pots	4	30	1		
Shrimp, beam trawl	22	69	-0-		
Salmon, hand troll	1,239	2,746	19	4	1.0
Salmon, power troll	742	999	9	16	.418
Tanner crab, small boat pots	166	295	-0-		
Tanner crab, large boat pots	224	341	-0-		

P = Estimate of the proportion of fishing effort that is local

LPO = Number of local permit owners

TP = Total number of permits

PF = Number of permits fished

B = Number of boats participating in the fishery

P = 1 when calculated value excedes 1

Source: ADF&G and CFEC data files

TABLE 3.179

PROJECTED PEAK YAKUTAT PROCESSING REQUIREMENTS FOR WATER

	1000 GALLONS/DAY				PERCENTAGE INCREASE*			
	Traditional Fisheries		All Fisheries		Traditional Fisheries		All Fisheries	
Year	1	2	1	2	1	2	1	2
1980	127	122	127	122	1.21	-2.8o	1.43	-2.59
1981	136	128	137	129	9.16	2.74	9.46	3.02
1982	148	136	148	137	18.02	8.86	18.46	9.26
1983	160	144	161	145	27.85	15.57	28.47	16.13
1984	174	154	175	155	38.82	22.98	39.71	23.76
1985	189	164	190	165	51.03	31.12	52.30	32.22
1986	192	163	194	165	53055	30.63	55.36	32.18
1987	195	162	198	165	55.90	29.98	58.51	32.15
1988	198	162	203	166	58.35	29.38	62.08	32.43
1989	201	161	208	166	60.84	28.79	66.20	33.08
1990	204	160	214	168	63.44	28.26	71.15	34.30
1991	208	160	221	170	66.09	27.73	77.17	36.25
1992	211	159	231	174	68.85	27.25	84.81	39.28
1993	215	158	243	180	71.68	26.80	94.69	43.79
1994	218	158	260	188	74.60	26.37	107.82	50.42
1995	222	157	282	200	77.58	25.96	125.60	60.02
1996	226	157	313	217	80.70	25.61	150.18	73.91
1997	230	157	356	242	83.89	25.27	184.53	93.83
1998	234	156	416	278	87.16	24.95	233.13	122.40
1999	238	156	503	329	90.57	24.68	302.52	163.35
2000	243	156	628	402	94.05	24.42	402.18	221.99

Source: Alaska Sea Grant Program.

[1] Requirement without increased efficiency.

[2] Requirement with a 2 percent annual decrease in input requirements per unit produced.

*Projected percentage increase since the late 1970s.

Electricity

Based on a base peak load requirement of 50,000 kilowatt hours of electricity per month, the projected peak use of electricity by processing plants in the year 2000 is projected to range from 62,000 to 2,255,000 million kilowatt hours per month (Table 3. 180).

Employment

Using 32 as the base level of average monthly employment in Yakutat processing plants, the projections of average monthly employment for the year 2000 range from 40 to almost 400 (see Table 3.181).

Income

Using $384,000 (i.e., 32 x $12,000) as the base period annual payroll of processing plants, the annual real income for the year 2000 is projected to range from $0.6 million to $5.9 million (see Table 3.181). The associated projected percentage increases in processing plant employment and income are reported in Table 3.182.

Number of Plants

The number of processing plants is not a good measure of processing activity because production per plant can vary greatly. There is expected to be sufficient processing activity to support no more than one large processing

TABLE 3.180

PROJECTED PEAK YAKUTAT PROCESSING REQUIREMENTS FOR ELECTRICITY

	1000 KWH/MONTH				PERCENTAGE INCREASE*			
	Traditional Fisheries		All Fisheries		Traditional Fisheries		All Fisheries	
Year	1	2	1	2	1	2	1	2
1980	51	49	52	50	1.21	-2.80	4.63	0.49
1981	55	51	57	54	9.16	2.74	14.03	7.32
1982	59	54	62	58	18.02	8.86	24.96	15.26
1983	64	58	69	62	27.85	15.57	37.75	24.52
1984	69	61	76	68	38.82	22.98	52.97	35.50
1985	76	66	86	74	51.03	31.12	71.25	48.67
1986	77	65	91	78	53.55	30.63	82.48	55.25
1987	78	65	99	82	55.90	29.98	97.35	64.54
1988	19	65	109	89	58.35	29.38	117.79	77.95
1989	80	64	123	99	60.84	28.79	146.17	97.12
1990	82	64	143	112	63.44	28.26	186.08	124.49
1991	83	64	171	132	66.09	27.73	242.53	163.41
1992	84	64	211	159	68.85	27.25	322.97	218.77
1993	86	63	269	199	71.68	26.80	438.11	297.43
1994	87	63	352	255	74.60	26.37	603.56	409.24
1995	89	63	471	334	77.58	25.96	842.06	568.22
1996	90	63	643	447	80.70	25.61	1186.83	794.52
1997	92	63	893	608	83.89	25.27	1686.24	1116.84
1998	94	62	1256	838	87.16	24.95	2411.09	1576.42
1999	95	62	1783	1166	90.57	24.68	3465.05	2232.45
2000	97	62	2550	1635	94.05	24.42	4999.87	3169.89

Source: Alaska Sea Grant Program.

[1] Requirement without increased efficiency.

[2] Requirement with a 2 percent annual decrease in input requirements per unit produced.

*projected percentage increase since the late 1970s.

TABLE 3.181

PROJECTED YAKUTAT PROCESSING EMPLOYMENT AND INCOME, 1980-2000

	TRADITIONAL FISHERIES						ALL FISHERIES					
	WITHOUT INCREASED EFFICIENCY			WITH INCREASED EFFICIENCY			WITHOUT INCREASED EFFICIENCY			WITH INCREASED EFFICIENCY		
Year	Employment[1]	Nominal Income[2]	Real Income[3]	Employment	Nominal Income	Real Income	Employment	Nominal Income	Real Income	Employment	Nominal Income	Real Income
1980	32	441	396	31	423	380	33	447	401	32	429	386
1981	35	506	431	33	477	406	36	515	438	33	485	413
1982	38	583	471	35	538	434	39	595	481	36	550	444
1983	41	673	515	37	608	465	42	691	529	38	626	479
1984	44	778	564	39	689	500	46	805	584	41	716	519
1985	48	901	620	42	782	538	50	941	647	44	822	565
1986	49	976	636	42	830	541	52	1035	674	45	889	580
1987	50	1055	652	42	880	543	54	1143	706	46	968	598
1988	51	1141	668	41	933	546	56	1272	744	47	1063	622
1989	51	1235	685	41	989	549	60	1428	792	49	1182	656
1990	52	1336	703	41	1049	552	64	1624	854	52	1336	703
1991	53	1446	721	41	1112	554	69	1874	934	57	1539	768
1992	54	1566	740	41	1180	558	76	2202	1041	63	1816	858
1993	55	1695	759	41	1252	561	86	2644	1184	71	2201	986
1994	56	1836	780	40	1329	564	99	3253	1381	84	2745	1166
1995	57	1989	801	40	1411	568	117	4106	1652	101	3527	1420
1996	58	2156	822	40	1498	572	143	5322	2030	125	4665	1779
1997	59	2336	845	40	1592	575	178	7079	2560	160	6334	2290
1998	60	2532	868	40	1691	579	228	9645	3305	208	8803	3017
1999	61	2746	892	40	1797	584	298	13424	4361	277	12475	4053
2000	62	2978	917	40	1909	588	397	19030	5860	375	17961	5531

Source : Alaska Sea Grant Program.

[1] Average monthly employment.

[2] Annual payroll in $1,000.

[3] Income in 1978 dollars in ($1,000).

TABLE 3. 182

PROJECTED PERCENTAGE CHANGE* IN YAKUTAT
PROCESSING EMPLOYMENT AND INCOME 1980-2000

	TRADITIONAL FISHERIES						ALL FISHERIES					
	WITHOUT INCREASED EFFICIENCY			WITH INCREASED EFFICIENCY			WITHOUT INCREASED EFFICIENCY			WITH INCREASED EFFICIENCY		
Year	Employ- ment[1]	Nominal Income[2]	Real Income[3]	Employ- ment	Nominal Income	Real Income	Employ- ment	Nominal Income	Real "Income	Employ- ment	Nominal Income	Real Income
1980	1.21	14.80	3.14	-2*80	10.25	-0.94	2.53	16.29	4.48	-1.48	11.74	0.40
1981	9.16	31.86	12.29	2.74	24.1o	5.69	10.98	34.05	14.16	4.56	26.30	7.56
1982	18.02	51.83	22.56	8.86	40.04	13.04	20.54	55.07	25.18	11.38	43.28	15.66
1983	27'.85	75.17	34.03	15.57	58.34	21.15	31.34	79.95	37.68	19.06	63.12	24.81
1984	38.82	102.56	46.91	22.98	79.44	30.14	43.66	109.62	52.o3	27.81	86.50	35.26
1985	51.03	134.70	61.34	31.1.?	103.75	40.07	57.75	145.14	68.52	37.83	114.19	47.24
1986	53.55	154.12	65.58	30.63	116.19	40.87	62.88	169.56	75.64	39.96	131.64	50.93
1987	55.90	174.79	69.72	29.98	129.10	41.5(3	68.88	197.66	83.84	42.96	151.98	55.63
1988	58.35	197.24	74.01	29.38	142.87	42.18	76.42	231.16	93*87	47.45	176.78	62.04
1989	60.84	221.54	78.43	28.79	15'7.47	42.87	86.02	271.89	106.36	53.97	207.81	70.81
1990	63.44	247.98	83.03	28.26	173.07	43.63	98.58	322.79	122.38	63.39	247.88	82.98
1991	66.09	276.61	87.76	27.73	189.62	44.39	115.17	387.90	143.25	76.81	300091	99.88
1992	68.85	307.75	92.69	27.25	207.30	45.22	137.48	473.49	171.01	95.88	373.04	123.54
1993	71.68	341.53	97.79	26.80	226.10	46.07	167.76	588.63	208.46	122.88	473.2o	156.76
1994	74.60	378.22	103.I.)4	26.37	246.13	46.96	209.25	747.05	259.64	161.03	614.96	203.56
1995	77.58	418.(-)1	108.47	25.96	267.44	47.87	266.52	969.17	330.28	214.90	818.59	269.68
1996	80.70	461.37	114.14	25.61	290.23	48.86	346.12	12/35.94	428.69	291.03	1114.80	363.40
1997	83.89	508.41	119.99	25.27	314.47	49.86	457.18	1743.47	566.56	398.56	1549.53	496.44
1998	87.16	559.50	126.03	24.95	340.29	50.90	612.79	2411.61	760.80	550.58	2192.40	685.67
1999	90.57	615.17	132.33	24.68	367.90	52.00	831.58	3395.93	1035.69	765.69	3148.66	955.37
2000	94.05	675.55	138.81	24.42	397.26	53.12	1139.95	4855.60	1425 .96	1070. 32	4577.31	134O. 26

Source: Alaska Sea Grant Program.

*1977 is the base period.

[1] Average monthly employment.

[2] Annual payroll in $1,000.

[3] Income in 1978 dollars in ($1,000).

plant from 1980 through 1995 and perhaps two for the remainder of the period. If smaller plants are used, perhaps three times as many plants will be in operation. In either case there is not expected to be a large number of processing plants. Since the development of the groundfish fishery is more speculative and more significant than that of the traditional fisheries, a summary of projected groundfish processing activity, including the number of plants, is presented in Table 3.183.

Local Processing Effort

Industry sources have indicated that the fish processing plants in Yakutat rely almost exclusively on the local labor force.

THE FEASIBILITY OF THE PROJECTED GROWTH

In this section, the feasibility of the projected growth of the Yakutat commercial fishing industry is evaluated in terms of the projected input requirements and projected input availability. The inputs that are considered include small boat harbor facilities, port facilities, labor, land, electric power, water and processing plant facilities. Projections of the availability of port facilities, labor, land, electric power, and water are drawn from the following Studies Program reports:

- Technical Report Number 31, Northern Gulf of Alaska Petroleum Development Scenarios Transportation Systems Impacts
- Technical Report Number 33, Northern Gulf of Alaska Petroleum Development Scenarios Local Socioeconomic Impacts

TABLE 3.183

PROJECTED YAKUTAT GROUNDFISH PROCESSING ACTIVITY, 19S0-2000

Year	CATCH (MT)	NUMBER OF PLANTS[1]	EMPLOYMENT (man years)	LAND (hectares)	ELECTRICITY (million KWH/year)	WATER (million gallons/year)
1980	41	0	0	0	0	0
1981	58	0	1	0	0	0
1982	83	0	1	0	0	0
1983	118	0	1	0	0	0
1984	168	0	2	0	0	0
1985	241	0	2	0	0	0
1986	344	0	3	0	0	0
1987	493	0	4	0	0	1
1988	707	0	6	0	0	1
1989	1015	0	8	0	0	1
1990	1459	0	11	0	0	2
1991	2099	0	16	0	0	3
1992	3023	0	22	0	0	4
1993	4.359	0	31	0	0	6
1994	6292	0	43	0	0	8
1995	9094	0	60	0	0	12
1996	13158	0	85	0	1	17
1997	19061	0	119	1	1	25
1998	27645	1	168	1	1	36
1999	40142	1	237	1	2	53
2000	58358	1	335	2	3	77

Source: Alaska Sea Grant Program.

[1] The number of full-time groundfish plants.

NOTE : The values are rounded to the nearest whole number. therefore a "O" indicates a value of less than 0.5.

Projections of input requirements are based on forecasts of harvesting and processing activity presented in previous sections, and the projections of input availability that are not available from other Studies Program reports are developed in this section.

Small Boat Harbor

The Yakutat small boat harbor facilities are not large enough to provide slips for all of the small salmon set gillnet boats that are active in the area during the summer or to provide moorage space of any kind to transient fishing vessels. Although the harbor is deep enough for very large vessels, the moorage structures were not designed for vessels in excess of 27.4 meters (90 feet). The physical characteristics of the harbor area will, however, permit the harbor to be significantly increased without extensive dredging or breakwater projects.

The projected growth of the traditional fisheries can probably occur without major improvements in the small boat harbor. The development of a local groundfish industry would, however, be hampered if more adequate facilities are not available for larger boats. Since Yakutat has been identified in the state bottomfish development program as one of five communities in which to concentrate its groundfish development efforts, and since the natural features of the existing harbor will facilitate its expansion, it is expected that more adequate large boat facilities will become available.

Port Facilities

Technical Report Number 31 indicates that the use of the Yakutat port facilities could increase by a factor of from 8 to 19 before they were fully utilized. The projected increase in the volume of fish products that will use the port facilities approaches, but does not surpass, current capacity. Therefore, the port facilities are not expected to constrain the growth projected for the commercial fishing industry.

Labor, Electric Power, and Water

The projected growth of the commercial fishing industry is feasible only if the corresponding rates of increase in input requirements can be met or surpassed by the rates of increase in input availability. The rates of increase of input requirements can be derived from the projections of input requirements developed in the previous section and the rates of increase in input availability can be inferred from information included in Technical Report Number 40. The report presents projections of community requirements for labor, electric power, and water for each of the OCS petroleum scenarios and indicates that the requirements can be met. The rates of increase in community-wide input requirements corresponding to the projections of community-wide input requirements are, therefore, considered to only include rates of increase that do not exceed feasible rates of increase in input availability. The highest rates of increase are associated with the high find case, therefore, the rates of increase in input requirements for the commercial fishing industry are compared to the rates of increase in community-wide input requirements/availability of the high find case to determine if the former are feasible. The projected rates of increase in input availability and requirements are presented in Table 3.184.

The record projected rate of increase in the supply of water exceeds the highest growth rate projected for water usage by the fishing industry and, through 1991, the annual projected increases in water availability exceed the projected increase in demand by the fishing industry. The fishing industry demand for electric power is expected to increase very rapidly during the 1990s; however, it is not projected to exceed the record rate of increase in electric power capacity projected for 1989. The fishing industry demand fore electric power is, however, expected to increase more rapidly than the commercial supply; but since the fish processing plants are expected to generate their own electric power in the absence of a lower price source of electric power, the slower rate of growth of commercially available electric power is not expected to constrain the projected growth of the Yakutat commercial fishing industry. The record rates of growth of population and employment projected for 1989 through 1990 greatly exceed the expected rate of increase in fish processing employment; this suggests that the labor force and the resulting land and housing requirements can increase at the rates required by the projections for the fishing industry.

It, therefore, appears that the supplies of water, electric power, and labor can increase rapidly enough to meet the projected input requirements of the fishing industry.

TABLE 3.184

COMPARATIVE RATES OF GROWTH, HIGH FIND CASE AND THE YAKUTAT FISHING INDUSTRY

	PERCENTAGE CHANGE															
	WATER					ELECTRIC POWER					POPU-LATION	EMPLOYMENT				
	OCS	Fishing Industry Case				Ocs	Fishing Industry Case				Ocs	Ocs	Fishing Industry Case			
Year	Case	1	2	3	4	Case	1	2	3	4	Case	Case	1	2	3	4
1981	14.5	7.–8	5:7	7:9	5.8	19.5	7.8	5.7	9.0	6.8	17.2	17.6	7.8	5.7	8.2	6.1
1982	5.?3	8.1	6.0	8.2	6.1	15.7	8.1	6.0	9.6	7.4	13.6	13.6	8.1	6.0	8.6	6.5
1983	3.1	8.3	6.2	8.5	6.3	7.9	8.3	6.2	10.2	8.0	.5.0	12.4	8.3	6.2	9.0	4.9
1984	7.3	8.6	6.4	8.7	6.6	21.9	8.6	6.4	11.0	8.8	19.7	20.6	8.6	6.4	9.4	7.4
1985	9.0	8.8	6.6	9.0	6.8	23.6	8.8	6.6	1200	9.7	21.5	22.0	8.8	6.6	9.8	7.8
1986	2.3	1.7	-0.4	2,0	-0.0	5.5	1.7	-0.4	6.6	4*4	3.7	3.6	1.7	-0.4	3.3	1.5
1987	0	1.5	-0.5	2.0	-0.0	-1.3	1.5	-0.5	8.1	6.0	-3.0	-2.5	1.5	-0.5	3.7	201
1988	25.3	1.6	-0.5	2.3	O*2	58.0	1.6	-0.5	10.4	8.1	55.3	55.5	1.6	-0.5	4.5	3*1
1989	20.8	1.6	-0.5	2.5	0.5	38.7	1.6	-0.5	13*O	10.8	38.7	33.3	1.6	-0.5	5.4	4.4
1990	18.9	1.6	-0.4	3.0	0.9	27.3	1.6	-0.4	16.2	13.9	27.3	27.5	1.6	-0.4	6*8	601
1991	4.2	1.6	-0.4	3.5	I*5	5.3	1.6	-0.4	19.7	17.3	5.3	5.2	1.6	-0.4	8.4	8.2
1992	-1.2	1.7	-0.4	4*3	2*2	-2.8	1.7	-0.4	23.5	21.0	-2.8	-2.6	1.7	-0.4	10.4	10.8
1993	2.8	1.7	-O*4	5.3	3.2	2.3	1.7	-0.4	27.2	24.7	2.3	1.6	1*7	-0.4	12.7	13.8
1994	1.0	1*7	-0.3	6.7	4.6	0.3	1.7	-0.3	30.7	28.1	O*3	0.4	1*7	-0.3	15.5	17.1
1995	-0.6	1.7	-(-).3	8.6	6.4	-2.0	1.7	-0.3	33*9	31.2	-2.0	-1.8	1.7	-0.3	18.5	20.6
1996	0.9	1.8	-0.3	10.9	8.7	0.6	1.8	-0.3	36.6	33.9	0,6	O*7	1.8	-0.3	21.7	24.2
1997	1.7	1.8	-0.3	13.7	11.5	1.9	1.8	-0.3	38.8	36.0	1.9	1.1	1.8	-0.3	24.9	27.5
1998	1.7	1.8	-0.3	17.1	14.7	1.5	1.8	-0.3	40.6	37.8	1.5	1.6	1.8	-0.3	27.9	30.5
1999	0	1.8	-0,2	20.8	18.4	0	1.8	-0.2	42.0	39.1	0	0	1.8	-0.2	30.7	33.1
2000	0.4	1.8	-I-).2	24.8	22.3	0.2	1.8	-0.2	43.1	40.2	(-)*2	O*2	1.8	-0.2	33.1	35.2

Source: Alaska Sea Grant Program.

1) Traditional fisheries without increased efficiency.
2) Traditional fisheries with increased efficiency.
3) All fisheries without increased efficiency.
4) All fisheries with increased efficiency.

Processing Facilities

Within a year, processing capacity can change significantly as the capacity of existing plants changes, as new plants are built, or as old plants become unusable. The ability to rapidly increase processing capacity, when the long-run prognosis indicates that it is profitable to do so, suggests that processing plant capacity will not be a constraint on the growth that is projected for the processing sector of the commercial fishing industry. The comparison of current processing capacity and the projected harvests for 2000, which is summarized in Table 3.185, also indicates that physical processing capacity is not expected to be a constraint upon the projected growth.

TABLE 3.185

YKUTAT HARVESTING CAPACITY

	Current Capacity (1 ,000 pounds per day)	Catch Forecasts for 2000	Days Required to Process the Catch Projected for 2000
Salmon[1]	20	3,875	194
Tanner Crab	45	3,000	67
Scallops	’22	106	5

[1]Set gillnet salmon catch.

The cold storage facility is scheduled to be rebuilt during 1979. Once it is in operation Yakutat salmon processing capacity will increase by approximately 80,000 pounds per day. With this additional capacity the salmon catch projected for the year 2000 could be processed in approximately forty days.

Land

The land required for the replacement of the cold storage facility and the addition of one large processing plant appears to be available and adequate for the projected growth.

Conclusion

The conclusion is that the long-term growth which is projected for the Yakutat commercial fishing industry appears to be feasible in terms of the long-term availability of inputs. This does not mean that, during the next 20 years, temporary shortages of labor or water or other inputs will not prevent the level of activity of the fishing industry from being as high as it might otherwise be. What it means is that the long-term growth projected for the industry appears to be feasible despite the occasional shortages that will occur.

IV. POTENTIAL IMPACTS OF ALTERNATIVE LEVELS OF OCS DEVELOPMENT

Competition between the commercial fishing and OCS petroleum industries for labor, ocean space use, and the services provided by the infrastructures of coastal communities can impact the development of a commercial fishing industry. The objective of this chapter is to analyze the potential impacts on the commercial fishing industries of Kodiak, Seward, Cordova, and Yakutat that may result from alternative hypothesized levels of OCS activity pursuant to lease sale No. 46 and/or lease sale No. 55. The method used to meet this objective is as follows:

- The characteristics of the hypothesized OCS activity and the projected impacts on the population, employment, and infrastructure of the coastal communities as presented in other studies program reports are summarized.

- Past experiences of interactions between the offshore oil and commercial fishing industries and economic analysis are used to identify potential impacts.

- The hypothesized characteristics of the development of the commercial fishing and OCS industries are compared in light of past experiences to determine the types of impacts that may occur.

The impacts that are considered are those on:

- Catch by species by weight and value.
- Level of fishing effort (number of vessels by type, employment, and income).
- Level of processing effort (number of plants by type, employment and income).
- Local participation in harvesting and processing.
- Fish markets.
- Capacity, suitability and location of local ports, harbors, processing plants, fleets, and public services.
- Siting and public service requirements of commercial harbors and onshore processing plants.
- Areas of conflict in ocean and harbor space use.
- Frequency and seasonality of ocean space and harbor use.
- Conflicts between recreational and commercial fishing activities.

- Organization of the commercial fishing industry and current economic and political trends of significance to the industry.

As is noted in Chapter I, there are serious limitations on the degree to which quantitative projections of impact can be made. For this reason, the discussion of potential impacts is typically discussed in qualitative rather than quantitative terms.

The Hypothesized Characteristics of OCS Development

In order to analyze the potential impact of OCS development, it is necessary to know what the characteristics of the OCS and commercial fishing industries and coastal communities are expected to be. The projected characteristics of the commercial fishing industries of the study area are presented in Chapter III. The projected characteristics of OCS development and of the coastal communities as described in other SESP reports are summarized in this section and subsequent sections by OCS development scenario. The reports from which the summaries are drawn were written in preparation of the following SESP reports:

- Technical Report Number 29

  Northern Gulf of Alaska

  Petroleum Development

  Scenarios

- Technical Report Number 31

  Northern Gulf of Alaska

  Petroleum Development Scenarios

  Transportation Systems Impacts

- Technical Report Number 32

  Northern and Western Gulf of Alaska

  Petroleum Development Scenarios

  Local Socioeconomic Baseline

- Technical Report Number 33

  Northern Gulf of Alaska

  Petroleum Development Scenarios

  Local Socioeconomic Impacts

- Technical Report Number 34

  Northern Gulf of Alaska

  Petroleum Development Scenarios

  Economic and Demographic Impacts

- Technical Report Number 35

  Western Gulf of Alaska

  Petroleum Development Scenarios

- Technical Report Number 37

  Western Gulf of Alaska

  Petroleum Development Scenarios

  Transportation Systems Impacts

- Technical Report Number 38

  Western Gulf of Alaska

  Petroleum Development Scenarios

  Economic and Demographic Impacts

- Technical Report Number 40

  Western Gulf of Alaska

  Petroleum Development Scenarios

  Local Socioeconomical Impacts

These reports describe the hypothesized OCS activity and project the potential impacts that alternative levels of OCS development may have on the environments in which the commercial fisheries operate. These reports, therefore, provide information which serves as a basis for the analysis of the potential impacts on the fishing industries.

The three alternative levels of OCS development to be considered will be referred to as the low, mean, and high find cases. They are generated from the 95 percent, mean, and 5 percent probability resource level scenarios, respectively. The low find case encompasses the OCS development that is expected to occur if the actual level of the recoverable resources is found to be no greater than that which is thought to have a 95 percent probability of existing. Similarly, the high find case encompasses the OCS development that is expected to occur if the actual level of the recoverable resources if found to equal that which is thought to have at most a 5 percent probability of existing. The mean find case is associated with a statistical mean level of recoverable resources.

LEASE SALE NO. 55

Low Find Case, 95 Percent Probability Resource Scenario

The low find case is also the exploration only case, since the level of recoverable resources that has at least a 95 percent probability of existing is not expected to be sufficient to warrant field development. Under the 95 percent scenario, exploration begins in the Northern Gulf in the year after lease sale No. 55 and ends after four years of effort. Technical Report Number 33 indicates that the resulting impacts on Yakutat will be short-term and modest and that the impacts on Cordova and Seward will be fleeting and negligible. The hypothesized exploration activities are outlined in Table 4.1.

The peak year employment impact in Yakutat is in 1981 and totals 52 jobs (see Table 4.2). This 15 percent increase in employment is matched by a

TABLE 4.1

ASSUMPTIONS FOR THE DISTRIBUTION OF EMPLOYMENT
AMONG THE COASTAL AREAS OF SEWARD, CORDOVA AND YAKUTAT
95 PERCENT PROBABILITY RESOURCE LEVEL SCENARIO - EXPLORATION ONLY
NORTHERN GULF OF ALASKA

Phase, Task and Area of Operations	Seward	Cordova	Yakutat
EXPLORATION			
Survev			
Offshore Geophysical and Geological Surveying [area of operation]	N/A	Survey vessels conducting geophysical and geological surveys on the Middleton and Yakataga Shelves outside the Cordova coastal area.	Survey vessels conducting geophysical and geological surveys on the Yakutat Shelf outside the Yakutat coastal area.
Onshore Service Base	Temporary service base providing resupply, communications and a point for crew rotation for vessels surveying the Middleton, Yakataga and Yakutat Shelves.	N/A	N/A
Rigs			
Offshore Exploration Well Drilling [area of operation]	N/A	Rigs drilling exploration wells on Middleton and Yakataga Shelves outside the Cordova coastal area.	Rigs drilling exploration wells on the Yakutat Shelf outside the Yakutat coastal area.

TABLE 4.. (continued,

Marine Transportation [port area]	Supply/anchor/tug boats transporting materials to rigs, moving rig anchors and towing rigs on the Middleton and Yakataga Shelves.	N/A	Supply/anchor/tug boats transporting materials to rigs, moving rig anchors and towing rigs on the Yakutat Shelf.
Onshore Service Base	Shore base supplying rigs and boats on Middle-ton and Yakataga Shelves with tubular materials, fuel, water, mud, cement, food and other cargo.	N/A	Shore base supplying righs and boats on the Yakutat Shelf with tubular materials, fuel, water, mud, cement, and other cargo.
Air Transportation	N/A	Helicopter service from Cordova Airport transporting offshore personeel and small volume, light weight freight to and from rigs on the Mid-dleton and Yakataga Shelves.	Helicopter service from Yakutat Airport transporting offshore personnel and small volume, light weight freight to and from rigs on the Yakutat Shelf.

Source: Alaska Consultants, Inc. February 1979.

TABLE 4.2

YAKUTAT POPULATION AND EMPLOYMENT PROJECTIONS,
A COMPARISON OF THE BASE CASE AND THE LOW FIND CASE

	Population		Employment		Change from the Base Case			
					Absolute Change		Percentage in	
Year	Base Case	Low Case	Base Case	Low Case	Population	Employment	Population	Employment
1981	604	708	302	354	104	52	17.22	17.22
19$2	622	692	311	346	70	35	11.25	11.25
1983	634	670	343	361	36	18	5,68	5.25
1984	634	642	352	356	8	4	1.26	1.14
1985	639	639	365	365	0	0	0	0
1986	651	651	372	372	0	0	0	0
1987	677	677	387	387	0	0	0	0
1988	693	693	396	396	0	0	0	0
1989	695	695	397	397	0	0	0	0
1990	746	746	439	439	0	0	0	0
1991	765	765	450	450	0	0	0	0
1992	787	787	463	463	0	0	0	0
1993	828	828	473	473	0	0	0	0
1994	847	847	484	484	0	0	0	0
1995	877	877	501	501	0	0	0	0
1996	894	894	511	511	0	0	0	0
1997	902	902	501	501	0	0	0	0
1998	927	927	515	515	0	0	0	0
1999	927	927	515	515	0	0	0	0
2000	934	934	519	519	0	0	0	0

The projections of employment and population were prepared by Alaska Consultants, Inc.

15 percent increase in population, suggesting that the OCS generated employment does not compete with other local employment but rather attracts the required additions to the labor force to Yakutat. The projected impact on Cordova is negligible since, with the exception of the helicopter service from the Cordova airport, the exploration activity is expected to occur some distance from Cordova. A one percent increase in employment and population is projected for the peak impact years of 1982 and 1983. Again the implication is that the employment generated by the OCS activity is matched by an increase in the labor force (see Table 4.3). The peak year impact in Seward is expected to increase employment and population by less than 3 percent (see Table 4.4).

The impacts on the transportation systems are also expected to be minor. There is expected to be one helicopter flight per day from both Yakutat and Cordova. The number of barge and small tanker trips necessary to transport the industrial freight associated with exploration is not expected to exceed seven in any one year at either Seward or Yakutat. The number of supply boat arrivals per day is expected to be one or two in Yakutat, zero in Cordova, and one in Seward.

<u>Mean Find Case, Mean Probability Resource Scenario</u>

The mean find case is hypothesized to consist of exploration activity that results in the discovery of nine economically viable oil and gas fields on the Middleton and Yakutat shelves. The development of these fields will include the use of offshore production platforms, submarine pipelines, and onshore oil storage terminals and trans-shipment facilities

TABLE 4.3

CORDOVA POPULATION AND EMPLOYMENT PROJECTIONS,
A COMPARISON OF THE BASE CASE AND THE LOW FIND CASE

Year	Population		Employment		Change from the Base Case			
	Base Case	Low Case	Base Case	Low Case	Absolute Change		Percentage in	
					Population	Employment	Population	Employment
1981	3002	3014	1501	1507	12	6	0.40	(-).40
1982	3054	3076	1527	1538	22	11	0.72	0.72
1983	3104	3126	1552	1563	22	11	0.71	0.71
1984	3156	3162	1578	1581	6	3	0,19	0.19
1985	3208	3208	1604	1604	0	0	0	0
1986	3264	3264	1632	1632	0	0	0	0
1987	3322	3322	1661	1661	0	0	o	0
1988	3382	3382	1691	1691	0	0	0	0
1989	3440	3440	1720	1720	0	0	0	0
1990	3498	3498	1749	1749	0	0	0	0
1991	3568	3568	1784	1784	0	0	0	0
1992	3642	3642	1821	1821	0	0	0	0
1993	3714	3714	1857	1857	0	0	0	0
1994	3794	3794	1896	1896	0	0	0	0
1995	3872	3872	1936	1936	0	0	0	0
1996	3954	3954	1977	1977	0	0	0	0
1997	4044	4044	2022	2022	0	o	0	0
1998	4130	4130	2065	2065	0	0	0	0
1999	4220	4220	2110	2110	0	0	0	0
200(3	4322	4322	2161	2161	0	0	0	0

The projections of employment and population were prepared by Alaska Consultants, Inc.

TABLE 4.4

SEWARD (NORTHERN GULF) POPULATION AND EMPLOYMENT PROJECTIONS,
A COMPARISON OF THE BASE CASE AND THE LOW FIND CASE

Year	Population		Employment		Change from the Base Case			
					Absolute Change		Percentage in	
	Base Case	Low Case	Base Case	Low Case	Population	Employment	Population	Employment
1981	2696	2734	1172	1192	40	20	1.48	1.71
1982	2732	2796	1188	1220	64	32	2.34	2.69
1983	2786	2838	1232	1258	52	26	1.87	2.11
1984	2896	2912	1303	1311	16	8	0.55	0.61
1985	3041	3041	1392	1392	0	0	0	0
1986	3052	3052	1422	1422	0	0	0	0
1987	3064	3064	1454	1454	0	0	0	0
1988	3077	3077	1487	1487	0	0	0	0
1989	324?	3242	1596	1596	0	0	0	0
1990	3384	3384	1698	1698	0	0	0	0
1991	3416	3416	1748	1748	0	0	0	0
1992	3449	3449	1800	1800	0	0	0	0
1993	3553	3553	1854	1854	0	0	0	0
1994	3660	3660	1910	1910	0	0	0	0
1995	3771	3771	1968	1968	0	0	0	0
1996	3887	3887	2029	2028	0	0	0	0
1997	4008	4008	2091	2091	0	0	0	0
1998	4130	4130	2155	2155	0	0	0	0
1999	4258	4258	2222	2222	0	0	0	0
2000	4393	4393	2293	2293	0	0	0	0

The projections of employment and population were prepared by Alaska Consultants, Inc.

required for production. Yakutat, Cordova, and Seward are expected to provide support for exploration, field development, and production. Major onshore construction projects are expected to include marine terminals for oil and gas and natural gas liquification plants in the Yakutat and Cordova areas and a permanent service base both in Seward and Yakutat.

The OCS exploration, field development, and production activities that are expected for the mean find case are summarized in Table 4.5. The population and employment impacts in Yakutat are expected to occur in three distinct stages corresponding to the exploration, field development, and production phases of OCS activity (see Table 4.6). First there will be a period of steady but moderate expansion as Yakutat serves as a principal support base during the exploration phase. Second, there will be a construction boom in Yakutat during the field development stage. The construction projects, which include a marine oil terminal and a liquid natural gas (LNG) plant, are expected to employ over 1,000 transient construction workers, who are expected to be housed in a construction camp at the construction site. This second phase of impact is expected to occur between 1986 and 1989, with the peak employment occurring in 1987 and 1988. The third impact phase is expected to begin in 1990 with the onset of terminal operations and to continue throughout the production phase of OCS activity, which will extend beyond 2000. During this phase, OCS activity will generate over 650 new jobs.

TABLE 4.5

ASSUMPTIONS FOR THE DISTRIBUTION OF EMPLOYMENT
AMONG THE COASTAL AREAS OF SEWARD, CORDOVA AND YAKUTAT
MEAN (AND 5 PERCENT) PROBABILITY RESOURCE LEVEL SCENARIO
NORTHERN GULF OF ALASKA a/

Phase, Task and Area of Operations	Seward	Cordova	Yakutat
EXPLORATION			
Survey			
Offshore			
Geophysical and Geological Surveying [area of operation]	N/A	Survey vessels conducting geophysical and geological surveys on the Middleton (and Yakataga) Shelf outside the Cordova coastal area.	Survey vessels conducting geophysical and geological surveys on the Yakutat Shelf outside the Yakutat coastal area.
Onshore			
Service Base	Temporary and later permanent service base providing resupply, communications and a point for crew rotation for vessels surveying the Middleton, (Yakataga) and Yakutat Shelves.	N/A	N/A
Rigs			
Offshore			
Exploration Well Drilling [area of operation]	N/A	Rigs drilling exploration wells on Middleton (and Yakataga) Shelf outside the Cordova coastal area.	Rigs drilling exploration wells on the Yakutat Shelf outside the Yakutat coastal area.

TABLE 4.5 (continued)

Marine Transportation [port area]	Supply/anchor/tug boats transporting materials to rigs, moving rig on the Middleton (and Yakataga) Shelf.	ii/A	Supply/anchor/tug boats transporting materials to rigs, moving rigs on the Yakutat Shelf.
Onshore Service Base	Shore-base supplying rigs and boats on Middleton (and Yakataga) Shelf with tubular materials, fuel, water, mud, cement, food and other cargo.	N/A	Shore bases supplying rigs and boats on the Yakutat Shelf with tubular materials, fuel, water, mud, cement, and other cargo.
Air Transportation	N/A	Helicopter service from Cordova Airport transporting offshore personnel and small volume, light weight freight to and from rigs on the Middleton (and Yakataga) Shelf.'	Helicopter service from Yakutat Airport transporting offshore personnel and small volume, light weight freight to and from rigs on the Yakutat Shelf.
Construction	Constructing a permanent service base on Resurrection Bay.	N/A	Constructing a permanent service base on Monti Bay.
DEVELOPMENT			
Platform Installation and Offshore Pipeline Construction			
Offshore Platform Installation [area of operation]	N/A	Locating, installing and commissioning platforms on the Middleton (and Yakataga Shelf) outside the Cordova coastal area.	Locating, installing and commissioning platforms on the Yakutat Shelf outside the Yakutat coastal area.

TAP'.E 4.5 (cent'nued)

Pipeline Construction [area of operations]	N/A	Laying and burying subsea gathering lines and a trunk line to Hinchinbrook Island.	Laying and burying subsea gathering lines and a trunk line to the Yakutat Forelands.
Marine Transportation [port area]	Supply/anchor/tug boats transporting materials to platforms, lay barges and bury barges. Half of the vessels for the total NGA pipelaying and burying will be provided from Seward.	N/A	Supply/anchor/tug boats transporting materials to platforms, lay barges, and bury barges. Half of the vessels for the total NGA pipelaying and burying will be provided from Yakutat.
Onshore Service Base	Shore base supplying boats, platforms, lay barges and bury barges with tubular materials, fuel, water, food and other cargo. Half of the total effort for platform installation and pipeline construction in the NGA will be provided from Seward.	N/A	Shore base supplying base platforms, lay-barges and bury barges with tubular materials, fuel, water, food and other cargo. Half of the total effort for platform installation and pipeline construction in the NGA will be provided from Yakutat.
Air Transportation	N/A	Helicopter service at Cordova Airport transporting offshore personnel and small volume, lightweight freight to platforms, lay barges and bury barges on the Middleton (and Yakataga) Shelf.	Helicopter service at Yakutat Airport transporting offshore personnel and small volume, light weight freight to platforms, lay barges and bury barges on the Yakutat Shelf.
Construction	Coating of all pipe used in subsea gathering and trunk pipelines at Seward.	Constructing onshore pipeline, oil terminal and LNG plant at Hinchinbrook Island.	Constructing onshore pipeline, oil terminal and LNG plat on Yakutat Bay.

TABLE 4.5 (continued)

Platforms			
Offshore			
Development Drilling [area of operation]	N/A	Development drilling on platforms on the Middleton (and Yakataga) Shelf outside the Cordova coastal area.	Development drilling on platforms on the Yakutat Shelf outside the Yakutat coastal area.
Marine Transportation	Supply boats transporting materials to platforms on the Middleton (and Yakataga) Shelf.	N/A	Supply boats transporting materials to platforms on Yakutat Shelf.
Onshore			
Service Base	Shore base supplying boats and platforms on Middleton (and Yakataga) Shelf with tubular materials, fuel, water, mud, cement, food and other cargo.	N/A	Shore base supplying boats and platforms on the Yakutat Shelf with tubular materials, fuel, water, mud, cement, food and other cargo.
Air transportation	N/A	Helicopter service at Cordova Airport transporting offshore personnel and small volume, light weight freight to platforms on Middleton (and Yakataga) Shelf.	Helicopter service at Yakutat Airport transporting offshore personnel and small volume, light weight freight to platforms on Yakutat Shelf.
PRODUCTION			
Platforms			
Offshore			
Platform Operations [area of operation]	N/A	Operating platforms with periodic workovers and well stimulation on Middleton (and Yakataga) Shelf.	Operating platforms with workovers and well stimulation on Yakutat Shelf.

TABLE 4.5 (continued)

Marine Transportation [port area]	Supply boats transporting materials to platforms on Middleton and Yakataga Shelves. Half of the Middleton (and Yakataga) Shelf effort will be provided from Seward.	Supply boats transporting materials to platforms on Middleton (and Yakataga) Shelf. Half of the Middleton (and Yakataga) Shelf effort will be provided from Seward.	Supply boats transporting materials to platforms on the Yakutat Shelf.
Onshore Service Base	Shore base providing half the effort in supplying boats and platforms on the Middleton (and Yakataga) Shelf with tubular materials, fuel, water, mud, cement, food and other' cargo.	Shore base providing half the effort in supplying boats and platforms on the Middleton (and Yakataga) Shelf with tubular materials, fuel, water, mud, cement, food and other cargo.	Shore base supplying boats and platforms on the Yakutat Shelf with tubular materials, fuel, water, mud, cement, food and other cargo.
Oil Terminal and LNG Plant Operations	N/A	Operating oil terminal and LNG plat processing oil and gas from the Middleton Shelf. Forty percent of the total NGA oil terminal/LNG plant employment will be provided at Hinchinbrook Island. Hinchinbrook Island oil terminal and LNG plant employees assumed to commute daily from Cordova.	Operating oil terminal and LNG plant processing oil and gas from the Yakutat Shelf. Sixty percent of the total NGA oil terminal/LNG plant will be provided at Yakutat.

a/ The 5 percent probability resource level inculdes exploration, development and offshore production on the Yakataga Shelf" enclosed in (). The Yakataga Shelf is not included in the mean case. "

Source: Alaska Consultants, Inc. February 1979.

TABLE 4.6

YAKUTAT POPULATION AND EMPLOYMENT PROJECTIONS,
A COMPARISON OF THE BASE CASE AND THE MEAN FIND CASE

	Population		Employment		Change from the Base Case			
					Absolute Change		Percentage in	
Year	Base Case	Mean Case	Base Case	Mean Case	Population	Employment	Population	Employment
1981	604	690	302	345	86	43	14.24	14.24
1982	622	726	311	363	104	52	16.72	16.72
1983	634	810	343	431	176	88	27.76	25.66
1984	634	810	352	440	176	88	27.76	25.00
1“985	639	815	365	453	176	88	27.54	24.11
1986	651	949	372	521	298	149	45*7R	40005
1987	677	1047	387	572	370	185	54.65	47.80
1988	693	1105	396	629	412	233	59.45	58.84
1989	695	1487	397	793	792	396	113.96	99,75
1990	746	2148	439	1140	1402	701	187.94	159.68
1991	765	22?1	450	1178	1456	728	190.33	161.78
1992	787	2153	463	1146	1366	683	173.57	147.52
1993	828	2154	473	1024	1326	551	160.14	116.49
1994	847	2131	484	1126	1284	642	151*59	132.64
1995	877	2175	501	1050	1298	549	148.00	109.58
1996	894	2235	511	1183	1341	672	150.00	131*51
1997	902	2260	5(31	1180	1358	679	150.55	135.53
1998	927	2299	515	1201	1372	686	148.00	133.20
1999	927	2299	515	1201	1372	686	148.00	133.20
2000	934	2306	519	1205	1372	686	146.90	132.18

The projections of employment and population were prepared by Alaska Consultants, Inc.

The population and employment impacts in Cordova are expected to be minimal during the exploration and field development stages of the mean find case (see Table 4.7). The expectation of minimal impacts is the result of Hinchinbrook Island being identified as the probable site of the marine oil terminal and LNG plant associated with the hypothesized oil and gas discoveries on the Middleton shelf. However, Cordova is expected to be the home base for the operational work force for the OCS facilities on Hinchinbrook Island; therefore, during the production phase of OCS activity, significant population and employment impacts are expected in Cordova. Equal percentage increases in population and employment over the base case are projected, indicating that the employment generated by OCS activity will attract additional workers to Cordova rather than compete with other employment opportunities.

The population and employment impacts in Seward in the mean find case are projected to occur in three distinct phases corresponding to the three stages of OCS activity (see Table 4.8). During the exploration phase, Seward is expected to be the site of a service base and the resulting impacts are minimal. During the field development phase the construction and operation of a permanent service base and a pipe coating yard are projected to result in more significant increases in population and employment. These two construction projects are expected to employ a large number of transient workers who will be housed in temporary construction camps. In the early 1990s, the pipe yard is expected to close down and the service base is expected to become less active and the employment and population impacts are once again projected to be minimal.

TABLE 4.7

CORDOVA POPULATION AND EMPLOYMENT PROJECTIONS,
A COMPARISON OF THE BASE CASE AND THE MEAN FIND CASE

Year	Population		Employment		Change from the Base Case			
					Absolute Change		Percentage in	
	Base Case	Mean Case	Base Case	Mean Case	Population	Employment	Population	Employment
1981	3002	3010	1501	1505	8	4	0.27	0.27
1982	3054	3068	1527	1534	14	7	0.46	0.46
1983	3104	3126	1552	1563	22	11	0.71	0.71
1984	3156	3182	1578	1591	26	13	0.82	0.82
1985	3208	3240	1604	1620	32	16	1*OO	1.00
1986	3264	331.8	1632	1659	54	27	1.65	1.65
1987	3322	3388	1661	1694	66	33	1.99	1.99
1988	3382	3988	1691	1969	606	278	17.92	16.44
1989	3440	4038	1720	2019	598	299	17.38	17.38
1990	3498	4098	1749	2049	600	300	17.15	17.15
1991	3568	4214	1784	2107	646	323	18.11	18.11
1992	3642	4290	1821	2145	648	324	17.79	17.79
1993	3714	4378	1857	2189	664	332	17.88	17.88
1994	3794	4458	1896	2228	664	332	17.50	17.51
1995	3872	4536	1936	2268	664	332	17.15	17.15
1996	3954	4632	1977	2316	678	339	17.15	17.15
1997	4044	47?2	2022	2361	678	339	16.77	16.77
1998	4130	4812	?065	2404	682	339	16.51	16.42
1999	4?20	4898	2110	2449	678	339	16.07	16.07
2000	4322	5000	2161	2500	678	339	15.69	15.69

The projections of employment and population were prepared by Alaska Consultants, Inc.

TABLE 4.8

SEWARD (NORTHERN GULF) POPULATION AND EMPLOYMENT PROJECTIONS, A COMPARISON OF THE BASE CASE AND THE MEAN FIND CASE

Year	Population		Employment		Change from the Base Case			
					Absolute Change		Percentage in	
	Base Case	Mean Case	Base Case	Mean Case	Population	Employment	Population	Employment
1981	2696	2720	1172	1184	24	12	0.89	1.02
1982	2732	2764	1188	1204	32	16	1.17	1.35
1983	2786	2846	1232	1262	60	30	2.15	2.44
1984	2896	2964	1303	1337	68	34	2.35	2.61
1985	3041	3209	1392	1476	168	84	5.52	6.03
1986	3052	3186	1422	1489	134	67	4.39	4.71
1987	3064	3202	1454	1523	138	69	4.50	4.75
1988	3077	3291	1487	1594	214	107	6.95	7.20
1989	3242	3628	1596	1789	386	193	11.91	12.09
1990	3384	3744	1698	1878	360	180	10.64	10.60
1991	3416	3624	1748	1853	210	105	6.15	6.01
1992	3449	3539	1800	1845	90	45	2.61	2.50
1993	3553	3607	1854	1881	54	27	1.52	1.46
1994	3660	3696	1910	1928	36	18	0.98	0.94
1995	3771	3907	1968	1986	136	18	3.61	0.91
1996	3887	3923	2028	2046	36	18	0.93	0.89
1997	4008	4044	2091	2109	36	18	0.90	0.86
199P	4130	4166	2155	2173	36	18	0.87	0.84
1999	4258	4294	22.?2	2240	36	18	0.85	0.81
7000	4393	4429	?293	2311	36	18	0.82	0.78

The projections of employment and population were prepared by Alaska Consultants, Inc.

The projections of vessel traffic resulting from OCS activity are summarized in Table 4.9.

TABLE 4.9

OCS Vessel Traffic Mean Find Case

	Service Boat Arrivals Per Day	Dry Goods Barge Annual Per Year	Fuel Tankers	Oil Tanker and LNG Ships Per Week
Yakutat	1-9	0-13	3-18	1-8
Cordova	O-1	0	0	0
Seward	1-4	1-3	1-4	0

Source: Peter Eakland and Associates, 1979.

<u>High Find Case, 5 Percent Probability Resource Scenario</u>

This case consists of exploration activities that result in 18 commercial oil and gas discoveries. The development phase includes the installation of 32 production platforms and 145 miles of submarine pipelines and the construction of service bases in Yakutat and Seward, and marine terminals and LNG plants in Yakutat and on Hinchinbrook Island. Although the magnitudes of the levels of activity are much greater in the high find case than in the mean find case the types of activities are similar. These activites are outline in Table 4.5.

The employment and population impacts in Yakutat, Cordova, and Seward are expected to be similar in character but larger in magnitude than the projected percentage increases in population and employment as compared to the base case are typically equal (see Table 4.10 through 4.12). This indicates that the employment generated by the OCS activity is expected to attract individuals to the coastal communities. The projections of OCS related vessel traffic are presented in Table 4.13.

TABLE 4.10

YAKUTAT POPULATION AND EMPLOYMENT PROJECTIONS,
A COMPARISON OF THE BASE CASE AND THE HIGH FIND CASE

	Population		Employment		Change from the Base Case			
					Absolute Change		Percentage in	
Year	Base Case	High Case	Base Case	High Case	Population	Employment	Population	Employment
1981	604	708	302	354	104	52	17.22	17.22
1982	622	804	311	402	182	91	29.26	29.26
1983	634	852	343	452	218	109	34.30	31.78
1984	634	10?0	352	545	386	193	60.88	54.83
1985	639	1239	365	665	600	300	93,90	82.19
1986	651	1285	372	689	634	317	97*39	85.22
1987	677	1247	387	672	570	285	84.19	73.64
1988	693	1937	396	1045	1244	649	179,51	163.89
1989	695	2687	397	1393	1992	996	286.62	250.88
1990	746	3420	439	1776	2674	1337	358.45	304.56
1991	765	3601	450	1868	2836	1418	370.72	315.11
1992	787	3501	463	1820	2714	1357	344.85	293.09
1993	828	3580	473	1849	2752	1376	332.37	290.91
1994	847	3591	484	1856	2744	1372	323.97	283.47
1995	/377	3519	501	1822	2642	1321	301.25	263.67
1996	894	3540	511	1834	2646	1323	295.97	258.90
1997	902	3608	501	1854	2706	1353	300.00	270.06
1998	927	3663	515	1883	2736	1368	295.15	265.63
1999	927	3663	515	1883	2736	1368	295.15	265.63
2000	934	3670	519	1887	2736	1368	292.93	263.58

The projections of employment and population were prepared by Alaska Consultants, Inc.

TABLE 4.11

CORDOVA POPULATION AND EMPLOYMENT PROJECTIONS,
A COMPARISON OF THE BASE CASE AND THE HIGH FIND CASE

	Population		Employment		Change from the Base Case			
					Absolute Change		Percentage in	
Year	Base Case	High Case	Base Case	High Case	Population	Employment	Population	Employment
1981	3002	3014	1501	1507	12	6	O*4O	0.40
1982	3054	3076	1527	1538	22	11	0.72	0.72
1983	3104	3136	1552	1568	32	16	1.03	1.03
1984	3156	3200	1578	1600	44	22	1.39	1.39
1985	3208	3252	1604	1626	44	22	1.37	1.37
1986	3264	3300	1632	1650	3 6	18	1.10	1.10
1987	3322	3436	1661	1718	114	57	3*43	3.43
1988	3382	3594	1691	1797	212	106	6.27	6.27
1989	3440	4032	1720	2016	592	296	17.21	17.21
1990	3498	4834	1749	2417	1336	668	38.19	38.19
1991	3568	4900	1784	2450	1332	666	37.33	37.33
1992	3642	4918	1821	2459	1276	638	35.04	35.04
1993	3714	4990	1857	2495	1276	638	34.36	34.36
1994	3794	5114	1896	2556	1320	660	34.79	34.81
1995	3872	5222	1-936	2611	1350	675	34.87	34*87
1996	3954	5318	1977	2659	1364	682	34.50	34.50
1997	4044	5408	2022	2704	1364	682	33.73	33.73
1998	4130	5498	2065	2747	1368	682	33.12	33.03
1999	4220	5584	2110	2792	1364	682	32.32	32.32
2000	4322	5666	?161	2833	1344	672	31.10	31.10

The projections of employment and population were prepared by Alaska Consultants, Inc.

TABLE 4.12

SEWARD (NORTHERN GULF) POPULATION AND EMPLOYMENT PROJECTIONS,
A COMPARISON OF THE BASE CASE AND THE HIGH FIND CASE

	Population		Employment		Change from the Base Case			
					Absolute Change		Percentage in	
Year	Base Case	High Case	Base Case	High Case	Population	Employment	Population	Employment
1981	2696	2726	1172	1187	30	15	1.11	1.28
1982	2732	2784	1188	1214	52	26	1.90	2.19
1983	2786	2862	1232	1270	76	38	2.73	3.08
1984	2896	3072	1303	1391	176	88	6.08	6.75
1985	3041	3167	1392	1455	126	63	4.14	4.53
1986	3052	3180	1422	1486	128	64	4.19	4.5(-1
198?	3064	3364	1454	1604	300	150	9.79	10.32
1988	3077	3761	1487	1829	684	342	22.23	23.00
1989	3242	3978	1596	1964	736	368	22.70	23.06
1990	3384	4098	1698	2055	714	357	21.10	21.02
1991	3416	4144	1748	2112	728	364	21.31	20.82
1992	3449	3861	1800	2006	412	206	11*95	11.44
1993	3553	3R55	1854	2005	302	151	8.50	8.14
1994	3660	3816	1910	1988	156	78	4.26	4.08
1995	3771	3991	1968	2028	220	60	5.83	3.05
1996	3887	3995	2028	2082	108	54	2.78	2.66
1997	4008	4116	2091	2145	108	54	2.69	2.58
1998	4130	4238	2155	2209	108	54	2.62	2.51
1999	4258	4366	2222	2279	108	57	2.54	2.57
2000	4393	4493	2293	2343	100	50	2.28	2.18

The projections of employment and population were prepared by Alaska Consultants, Inc.

TABLE 4.13

OCS Vessel Traffic, High Find Case

	Service Boat Arrivals per Day	Dry Goods Barge Arrivals per Year	Five Tanker Arrivals per Year	Oil Tanker LNG Ships per Year
Yakutat	1-2	2-22	2-22	0-658
Cordova	o-1	0	0	0
Seward	1-7	1-1o	1-14	0

Source: Peter Eakland and Associates.

LEASE SEAL NO. 46

Low Find Case, 95 Percent Probability Resource Scenario

The low find case and the exploration only case are the same, since the level of recoverable resources that is thought to have a 95 percent probability of existing is-not expected to be sufficient to warrant field development. The exploration activity is expected to last from 1981 through 1983 and result in 17 exploration wells, 11 in the Middle A"lbatross Basin and six in the Tugidak Basin.

The OCS activities associated with the low find case are summarized in Table 4.14. The transitory and minimal population and employment impacts that are projected for Kodiak and Seward are presented in Tables 4.15 and 4.16.

Vessel traffic is expected to be minimal in Kodiak since the service base in Seward is assumed to support exploration activities. The vessel traffic out of Seward is expected to consist primarily of up to 36 supply boat arrivals per month.

Mean Find Case, Mean Probability Resource Scenario

The exploration phase of the mean find case is expected to last for three years and result in the discovery of one commercial oil field in the Middle Albatross Basin and no gas resources of commercial value. The field development phase is assumed to commence in 1985 with the

TABLE 4.14

ASSUMPTIONS FOR THE DISTRIBUTION OF EMPLOYMENT
AMONG THE COASTAL AREAS OF SEWARD AND KODIAK
95 PERCENT PROBABILITY RESOURCE LEVEL SCENARIO - EXPLORATION ONLY
WESTERN GULF OF ALASKA

Phase, Task and Area of Operation	Seward	Kodiak
EXPLORATION		
Survey		
Offshore Geophysical and Geological Surveying [area of operation]	N/A	Survey vessels conducting geophysical and geological surveys on Albatross and Tugidak Basins outside the Kodiak coastal area.
Onshore Service Base	Temporary service base providing resupply, communications and a point for crew rotation for vessels surveying Albatross and Tugidak Basins.	N/A
Rigs		
Offshore Exploration Well Drilling [area of operation]	N/A	Rigs drilling exploration wells on Albatross and Tugidak Basins outside the Kodiak coastal area.
Marine Transportation [port area]	Supply/anchor/tug boats transporting materials to rigs, moving rig anchors and towing rigs on the Albatross and Tugidak Basins.	N/A

TABLE 4.14 (continued)

Onshore Service Base	Shore base supplying rigs and boats on Albatross and Tugidak Basins with tubular materials, fuel, water, mud, cement, and other cargo.	N/A
Air Transportation	N/A	Helicopter service from Kodiak Airport transporting offshore personnel and small volume, light weight freight to and from rigs on the Albatross and Tugidak Basins.

Source: 'Alaska Consultants, Inc. April 1979.

TABLE 4.15

KODIAK POPULATION AND EMPLOYMENT PROJECTIONS,
A COMPARISON OF THE BASE CASE AND THE LOW FIND CASE

	Population		Employment		Change from the Base Case			
					Absolute Change		Percentage in	
Year	Base Case	Low Case	Base Case	Low Case	Population	Employment	Population	Employment
1981	7782	7814	6694	6712	32	18	O*41	0.27
1982	8317	8349	7028	7044	32	16	0.38	0.23
1983	8876	8888	“7377	7383	12	6	0.14	0.00
1984	9500	9500	7765	7765	0	0	0	0
1985	10046	10046	8100	8100	0	0	0	0
1986	10498	10498	R373	8373	0	0	0	0
1987	10887	10887	8609	8609	0	0	0	0
1988	11268	11268	8840	8840	0	0	0	0
1989	11496	11496	8982	8982	0	0	0	0
1990	11791	11791	9163	9163	0	0	0	0
1991	12170	12170	9331	9331	0	0	0	0
1992	12743	12743	9610	9610	0	0	0	0
1993	13149	13149	9789	9789	0	0	0	0
1994	13517	13517	9944	9944	0	0	0	0
1995	13879	13879	10094	10094	0	0	0	0
1996	14159	14159	10196	10196	0	0	0	0
1997	14449	14449	10302	10302	0	0	0	0
1998	14660	14660	10363	10363	0	0	0	0
1999	15052	15052	10524	10524	0	0	0	0
2000	15344	15344	10628	10628	0	0	0	0

The projections of employment and population were prepared by Alaska Consultants, Inc.

TABLE 4.16

SEWARD (WESTERN GULF) POPULATION AND EMPLOYMENT PROJECTIONS,
A COMPARISON OF THE BASE CASE AND THE LOW FIND CASE

	Population		Employment		Change from the Base Case			
					Absolute Change		Percentage in	
Year	Base Case	Low Case	Base Case	Low Case	Population	Employment	Population	Employment
1981	2720	2796	1184	1222	76	38	2.79	3.21
1982	2764	2840	1204	1242	76	38	2.75	3.16
1983	2846	2872	1262	1274	26	12	0.91	0.95
1984	2964	2964	1337	1337	0	0	0	0
1985	3645	3645	1476	1476	0	0	0	0
1986	3235	3235	1489	1489	0	0	0	0
1987	3202	3202	1523	1523	0	0	0	0
1988	3320	3320	1594	1594	0	0	0	0
1989	3686	36R6	1789	1789	0	0	0	0
1990	3744	3744	1878	1878	0	0	0	0
1991	3626	3626	1853	1853	0	0	0	0
199.?	3539	3539	1845	1845	0	0	0	0
1993	3607	3607	1881	1881	0	0	0	0
1994	3696	3696	1928	1928	0	0	0	0
1995	3907	3907	1986	1986	0	0	0	0
1996	3923	39?3	2046	2046	0	0	0	0
1997	4044	4044	2109	2109	0	0	0	0
1998	4166	4166	2173	2173	0	0	0	0
1999	4294	4294	2?40	2240	0	0	0	0
2000	4429	4429	2311	2311	0	0	0	0

The projections of employment and population were prepared by-Alaska Consultants, Inc.

installation of a production platform and an offshore loading system. Support for field development is expected to come primarily from Kodiak. The production phase is assumed to last from 1987 through 1999. The OCS activities associated with the mean find case are summarized in Table 4.17.

The population and employment impacts in Kodiak are expected to be minor with the exception of the employment impact result"ing from the construction of a permanent service base at Womens Bay in 1983. It is assumed that the labor force used to construct the service base will consist primarily of transient construction workers who will live in a temporary construction camp. The projected employment and population impacts are presented in Table 4.18.

The population and employment impacts in Seward in the mean find case are similar to those in the low find case since the Seward service base is expected to be active during the exploration phase, but to provide very limited support services once a permanent base is established in Kodiak. The projected impacts are presented in Table 4.19. The projections of OCS related vessel traffic for the mean find case are summarized in Table 4.20.

TABLE 4.17

ASSUMPTIONS FOR THE DISTRIBUTION OF EMPLOYMENT
AMONG THE COASTAL AREAS OF SEWARD AND KODIAK
MEAN PROBABILITY RESOURCE LEVEL SCENARIO
WESTERN GULF OF ALASKA

Phase, Task and Area of Operations	Seward	Kodiak
EXPLORATION		
Survey		
Offshore Geophysical and Geological Sruveying [area of operation]	N/A	Survey vessels conducting geophysical and geological surveys on Albatross Basin outside the Kodiak coastal area.
Onshore Service Base	Temporary and later permanent service base providing resupply, communications and a point for crew rotation for vessels surveying Albatross Basin.	N/A
Rigs		
Offshore Exploration Well Drilling [area of operation]	N/A	Rigs drilling exploration wells on the Albatross Basin outside the Kodiak coastal area.
Marine Transportation [port area]	Supply/anchor/tug boats transporting materials to rigs, moving rig anchors and towing rigs on the Albatross Basin.	Supply/anchor/tug boats transporting materials to rigs, moving rig anchors and towing rigs on the Albatross Basin.

TABLE 4.17 (continued)

Onshore Service Base	Shore base supplying rigs and boats on Albatross Basin with tubular materials, fuel, water, mud, cement, food and other cargo.	N/A
Air Transportation	N/A	Helicopter service from Kodiak Airport transporting offshore personnel and small volume, light weight freight to and from rigs on the Albatross Basin.
Construction	N/A	Constructing a permanent service base.
DEVELOPMENT		
Platform Installation		
Offshore Platform Installation [area of operation]	N/A	Locating, installing and commissioning platforms on the Albatross Basin outside the Kodiak coastal area.
Marine Transportation [port area]	Supply/anchor/tug boats transporting materials to platforms, lay barges and bury barges. Half of the vessels for the total WGA platform installation will be provided from Seward.	Supply/anchor/tug boats transporting materials to platforms, lay barges and bury barges. Half of the vessels for the total WGA platform installation will be provided from Kodiak.
Onshore Service Base	Shore base supplying boats and platforms with tubular materials, fuel, water, food and other cargo. Half of the total effort for platform installation in the WGA will be provided from Sdward.	Shore base supply boats and platforms with tubular materials, fuel water, food and other cargo. Half of the total effort for platform installation in the WGA will be provided from Kodiak.

Air Transportation	N/h	Helicopter service at Kodiak Airport transporting offshore personnel and small volume, lightweight freight to platforms, lay barges and bury barges on the Albatross Basin.
Platforms		
Offshore		
Development Drilling [area of operation]	N/A	Development drilling on platforms on the Albatross Basin outside the Kodiak coastal area.
Marine Transportation [port area]	Supply boats transporting materials to platforms on the Albatross Basin.	Supply boats transporting materials to platforms on the Albatross Basin.
Onshore		
Service Base	Shord base supplying boats and platforms on Albatross Basin with tubular materials, fuel, water, mud, cement, food and other cargo.	Shore base supply boats and platforms on Albatross Basin with tubular materials, fuel, water, mud, cement, food and other cargo.
Air Transportation	N/A	Helicopter service at Kodiak Airport transporting offshore personnel and small volume, light weight freight to platforms on Albatross Basin.
PRODUCTION		
Platforms		
Offshore		
Platform Operations [area of operation]	N/A	Operating platforms with workovers and well stimulation on Albatross Basin.
Marine Trasnportation [port area]	N/A	Supply boats transporting materials to platforms on the Albatross Basin.

TABLE 4.17 (continued)

Onshore Service Base	N/A	Shore base supplying boats and platforms on the Albatross Basin with tubular materials, fuel, water, mud, cement, food and **other** cargo.

Source: Alaska Consultants, Inc. April 1979.

TABLE 4.18

KODIAK POPULATION AND EMPLOYMENT PROJECTIONS,
A COMPARISON OF THE BASE CASE AND THE MEAN FIND CASE

Year	Population Base Case	Population Mean Case	Employment Base Case	Employment Mean Case	Change from the Base Case: Absolute Change Population	Absolute Change Employment	Percentage in Population	Percentage in employment
1981	7782	7804	6694	6705	22	11	0.28	0.16
1982	8317	8339	7028	7039	?2	11	0.26	0.16
1983	8876	8888	7377	7383	12	6	0.14	0.08
1984	9500	10063	7765	7812	563	47	5*93	0.61
1985	10046	10112	8100	8133	66	33	0.66	0.41
1986	10498	10596	8373	8422	98	49	0.93	0.59
1987	10887	10967	8609	8649	80	40	0.73	0.46
1988	11268	11378	8840	8895	110	55	0.98	0.62
1989	11496	11558	8982	9013	62	31	0.54	0.35
1990	11791	11853	9163	9194	62	31	0.53	0.34
1991	12170	12232	9331	9362	62	31	0.51	0.33
199?	12743	12810	9610	9648	67	38	0.53	0.40
1993	13149	13225	97$9	9827	76	38	0.58	0.39
1994	13517	13593	9944	9982	76	38	0.56	0.38
1995	13879	139’55	10094	101.32	76	38	0.55	0.38
1996	14159	14235	10196	10234	76	38	0.54	0.37
1997	14449	14525	10302	10340	76	38	0.53	0,37
1998	14660	14736	10363	10401	76	38	0.52	0.37
1999	15052	15122	10524	10559	70	35	0.47	0.33
2000	15344	15344	10628	10628	0	0	0	0

The projections of employment and population were prepared by Alaska Consultants, Inc.

TABLE 4.19

SEWARD (WESTERN GULF) POPULATION AND EMPLOYMENT PROJECTIONS,
A COMPARISON OF THE BASE CASE AND THE MEAN FIND CASE

Year	Population		Employment		Change from the Base Case			
					Absolute Change		Percentage in	
	Base Case	Mean Case	Base Case	Mean Case	Population	Employment	Population	Employment
1981	2720	2?72	1184	1210	52	26	1.91	2.20
1982	2764	2816	1204	1230	52	26	1.88	2.16
1983	2846	2872	1262	1274	26	12	0.91	0.95
1984	2964	2964	1337	1337	0	0	0	0
1985	3645	3699	1476	1503	54	27	1.48	1.83
1986	3235	3293	1489	1518	58	29	1.79	1.95
1987	3202	32?0	1523	1532	18	9	0.56	0.59
1988	3320	3332	1594	1600	12	6	0.36	0.38
1989	3686	3686	1789	1789	0	0	0	0
1990	3744	3744	1878	1878	0	0	0	0
1991	3626	3626	1853	1853	o	o	0	o
1992	3539	3539	1845	1845	0	0	0	0
1993	3607	3607	1881	1881	0	0	0	0
1994	3696	3696	1928	1928.	0	0	0	0
1995	3907	3907	1986	1986	0	0	0	0
1996	3923	3923	2046	2046	0	0	0	0
1997	4044	4(-)44	2109	2109	0	0	0	0
1998	4166	4166	2173	2173	0	0	0	0
1999	4294	4294	?240	?240	0	0	0	0
?000	4429	4429	2311	2311	0	0	0	0

The projections of employment and population were prepared by A'laska Consultants, Inc.

TABLE 4.20

Projected OCS Vessel Traffic, Mean Find Case
Western Gulf

Arrivals Per Month

	Supply Boats	Dry Goods Barges	Fuel Tankers	Oil Tankers
Kodiak	0-25	1-2	1-2	0
Seward[1]	11-62	1-2	1-2	0
Albatross Basin	--	--	--	0-2

[1] The vessel traffic into Seward supports OCS activity in both the Northern and Western Gulf.

Source: Peter Eakland and Associates, 1979.

High Find Case, 5 Percent Probability Resource Scenario.

In the high find case, exploration is assumed to begin in 1981 and continue through 1988. The activity, which is first centered in the Middle Albatross Basin and later in the Tugidak Basin, is expected to result in 78 wells and the discovery of four oil fields and three gas fields of commercial value. The exploration activity is at first supported by temporary supply bases in Kodiak and Seward, but later it is supported primarily from a permanent base in Kodiak.

Field development, which is expected to begin in 1984, includes the installation of production platforms and submarine pipelines and the construction of an LNG plant and marine oil terminal at Ugak Bay. The production phase is expected to begin in 1986 and continue beyond 2000. The OCS activities associated with each phase of the hypothesized OCS operations are summarized in Table 4.21.

The projected employment and population impacts in Kodiak are significant in the high find case, once a permanent supply base is established in 1983 (see Table 4.22). The population and employment projections do not include the transient construction workers, who will be housed in temporary onsite construction camps during the construction of the service base, the LNG plant and the marine oil terminal, and during the expansion of the service base.

The projected population and employment impacts in Seward, which are summarized in Table 4.23, indicate that the magnitudes of the impacts will vary during the three phases of OCS activity. The employment impact fluctuates from 22 to 52 new jobs during the early stages of exploration, when the Seward service base is the principal support facility in the Western Gulf, to over 143 new jobs, when the Seward pipe coating yard supports pipe laying operations off Kodiak Island, and. back to under 50 new jobs during the later development and the production phases, when the pipe coating yard is inactive and the Seward service base has a supplemental role as a support facility.

The projections of OCS related vessel traffic are summarized in Table 4.24,

TABLE 4.21

ASSUMPTIONS FOR THE DISTRIBUTION OF EMPLOYMENT AMONG THE COASTAL AREAS OF SEWARD AND KODIAK 5 PERCENT PROBABILITY RESOURCE LEVEL SCENARIO - OIL AND GAS WESTERN GULF OF ALASKA

Phase, Task and Area of Operations	Seward	Kodiak
EXPLORATION		
Survey		
Offshore		
Geophysical and Geological Surveying [area of operation]	N/A	Survey vessels conducting geophysical and geological surveys on Albatross and Tugidak Basins outside the Kodiak coastal area.
Onshore		
Service Base	Temporary and later permanent service base providing resupply, communications and a point for crew rotation for vessels surveying Albatross and Tugidak Basins.	N/A
Rigs		
Offshore		
Exploration Well Drilling [area of operation]	N/A	Rigs drilling exploration wells on the Albatross and Tugidak Basins outside the Kodiak coastal area.
Marine Transportation [port area]	Supply/anchor/tug boats transporting materials to rigs, moving rig anchors and towing rigs on the Albatross and Tugidak Basins.	Supply/anchor/tug boats transporting materials to rigs, moving rig anchors and towing rigs on the Albatross and Tugidak Basins.

TABLE 4.21 (continued)

Onshore Service Base	Shore base supplying rigs and boats on Albatross and Tugidak Basins with tubular materials, fuel, water, mud, cement, food and other cargo.	Shore base supplying rigs and boats on Albatross and Tugidak Basins with tubular materials, fuel, water, mud, cement, food and other cargo.
Air Transportation	N/A	Helicopter service from Kodiak Airport transporting offshore personnel and small volume, light weight freight to and from rigs on the Albatross and Tugidak Basins.
Construction	N/A	Constructing a permanent service base.
DEVELOPMENT		
Platform Installation		
Offshore Platform Installation [area of operation]	N/A	Locating, installing and commissioning platforms on the Albatross and Tugidak Basins outside the Kodiak coastal area.
Pipeline Construction	N/A	Laying and burying subsea gathering lines and a trunk line from Albatross Basin to the north shore of Ugak Bay.
Marine Transportation [port area]	Supply/anchor/tug boats transporting materials to platforms, lay barges and bury barges. Half of the vessels for the total WGA platform installation will be provided from Seward.	Supply/anchor/tug boats transporting materials to platforms, lay barges and bury barges. Half of the vessels for the total WGA platform installation will be provided from Kodiak.
Onshore Service Base	Shore base supplying boats and platforms with tubular materials, fuel water, food and other cargo. Half of the total effort for platform installation in the WGA will be provided from Seward.	Shore base supply boats and platforms with tubular materials, fuel, water, food and other cargo. Half of the total effort for platform installation in the WGA will be provided from Kodiak.

iABLE 4.21 (continued)

Air Transportation	N/A	Helicopter service at Kodiak Airport transporting offshore personnel and small volume, light weight freight to platforms, lay barges and bury barges on the Albatross Basin.
Construction	Coating of all pipe used in subsea gathering and trunk pipelines at Sews rd.	Constructing onshore pipeline, oil terminal and LNG plant on the north shore of Ugak Bay.
<u>Platforms</u>		
Offshore		
Development Drilling [area of operation]	N/A	Development drilling on platforms the Albatross Basin outside the Kodiak coastal area.
Marine Transportation [port area]	Supply boats transporting materials to platforms on the Albatross and Tugidak Basins.	Supply boats transporting materials to platforms on the Albatross and Tugidak . Basins.
Onshore		
Service Base	Shore base supplying boats and platforms on Albatross and Tugidak Basins with tubular materials, fuel, water, mud, cement, food and other cargo.	Shore base supplying boats and platforms on Albatross and Tugidak Basins -with tubular materials, fuel, water, mud, cement, food and other cargo.
Air Transportation	N/A	Helicopter service at Kodiak Airport transporting offshore personnel and small volume, light weight freight to platforms on Albatross and Tugidak Basins.
PRODUCTION		
<u>Platforms</u>		
Offshore		
Platform Operations [area of opration]	N/A	Operating platforms with workovers and well stimulation on Albatross and Tugidak Basins.

TABLE 4.21 (continued)

Marine Transportation [port area]	Supply boats transporting materials to platforms on the Albatross and Tugidak Basins. One third of the Albatross and Tugidak Basins effort will be provided from Seward.	Supply boats transporting materials to platforms on the Albatross and Tugidak Basins. Two thirds of the effort on the Albatross and Tugidak Basins will be provided from Kodiak.
Onshore Service Base	Shore base providing one third the effort in supplying boats and platforms on the Albatross and Tugidak Basins with tubular materials, fuel, water, mud, cement, food and other cargo.	Shore base providing two thirds the effort in supplying boats and platforms on the Albatross and Tugidak Basins with tubular materials, fuel, water, mud, cement, food and other cargo.
Oil Terminal and LNG Plant Operations	N/A	Operating oil terminal and LNG plant on the north side of Ugak Bay processing oil and gas from Albatross Basin.

Source: Alaska Consultants, Inc. March 1979.

TABLE 4.22

KODIAK POPULATION AND EMPLOYMENT PROJECTIONS,
A COMPARISON OF THE BASE CASE AND THE HIGH FIND CASE

	Population		Employment		Change from the Base Case			
					Absolute Change		Percentage in	
Year	Base Case	High Case	Base Case	High Case	Population	Employment	Population	Employment
1981	7782	7802	6694	6704	20	10	0.26	0.15
1982	8317	8361	7028	7050	44	22	0.53	0.31
1983	8876	9688	7377	7455	812	78	9.15	1.06
1984	9500	10753	7765	7905	1253	140	13.19	1.80
1985	10046	11365	8100	8305	1319	205	13*13	2.53
1986	10498	11309	8373	8616	811	243	7.73	2.90
1987	10R87	12070	8609	8907	1183	298	10.87	3.46
1988	11268	12573	8840	9449	1305	609	11.58	6.89
1989	11496	12792	8982	9630	1296	648	11.27	7.21
1990	11791	13093	9163	9814	1302	651	11.04	7.10
1991	12170	13440	9331	9966	1270	635	10.44	6.81
1992	12743	13993	9610	10235	1250	625	9.81	6.50
1993	13149	14361	9789	10395	1212	606	9.22	6.19
1994	13517	14745	9944	10558	12?8	614	9.08	6.17
1995	13879	15123	10094	10716	1244	622	8.96	6.16
1996	14159	15419	10196	108?6	1260	630	8.90	6.18
1997	14449	15709	10302	10932	1260	630	8.72	6.12
1998	14660	15920	10363	10993	1260	630	8.59	6.08
1999	15052	16312	10524	11154	1260	630	8.37	5.99
2000	15344	16604	10628	11258	1.260	630	8.21	5.93

The projections. of employment and population were prepared by Alaska Consultants, Inc.

TABLE 4.23

SEWARD (WESTERN. GULF) POPULATION AND EMPLOYMENT PROJECTIONS,
A COMPARISON OF THE BASE CASE AND THE HIGH FIND CASE

	Population		Employment		Change from the Base Case			
					Absolute Change		Percentage in	
Year	Base Case	High Case	Base Case	High Case	Population	Employment	Population	Employment
1981	2720	2764	1184	1206	44	22	1.62	1.86
1982	2764	2868	1204	1256	104	52	3.76	4.32
1983	2846	2950	1262	1314	104	52	3.65	4.12
1984	2964	3184	1337	1447	220	110	7.42	8.23
1985	3645	3960	1476	1619	315	143	8.64	9.69
1986	3235	3470	1489	1599	235	110	7.26	7.39
1987	3202	3497	1523	1656	295	133	9.21	8.73
1988	3320	3579	1594	1716	259	122	7.80	7.65
1989	3686	3916	1789	1904	230	115	6.24	6.43
1990	3744	3940	1878	1976	196	98	5.24	5.22
1991	3626	3762	1853	1921	136	68	3.75	3.67
1992	3539	3655	1845	1903	116	58	3.28	3.14
1993	3607	3705	1881	1930	98	49	2.72	2*60
1994	3696	3792	1928	1976	96	48	2.60	2.49
1995	3907	4003	1986	2034	96	48	2.46	2.4?
1996	3923	4019	2046	2094	96	48	2.45	2.35
1.997	4044	4140	2109	2157	96	4a	2.37	2.28
1998	4166	4262	2173	2221	96	48	2.30	2.21
1999	4294	4390	2240	2288	96	48	2.24	2.14
2000	4429	4525	?311	2359	96	48	2.17	2.08

The projections of employment and population were prepared by Alaska Consultants, Inc.

TABLE 4.24

Projected OCS Vessel Traffic,
High Find Case, Western Gulf

Arrivals Per Month

	Supply Boats	Dry Goods Barges	Fuel Tankers	Oil Tankers and LNG Ships
Kodiak	5-101	1-5	1-7	---
Seward[1]	7-144	1-7	1-10	---
Ugak Bay				0-12
Tugidak Basin				0-2

[1] Vessel traffic into Seward supports OCS activity in both the Northern Gulf and Western Gulf.

Source: Peter Eakland and Associates, 1979.

Using Past Interactions Between the Offshore Petroleum and Commercial Fishing Industries and Economic Analyses to Identify Potential Impacts

In the following sections, past experiences of interactions between the offshore petroleum and commercial fishing industries and economic analyses are used to identify the impacts that may result as these two industries compete for labor, ocean space use, and the services of the infrastructure of the coastal communities.

COMPETITION FOR LABOR

The commercial fishing industry is the largest employer in Kodiak, Seward, Cordova, and Yakutat, and its labor requirements are projected to increase in each of these communities as the traditional fisheries continue to expand and as a domestic groundfish industry develops. The question to be addressed in this section is, can the labor requirements of the commercial fishing industry be met as the OCS industry develops and becomes a major employer? The answer to this question will be determined by a number of factors including:

- the skill requirements of both industries
- wage differentials between the industries
- the hiring practices of both industries
- the sources of labor that are available to each industry
- the effect of OCS activity on the supply of labor in each community.

Skill Requirements

Differences in skill requirements tend to limit the competition for labor between two industries; an analysis of the skill requirements of the two industries can, therefore, be used to begin to determine for which types of labor the industries will compete. Typically, the skill requirements are sufficiently different to limit competition. For example, the offshore OCS operations require highly specialized labor, and the OCS supply boats are manned by licensed officers and crews with seaman's papers. Conversely, the seafood processing requires a large number of unskilled workers, and fishing boats are typically manned by individuals who are not licensed officers or do not have seaman's papers. Therefore, the offshore labor requirements of the OCS industry tend not to compete with either the harvesting or processing labor requirements of the fishing industry.

The OCS requirements for onshore labor, particularly for construction projects, can, however, compete directly with the labor requirements of the fishing industry since the skill requirements for many onshore jobs are minimal and can be met by many of those who are employed in the fishing industry. In terms of skill requirements, the OCS industry can also compete with the fishing industry for more skilled workers such as foremen and mechanics.

Wage Differentials

For the types of labor for which there is direct competition between the two industries, the effect of the competition on the fishing industry's ability to meet its labor requirements will be affected by the wage differential between the two industries. For example, the hourly wage in seafood processing is expected to be substantially below the hourly wage in construction; "therefore, to the extent that both can utilize unskilled labor, the onshore construction projects can provide effective and, therefore, potentially adverse competition. Conversely, the equivalent of an hourly wage in the harvesting sector is expected to exceed the hourly construction wage; therefore, the OCS construction labor requirements are expected to effectively compete with harvesting labor requirements although many fishermen are aptly qualified to work in construction.

Hiring Practices

The hiring practices of an industry also influence the degree to which it provides effective competition for particular types of labor. The hiring practices of the OCS industry will tend to limit the competition for labor. The industry consists of oil companies and service companies that participate in petroleum development on a global scale. As the activity of the industry begins in a new area, petroleum industry workers from other areas are brought in; therefore, the points of entry into the industry are typically not a new area of industry activity. A major exception to this hiring practice would include hiring for large onshore construction projects. For such projects, a large number of workers who are new to the industry are employed. This does not, however, mean that such workers will be hired locally. If local hiring halls of the construction unions do not exist or are not used, the large construction labor requirements may less effectively compete with the labor requirements of the fishing industry. The use of non-local hiring halls limits, but does not eliminate, access to local residents.

The hiring practices in the fishing industry will also tend to reduce the effective competition for labor between the two industries. For example, crews are typically hired in the home port of a fishing boat or its skipper; therefore, non-local boats do not draw heavily on the local labor force. The hiring of some processing plant employees also occurs in part at distant locations. For example, processing plants recruit students on college campuses in Alaska and in the Pacific Northwest and recruit nonstudents from the Seattle and Anchorage areas. Effective competition will also be reduced by the use of family members to crew fishing boats. Family crew members have close ties to a fishery and in many cases are too young to be employed elsewhere or have little interest in alternative employment opportunities.

Source of Labor

The source of labor and hiring practices are closely related; they both affect the effectiveness of the competition for labor generated by the OCS industry by differentiating between the labor pools from which each industry hires. The analysis presented under hiring practices is, therefore, applicable to this section. A factor which is more appropriately discussed in this section is the nature of employment in the two industries and, thus, the type of worker each attracts.

Many individuals are attracted to the fishing industry because being a fisherman results in a lifestyle that could not otherwise be enjoyed. To the extent that fishermen are tied to the non-monetary rewards of that lifestyle, they are not part of the labor pool in which other industries readily compete.

A less romantic distinction can be drawn between part of the unskilled labor force available to fish processing plants and OCS onshore construction projects. Seafood processing plants have had a much higher propensity to hire women, students, minorities, and transients that have construction contractors; therefore, the major source of labor in seafood processing has not been considered part of the labor pool for construction. This is no doubt explained by the preferences of these employees as well as those of prospective employers; that is, those who work in processing plants may do so in part because they prefer such employment to construction employment and in part because the employment opportunities in construction may be limited due to the desire of contractors to hire from their traditional labor pools. To the degree that some processing plant workers remain in a distinct labor pool, the labor competition of the OCS industry will be less effective in attracting the labor which has traditionally been available to processing plants.

An additional aspect of the source of labor that determines the impact of labor competition is the size of the labor pool the fishing industry can utilize. If an almost inexhaustible source of labor is available, the labor requirements of the fishing industry can be met despite large OCS labor requirements. For the traditional summer fisheries, the seafood processing sector of the industry has had access to such a labor pool. The large differential between the minimum and Alaska seafood processing wage and the high seasonal unemployment rates in the United States have resulted in an almost unlimited supply of seasonal workers in Alaska processing plants.

The harvesting sector of the industry also has access to a very large labor pool of prospective fishermen who are attracted to Alaska fisheries. This is demonstrated by the large number of letters fishing boat owners receive from such individuals and the ability of a competent skipper to turn such individuals into productive fishermen during one season,

Effects of OCS Activity on the Supply of Labor

The OCS labor requirements can adversely or beneficially impact the fishing industry. If the increase in labor demand due to OCS activity is greater than the increase in labor supply due to OCS activity, less labor is available for the fishing industry and the impact is detrimental. However, if the OCS activity results in the labor supply increasing more rapidly than demand, more labor is available for the fishing industry and the impact is beneficial.

In the preceding sections, economic analysis is used to delineate factors that will tend to determine the impact of competition for labor. The proceeding sections provide additional insight into the nature of potential impacts by reviewing the impacts that have occurred in the past.

Cook Inlet 1961-1968

The petroleum development which occurred in the Upper Cook Inlet between 1961 and 1968 provides an opportunity to measure the extent to which such competition existed and affected the processing sector of the commercial fishing industry. The experience in Cook Inlet is particularly useful in measuring the potential impact of high levels of OCS onshore employment because the development there was at first exclusively on-shore and included the construction of several oil and gas processing plants.

The Cook Inlet and Alaska oil boom began with the Swanson River strike of 1957. Onshore production began in 1959; offshore production did not, however, begin until 1965. Between 1961 and 1968 the petroleum development activities included: (1) the exploration for and/or development of six oil fields and 15 natural gas fields; (2) the construction of an 82-mile gas pipeline to connect the Kenai field with the Anchorage area; construction began in 1969; (3) the construction of marine terminal facilities at Port Nikiski, completed in 1961; (4) the construction of the Standard Oil Company's refinery in 1962 and 1963; (5) the construction of offshore platforms, the first being completed in 1964; (6) the construction of pipelines connecting the offshore fields with on-shore facilities; (7) the construction of the Collier Carbon and Chemical Corp. ammonia plant, and the Collier Carbon and Chemical Corp. and Japan Gas-Chemical Co. urea plant; (8) the initiation of construction of the Phillips Petroleum Co. and Marathon Oil Co. liquified natural gas plant and the Alaskan Oil and Refining Co. refinery; and (9) the construction in 1961 of a 42 mile pipeline from Granite Point to the Drift River marine terminal and storage facilities which were completed the same year. This brief overview of the development which occurred between 1961 and 1968 is based on material in A Social and Economic Impact Study ofOff-Shore Petroleum and Natural Gas in Alaska.

Employment data are not available for fish processing or the petroleum industry, but are available for groupings of industries which are dominated by one or the other. Employment related to the petroleum industry dominated mining and construction employment during the 1960s and fish processing was the principal source of employment in manufacturing. The employment in the former two sectors is, therefore, used as a proxy for employment in the petroleum industry, including petroleum-related construction. And manufacturing employment, minus an estimate of employment in the manufacturing of petroleum products, is used to represent fish processing employment.

A quick review of the employment, work force, and salmon harvest statistics presented in Table 4.25 indicates that the rate of increase in the labor force was sufficient to meet the growing employment requirements of the petroleum industry without adversely affecting employment in manufacturing. A more rigorous demonstration of the lack of an adverse effect is provided by the results of the following regression equations:

4.1 $EM = 91.45 - 0.00156\ CIS + 0.00312\ RCS + 0.159\ EC$ $\quad R^2 = 0.829 \quad D\text{-}W = 1.51$
t-statistics (-0.34) (2.00) (3.07)

4.2 $EM = 65.60 - 0.00242\ CIS + 0.00348\ RCS + 0.102\ EMC$ $\quad R^2 = 0.858 \quad D\text{-}W = 1.09$
t-statistics (-0.56) (2.36) (3.48)

4.3 $EM = -95.61 - 0.00355\ CIS + 0.00342\ RCS + 0.0612\ WF$ $\quad R^2 = 0.899 \quad D\text{-}W = 2.37$
t-statistics (-0.95) (2.84) (4.32)

where

EM = third quarter employment in manufacturing, excluding petroleum products: this is predominantly fish processing;

CIS = Cook Inlet salmon harvest in 1,000 pounds;

RCS = rest of Central Alaska salmon harvest;

EC = third quarter construction employment;

EMC = third quarter mining and construction employment;

WF = third quarter total civilian work force; the employment and work force statistics are for the Kenai - Cook Inlet labor market.

Equations 4.1 and 4.2 are used to test the hypothesis that increases in construction employment or increases in construction and mining employment, respectively, were at the expense of fish processing employment. The coefficients of EC and EMC are not, however, negative; they are significant

TABLE 4.25

UPPER COOK INLET COMMERCIAL FISHING AND PETROLEUM INDUSTRY STATISTICS 1961-1968

	Employment (number of persons)						Salmon Catch (1,000 lbs)	
Year	Mining	Construction	Mining & Construction	Manufacturing Excluding Petroleum Products[2]	Total Employment	Working Force	Cook Inlet	Remainder of Central Alaska
1961	156	68	224	227	2,585	2,838	11,692	65,263
1962	219	149	368	286	3,477	3,724	34,133	110,709
1963	150	154	304	348	3,307	3,664	11,544	81,711
1964	233	182	415	511	3,551	3,807	25,140	121,249
1965	255	479	734	331	4,175	4,462	14,119	59,109
1966	458	582	1,040	447	5,160	5,537	27,393	89,252
1967	1,122	1,266	2,388	426	6,362	6,768	14,616	33,023
1968	1,183	1,800	2,983	544	7,985	8,136	29,004	82,823

1 Third quarter employment July - August.

2 Manufacturing employment minus the employment at the Standard Oil Company refinery, the later was provided by a representative of the Standard Oil Company.

Sources: Catch and Production, ADF&G 1961-1968
Statistical Quarterly and Workforce Estimates by Area, Employment and Security Division, Alaska Department of Labor 1961-1968

and positive which indicates that the hypothesis can be rejected with a high degree of confidence. The results of equation 4.3 provide an explanation of why the increased petroleum employment was not detrimental , to fish processing. The coefficient of WF is positive and highly significant indicating that manufacturing (fish processing) employment increased as the work force increased. The increases in work force were primarily due to increased petroleum industry employment.

Commercial fishing industry sources associated with fish processing on the Kenai Peninsula during the period under investigation have also indicated that the supply of labor for processing plants was not adversely affected by the petroleum industry. Fred McGill of Kenai Packers and Vance Sutter of Whitney-Fidalgo, who held management positions in Kenai fish processing plants during the period of the Kenai oil boom, provided the following assessment of the impacts of the labor requirements of the petroleum industry. Petroleum industry activity did not adversely affect the supply of labor for fish processing because the fish processing labor force was dominated by students and women, for whom the petroleum industry offered limited employment opportunities, and because many of the petroleum related jobs were taken by people who were attracted to the area by the petroleum industry. Skilled workers in the fish processing plants were not hired away by the petroleum industry; this may in part be due to the petroleum industry's desire to be a good neighbor and cause as little conflict with existing industries as possible. Fish processing wages did not increase significantly as a result of the petroleumindustry's demand for labor. This is no doubt due to the fact that these two industries drew from distinct labor pools.

The North Slope

The petroleum development activities associated with Prudhoe Bay provide another opportunity to determine whether the labor force can increase rapidly enough to meet the violatile labor requirements of the petroleum industry, without decreasing the quantity of labor available to other industries. As the data in Table 4.26 indicate, there was a dramatic increase in construction and total employment in 1974. Much of this was due to the large construction projects associated with the development of the Prudhoe Bay oil field.

TABLE 4.26

ALASKA EMPLOYMENT AND WORK FORCE STATISTICS 1970 - 1977

Year	Contract Construction Employment	Total Civilian Employment	Total Civilian Work Force	Unemployment	Unemployment Rate Alaska	Unemployment Rate Us.
1970	6,893	99,000	109,000	10,000	9.1	4.9
1971	7,443	104,000	116,000	12,000	10.6	5.9
1972	7,893	110,000	123,000	13,000	10.6	5.6
1973	7,838	116,000	130,000	14,000	10.8	4.9
1974	14,066	134,000	149,000	15,000	10.2	5.6
1975	25,876	165,000	180,000	15,000	8.2	8.5
1976	30,233	176,000	195,000	19,000	9.7	7.7
1977	19,546	132,000	150,000	18,000	12.2	7.0

Sources: Alaska Department of Labor Statistical Quarterly 1970-1977, Federal Reserve Bank of San Francisco, Western Economic Indicators, November/ December 1978.

Although the construction of the Trans Alaska Pipeline, the production facilities at Prudhoe Bay, and the marine terminal and storage facilities at Valdez directly and indirectly generated phenomenal increases in employment, the increases in employment were more than matched by increases in the size of the work force. The unemployment rate was lower during the peak years of construction (1975 and 1976) than it had been in the previous four years, but it remained high by U.S. standards and the number of unemployed actually increased.

The data for both Cook Inlet and the North Slope suggest that large increases in the demand for labor due to petroleum development activity can be more than met by increases in the work force. This does not imply that increased employment opportunities in the petroleum industry have not caused shortages in the supply of specific types of labor, but it does suggest that the total supply of labor tends to increase more rapidly than the total demand. There will, therefore, tend to be an excess supply of workers who are, at least temporarily, part of the pool of unskilled labor, and this is the major source of labor for fish processing.

North Sea

The experience of Scotland's commercial fishing industry, relative to petroleum development in the North Sea, can be used to determine the extent to which the large labor requirements of the petroleum industry can adversely affect the fishing industry. In this section, the Scottish experience, as outlined by John Sevy in Technical Report Number 28, is so used.

The Scottish experience reaffirms the belief stated previously that, to the extent that labor requirements of the petroleum industry adversely affect the commercial fishing industry, it is the processing sector, not the harvesting sector, that is affected.

Sevy cites several references to the impact of petroleum development on fish processing employment, A brief summary of these citations and their applicability to the Gulf of Alaska is as follows. George Hunter has noted a decline in fish processing employment on the Shetland Islands, which he attributes to the higher job security offered by oil-related firms, Whether fish processing workers are paid an hourly wage, as they are in Alaska, or on a piece rate basis as Sevy indicates they are in Shetland, the irregularity of landings and resulting irregularity in hours worked per week or month does decrease income and job security. However, in Alaska the peak season for fish processing, and the period in which income and job security are the highest for fish processing workers are during the summer; so when the OCS demand for construction workers is at its height, there will typically be high job security in fish processing. The lack of job security in fish processing may, therefore, be less important in Alaska than Hunter suggests it was in Shetland. The seasonality of fish processing employment in Alaska and the degree of job security can be measured by dividing monthly employment by the average monthly employment for a year as a whole. When this is done using 1978 food processing employment data, the quotient for October through May ranges from 0.58 to 0.91 and the quotient for June through September ranges from 1.23 to 1.89. The implication is that fish processing employment is highly, although not exclusively, concentrated in the summer months. Hunter does not qualify the reduction in fish processing employment due to petroleum development, and Sevy provides a possible explanation why he does not; British employment statistics do not distinguish between fish processing and meat processing and the harvesting sector of the commercial fishing industry had been declining. It is, therefore, difficult to measure the decline in fish processing employment and even more difficult to determine what part of the decline was due to petroleum development.

Mackay agrees with Hunter that any adverse affects of the increased competition for labor have been concentrated on fish processing, not harvesting; he notes that less than 0.3 percent of the Shetland fishermen have taken employment directly related to the petroleum industry. Mackay indicates that the competition for labor is not only concentrated in fish processing, but within fish processing it has been focused on the skilled workers such as machine maintenance personnel. The competition for unskilled workers has had less effect because the unskilled employment in fish processing is female-intensive. The unskilled labor in Alaska fish processing can be characterized as highly transient and female-intensive; therefore, skilled fish processing workers are perhaps also more likely to be poached in Alaska, as Mackay suggests they are in the Shetlands. However, the access that most Alaska processors have to pools of skilled labor in the Pacific Northwest and the rest of the country should reduce the adverse affects of competition for skilled labor. It should be noted that Scottish fish processing plants had access to skilled labor in that there was high unemployment of both skilled and unskilled labor throughout much of Scotland; however, Scottish plants were apparently much less accustomed to accessing distant pools of labor than are Alaskan plants which are often managed from the Seattle area.

Mackay and Marr report that competition for labor was also concentrated on skilled labor in the Peterhead area. Steel indicates that, excluding fishermen, commercial fishing industry employment decreased by 20 percent in the Peterhead area between 1972 and 1976, but that only a negligible change occurred in Shetland. He does not, however, allocate the change to particular causes.

Perhaps what is best documented about impacts on the commercial fishing industry of the competition for labor generated by petroleum industry activity, as well as the other interactions between the petroleum and commercial fishing industries, is that the impacts and/or interactions "are not well documented.

COMPETITION FOR OCEAN SPACE

The use of ocean space by the OCS industry will prevent fishing in some areas and will make fishing more costly in others. The objective of this section is to discuss the characteristics of the OCS industry use of ocean space that lead to this conclusion, the nature of these costs, and how these costs may potentially impact a fishery.

Offshore structures such as drilling and production platforms will prevent fishing in some areas, however, unless the number of such structures is extremely large, the proportion of a fishing ground that is lost due to such structures will be insignificant. And unless the target species is sedentary or attracted to such structures, the decrease in catch will be less than proportionate with the loss in fishing areas. The species under consideration are not sedentary. There is not sufficient biological information to determine the extent to which various species will be attracted to each structure.

In addition to preempting an area within a fishing ground, an offshore structure can also increase the cost of fishing in the remaining areas. The increased costs can occur because the structure prevents the most efficient use of the remainder of the fishing ground or because of navigational hazards posed by the structure. The former can occur in a fishery which utilizes non-fixed gear such as trawls or long-lines. The latter can occur despite the fact that the positions of such structures are reported in Notices to Mariners and despite the fact that their presence is discernible from some distance by day or night. The cost associated with the navigational hazards such structures pose appears to be quite low since Coast Guard accident data indicate that collisions with such structures are infrequent, even in areas where there are a large number of such structures. This cost may, in fact, be offset by the navigational aid that such structures provide.

Submarine pipelines will preempt fishing grounds if fishing is prohibited in sections of the pipeline corridor. They will tend to make fishing more costly in the portion of the corridor in which fishing is permitted unless the pipe is buried and remains buried and no debris is left on the seafloor after the pipe laying and burying operations. Past experiences indicate that neither condition will be met; therefore, submarine pipelines are expected to increase the cost of harvesting activities.

Additional fishing costs would include gear losses due to undersea obstacles associated with the pipeline, the cost associated with less efficient fishing patterns in non-fixed gear fisheries resulting from the position of the pipeline, and other costs incurred in avoiding pipeline-related gear losses. The avoidance costs could include the cost of additional onboard electronics that will allow a vessel to more readily avoid gear losses along the pipeline corridor, or the additional cost of fishing in a "less productive area if the pipeline corridor is through a highly productive fishing area and, to avoid gear losses, less productive areas must be fished.

It is not known how a submarine pipeline will affect biological relationships in each fishery; therefore, any discussion of a pipeline attracting fish and thus concentrating them in an area in which they can easily be caught, or not caught at all, is highly speculative. The same is true ' for other offshore structures.

Vessel traffic generated by OCS activity will also use areas of ocean space within fishing grounds. These vessels include supply boats, exploration rigs, survey vessels, barges used in the construction of submarine pipelines, barges and tankers used to deliver the materials needed for OCS operations, production platforms prior to installation, the tankers and LNG ships that will deliver the Gulf of Alaska oil and gas to markets elsewhere in the United States, and additional commercial traffic resulting from the population impacts of OCS activities. This additional vessel traffic will increase the cost of fishing. These costs will include the costs of gear losses and collisions that occur because of OCS generated marine traffic, and the costs incurred by fishermen in attempting to reduce the probability of such gear losses and collisions. The latter can include the cost of additional navigation equipment and the cost associated with having such marine traffic determine the areas fished.

Coast Guard marine accident data indicate that the number of collisions between fishing boats and the OCS generated marine traffic will probably be very small. Fishing vessels have been fairly successful in avoiding each other and other marine traffic in Alaska, and also in areas where the volume of traffic is much greater and more concentrated than it is expected to be in the Gulf of Alaska during this century. The sophisticated navigation equipment on many fishing boats and vessels associated with OCS activity, good seamanship, and good fortune greatly reduce, but do not eliminate; the probability of collisions.

East Coast fishermen report that they bear the cost of collision and gear loss avoidance; they indicate that supply boats, which comprise the bulk of the OCS marine traffic, often ignore the right-of-way of fishing boats, run through fishing grounds on automatic pilot, and consider it the fishermen’s fault when fishermen do not do what the supply boat tells them to do (National Fisherman, October, 1975, p. B.3). Even under more ideal conditions, gear losses are expected to occur. The potential for gear loss is greater for fixed gear fisheries than for non-fixed gear fisheries, since fixed gear such as crab pots and long lines are left unattended.

There are two gear loss problems associated with fixed and unattended gear; its presence is marked by a buoy that is much more difficult to observe visually or on radar than a fishing boat and, when it is lost, the cause of the loss is not known. Therefore, it is difficult for a fisherman to gain compensation for his gear losses. The crab and shrimp pot fishermen are more susceptible to gear losses than are halibut long-liners because the concentration of pot gear in some areas greatly increases the probability of gear losses when any OCS marine traffic enters the area. The necessity to completely avoid an area of pot gear to avoid gear losses is evidenced by the successful efforts of West Coast crab fishermen and tug boat operators to all but eliminate what were once substantial gear losses. This was accomplished by identifying routes that the tugs and barges could use to avoid areas of heavy pot concentrations. Halibut longline gear, which can extend for several miles and is marked only at the buoyed ends, is more vulnerable to vessels that have an exceptional draft or are dragging gear. Survey vessels are among those for which such gear provides a large but unobservable target.

Non-fixed gear such as trawls, purse seines, and dredges is continuously monitored by and is in the relative proximity of the fishing boat; therefore, gear losses to marine traffic are more readily avoided than for fixed gear. However, the size of the gear and the lack of maneuverability of a vessel using such gear can result in gear losses to marine traffic under adverse conditions. The greatest source of gear losses to non-fixed gear is, however, expected to result not from marine traffic but from debris that results from marine traffic and other submarine obstacles that result from OCS activity.

Debris on the seafloor has been a problem in areas of offshore petroleum development despite prohibitions on intentional dumping and despite regulations requiring that the location of unintentional dumpings be reported. Evidence from the North Sea, Upper Cook Inlet, and the Gulf of Mexico suggests that the OCS debris problem can be reduced but not eliminated. Therefore, gear losses will occur because of debris that results from OCS operations and the cost of such losses in many cases will be borne by the fishermen since it is in many instances difficult to determine whether it was, in fact, OCS debris that caused the loss.

The ability of a single undersea obstacle to continuously result in gear losses is demonstrated by a well-head in the Santa Barbara Channel which claimed the gear of five or more vessels over a period of several years before it was removed (National Fisherman, January, 1979, p. 38). There are several factors which make even known undersea obstacles hazardous. Fishermen may consider information on undersea obstacles to be proprietary, once they have found it at their own expense (in terms of gear loss and lost fishing time). Also, the exact location of such an obstacle may be difficult to determine, even after gear is lost, and information that the Coast Guard provides on the location of known obstacles is not in a form most readily usable by fishermen. The last problem existed in the Santa Barbara Channel because fishermen used loran A or C for navigation, but the location of obstacles as provided by the Coast Guard was in terms of latitude and longitude. An additional problem was that oil companies used the Lambert Grid system, which is different from the systems used by either the fishermen or the Coast Guard (National Fisherman, January, 1979).

If OCS uses of ocean space increase the cost of fishing, and if the fishermen cannot typically be compensated by the OCS industry because of the physical, legal, and theoretical difficulties associated with identifying the party responsible or the magnitude of the increased costs, the relevant question is, how will the increased costs affect harvesting activity? The answer to this question is less obvious than it is relevant.

If the binding constraint on harvesting activity is resource abundance and the subsequent quota, there is a margin within which costs can increase without causing harvesting activity to decline. In such a fishery, the sole effect of a cost increase within that margin would be a decrease in net income to the fishermen and/or boat owner. If entry into such a fishery is limited, the additional fishing costs would tend to reduce the value of the limited entry permit; in this case the burden of increased fishing costs is borne by those who own permits at the time when it is generally recognized that the cost of fishing will be higher due to OCS operations. New entrants into the fishery would not bear the higher costs if the price of the entry permit accurately reflects the increases in fishing cost that will result from such operations. It should also be noted that the margin within which costs can increase without reducing harvesting activity will tend to be larger for the limited entry fisheries, since much of the adjustment can occur through a decrease in the price of the limited entry permit.

Since costs and productivity vary among boats in any one fishery, the margins within which costs can increase without affecting harvesting varies. The least efficient boats will be the first to decrease harvesting effort, and as they do so, the harvesting activity of the more efficient boats will tend to increase as long as resource abundance ‘remains the binding constraint for the fishery as a whole. In this case, the number of boats and fishermen participating in a fishery will be reduced but catch will not change, and the net income of fishermen and/or boat owners may increase. If the increase in costs due to OCS operation is less than the decrease in cost that occurs as fishing effort becomes concentrated among the more efficient boats and fishermen, net income will increase.

If market conditions impose the binding constraint, an increase in fishing costs will result in a decrease in harvesting effort unless ex-vessel prices are increased to compensate fishermen for the additional costs. However, since seafood products are quite mobile between areas and, therefore, tend to compete interregionally prior to processing, and since processed forms from different regions compete in the same markets, large ex-vessel price differentials are not possible. Small ex-vessel price differentials are possible and may be sufficient to compensate fishermen for increased costs.

If ex-vessel prices are not increased to compensate fishermen, harvesting activity will decrease. The least efficient boats would be the first to reduce their effort and, as they do so, the effort of the remaining boats may increase as the resources per boat increase. It is therefore possible, however unlikely, that the total harvest will not decrease.

It should be noted that replacing the activity of less efficient boats with increased activity among the more efficient boats is beneficial in that it tends to decrease the total cost of the harvest exclusive of gear loss costs; however, it reduces the number of fishermen who are employed in a specific fishery. The decrease in employment is an adverse effect to the extent that unemployed fishermen cannot readily find alternative employment.

If total harvest does decrease as a result of the increase in fishing cost caused by OCS operations, processing activity in the local community will also tend to decrease unless the decrease in harvest is matched by a decrease in sales to non-local processors, or unless the decrease in the harvest available to local processors can be offset by increased imports of fish from other areas.

The conclusions are as follows:

- OCS uses of ocean space will increase the cost of fishing in the areas of joint use.

- The increase in fishing costs may be minimal and not decrease harvesting effort.
- A decrease in harvesting effort may be possible without decreasing catch.
- If catch decreases, local processing activity need not, but probably will, decrease.

COMPETITION FOR THE SERVICES OF THE INFRASTRUCTURE

The OCS industry requirements for the services of the infrastructure of the coastal communities will be substantial. If these requirements cannot be met without decreasing the services that would otherwise be available to, and would be required by, the commercial fishing industry, OCS operations will adversely affect the fishing industry. However, there are economies of scale associated with such services; if the OCS operations result in increases in the supply of these services that meet the OCS requirements, and also increase the supply and/or quality of the services available to the commercial fishing industry, the effect is beneficial. The services that are considered in this report are water, electric power, and port and harbor facilities.

Although the impact of competition for these services will depend upon the rates at which the supply of and demand for each service increase in each community, the general characteristics of the service requirements of the two industries, and past experiences of OCS and fishing industry competition for services, provide some general guidance in determining what the impacts may be. The remainder of this section summarizes information from such experiences in the Upper Cook Inlet and the North Sea, and addresses the characteristics of the requirements. The summary of the Cook Inlet experience is based on information provided by Fred McGill of Kenai Packers and Vance Sutter of Whitney-Fidalgo, each of whom has held a management position in the Cook Inlet fish processing industry since the beginning of the Upper Cook Inlet oil boom. The summary of the North Sea experience is based on material presented by Sevy in Technical Report Number 28.

McGill and Sutter reported that Upper Cook Inlet petroleum development did not adversely affect the supply of public services to the commercial fishing industry. A beneficial impact on the infrasturcture, although not on the supply of public services, was said to be the establishment of businesses which existed to provide specialized services to the petroleum industry but which were also used by the fishing industry. Examples of such businesses or services would include underwater welding and marine electronics repair.

For the services for which the two industries will tend to compete, the impact 'will be determined by the rates of increase in the supply of and demand for these services as a result of OCS operations, and by the ability of the fishing industry to find alternative inputs if the changes in supply and demand are adverse. For other services, the characteristics and/or practices of the two industries will reduce or eliminate competition. The ability of the fishing industry to adapt when confronted with a lack of services and the factors that reduce comeptition are discussed below.

The commercial fishing industry has demonstrated a remarkable ability to survive and make do when “required” services are not available. An example of this is the fishing industry that continues to expand in Dutch Harbor/Unalaska despite the fact that adequate water, electric power, and port or harbor facilities are not provided by the community. When such services were not provided, the fishing industry has been capable of providing its own sources of services. Processing plants use diesel generators to produce their own electric power; and since many communities also use this high-cost method, the cost differential of generating their own electric power is minimal. Wells can often be drilled when the municipal water system is inadequate, and freighters with self-contained cargo handling equipment can be used when only minimal port facilities are available. The height to which self-sufficiency can be taken is demonstrated by the completely self-contained processing barges which have recently been built. The barges can receive fish on the fishing grounds directly from fishing boats, process the fish using workers who are hired for the duration of the season and who live onboard, and load the processed fish directly onto ships or barges bound for markets in Seattle or Japan.

The characteristics of the water and electric power required by the two industries are quite similar; therefore, their requirements will tend to be competitive. However, their requirements for port and harbor facilities are sufficiently diverse to greatly reduce the effective competition of the OCS service requirements. The small boat harbors that provide moorage facilities for most commerical fishing boats in the Gulf of Alaska are not designed to accommodate vessels as large as the smallest

OCS vessels; these vessels will therefore not compete for moorage in the small boat harbors. However, there are two reasons why competition for moorage space will occur outside the small boat harbors until OCS vessels use only facilities that are built for their exclusive use. The reasons are that the small boat harbors are not large enough to provide moorage for all the fishing boats seeking it, nor are they large enough to service the larger fishing boats that are becoming more numerous. There vessels tie up wherever possible and, in many cases, temporarily use the facilities that will be used by OCS vessels before their own facilities are available.

The desire of the OCS industry to have facilities dedicated to OCS vessels in order to assure that the facilities are available when required, once it becomes apparent that a community will be the site of field development support activities, will climate the competition between fishing boast and OCS boats for moorage space. However, this may also preclude the benefit to be had from development of a harbor facility that could both serve the OCS industry and provide better service to the fishing industry than is currently available from the small boat harbors. The OCS harbor requirements could provide the impetus necessary for construction of a more adequate facility. It should be noted that the' larger fishing boats are quite similar in dimension to OCS supply boats and, as is mentioned in Appendix B, the Alaska fishing fleet includes several vessels that were originally OCS supply boats or were built using the basic design of such boats.

This section has completed the review of past experiences of the interaction between the commercial fishing and OCS industries and the general analysis of the potential impacts OCS operations may have on a commercial fishing industry. In the following section, this information is used, together with the material presented in the first section of this chapter, to discuss the area- and scenario-specific impacts that may occur.

Potential Impacts

The nature of the potential impacts is sufficiently similar for each resource scenario and each commercial fishing industry that they can most efficiently be discussed together by source of impact. The discussion of the potential impacts due respectively to the competition for labor, ocean space use, and infrastructure services is followed by a summary of potential impacts by scenario by commercial fishing industry.

COMPETITION FOR LABOR

The analysis of potential impacts of the competition for labor included a discussion of a number of factors that will tend to moderate this competition and perhaps result in a beneficial impact. These factors, together with the projected magnitude of the OCS labor requirements excluding direct labor requirements for OCS onshore construction projects, and other salient local factors are combined in this section to determine the potential effects of this competition for each resource scenario and each community. The labor requirements for the onshore construction projects are expected to have a minor effect on the fishing industry because the construction work force is assumed to primarily consist of transient workers who will be housed in onsite construction camps, and because the projects are sufficiently large to attract enough labor to an area so that the fishing industry employees which are lost can be replaced with new arrivals. The assumption that construction workers will primarily consist of transients is used in other SESP reports. It is a critical assumption because construction and fish processing use large amounts of relatively unskilled labor and because the wage in construction is expected to be significantly higher than that in fish processing. Therefore, if the construction workers are not primarily transients and if the construction projects do not attract enough labor to an area to meet the construction labor requirements, construction employment would be expected to occur at the expense of processing employment. The experiences of the oil boom in the Upper Cook Inlet and the Trans-Alaska Pipeline cited in an earlier section indicate that large construction projects tend to attract more labor than is required directly or indirectly by such projects.

Low Find Cases

The projected increases in employment in Seward and Cordova resulting from lease sale number 55 and in Kodiak and Seward resulting from lease sale number 46 are minimal; therefore, the impact on the fishing industry is expected to be negligible (see Tables 4.27 through 4.30). The significant employment requirements projected for Yakutat in 1981 and 1982 (see Table 4.31) are probably not sufficient to attract an adequate number of workers to Yakutat; therefore, some of the OCS employment is expected to be at the expense of the harvesting and. processing sectors of the Yakutat commercial fishing industry.

TABLE 4.27

SEWARD (NORTHERN GULF) POPULATION AND EMPLOYMENT PROJECTIONS, A COMPARISON OF THE BASE CASE AND THE LOW FIND CASE

Year	Population		Employment		Change from the Base Case			
					Absolute Change		Percentage in	
	Base Case	Low Case	Base Case	Low Case	Population	Employment	Population	Employment
1981	2696	2736	117.?	1192	40	20	1.48	1.71
1982	2732	2796	1188	1220	64	32	2.34	2.69
1983	2786	2838	1232	1258	52	26	1.87	2.11
1984	2896	2912	1303	1311	16	8	0.55	0.61
1985	3041	3041	1392	1392	0	0	0	0
1996	3052	3052	1422	1422	0	0	0	0
1987	3064	3064	1454	1454	0	0	0	0
1988	3077	3077	1487	1487	0	0	0	0
1989	324.?	3242	1596	1596	0	0	0	0
1990	3384	33R4	1698	1698	0	0	0	0
1991	3416	3416	174/3	1748	0	o	0	0
1992	3449	3449	1800	1800	0	0	0	0
1993	3553	3553	1854	1854	0	0	0	0
1994	3660	3660	1910	1910	0	0	0	0
1995	3771	3771	1968	1968	0	o	0	0
1996	3887	3887	2029	2028	0	0	0	0
1997	4008	4008	2091	2091	0	0	0	0
1998	4130	4130	2155	2155	0	0	0	0
1999	4258	4258	2222	2222	0	0	0	0
2000	4393	4393	2293	2293	0	0	0	0

The projections of employment and population were prepared by Alaska Consultants, Inc.

TABLE 4.28

CORDOVA POPULATION AND EMPLOYMENT PROJECTIONS,
A COMPARISON OF THE BASE CASE AND THE LOW FIND CASE

	Population		Employment		Change from the Base Case			
					Absolute Change		Percentage in	
Year	Base Case	Low Case	Base Case	Low Case	Population	Employment	Population	Employment
1981	3002	3014	1501	1507	12	6	0.40	0.40
1982	3054	3076	1527	1538	22	11	0.72	0.72
1983	3104	3126	1552	1563	22	11	0.71	0.71
1984	3156	3162	1578	1581	6	3	0,19	0.19
1985	3208	3208	1604	1604	0	0	0	0
1986	3264	3264	1632	1632	0	0	0	0
1987	3322	3322	1661	1661	0	0	0	0
1988	3382	3382	1691	1691	0	0	0	0
1989	3440	3440	1720	1720	0	0	0	0
1990	3498	3498	1749	1749	0	0	0	0
1991	3568	3568	1784	1784	0	0	0	0
1992	3642	3642	1821	1821	0	0	0	0
1993	3714	3714	1857	1857	0	0	0	0
1994	3794	3794	1896	1896	0	0	0	0
1995	3872	3872	1936	1936	0	0	0	0
1996	3954	3954	1977	1977	0	0	0	0
1997	4044	4044	2022	2022	0	0	0	0
1998	4130	4130	2065	2065	0	0	0	0
1999	4220	4220	2110	2110	0	0	0	0
2000	4322	4322	2161	2161	0	0	0	0

The projections of employment and population were prepared by Alaska Consultants, Inc.

TABLE 4.29

KODIAK POPULATION AND EMPLOYMENT PROJECTIONS,
A COMPARISON OF THE BASE CASE AND THE LOW FIND CASE

Year	Population		Employment		Change from the Base Case			
					Absolute Change		Percentage in	
	Base Case	Low Case	Base Case	Low Case	Population	Employment	Population	Employment
1981	7782	7814	6694	6712	32	18	0.41	0.27
1982	8317	8349	7028	7044	32	16	0.38	0.23
1983	8876	8888	7377	7363	12	6	0.14	0.08
1984	9500	9500	7765	7765	0	0	0	0
1985	10046	10046	8100	8100	0	0	0	0
1986	10498	10498	R373	8373	0	0	0	0
1907	10887	10887	8609	8609	0	0	0	0
1988	11268	11268	8840	8840	0	0	0	0
1989	11496	11496	8982	8982	0	0	0	0
1990	11791	11791	9163	9163	0	0	0	0
1991	12170	12170	9331	9331	0	0	0	0
1992	12743	12743	9610	9610	0	0	0	0
1993	13149	13149	9789	9789	0	0	0	0
1994	13517	13517	9944	9944	0	0	0	0
1995	13879	13879	10094	10094	0	0	0	0
1996	14159	14159	10196	10196	0	0	0	0
1997	14449	14449	10302	10302	0	0	0	0
1998	14660	14660	10363	10363	0	0	0	0
1999	15052	15052	10524	10524	0	0	0	0
2000	15344	15344	10628	10628	0	0	0	0

The projections of employment and population were prepared by Alaska Consultants, Inc.

TABLE 4.30

SEWARD (WESTERN GULF) POPULATION AND EMPLOYMENT PROJECTIONS,
A COMPARISON OF THE BASE CASE AND THE LOW FIND CASE

Year	Population Base Case	Population Low Case	Employment Base Case	Employment Low Case	Change from the Base Case: Absolute Change: Population	Change from the Base Case: Absolute Change: Employment	Change from the Base Case: Percentage in Population	Change from the Base Case: Percentage in Employment
1981	2720	2796	1184	1222	76	38	2.79	3.21
1982	2?64	2840	1204	1242	76	38	2.75	3.16
1983	2846	2872	1262	1274	26	12	0.91	0.95
1984	2964	2964	1337	1337	0	0	0	0
1985	3645	3645	1476	1476	0	0	0	0
1986	3235	3235	1489	1489	0	0	0	0
1987	3202	3202	1523	1523	0	0	0	0
1988	3320	3320	1594	1594	0	0	0	0
1989	3686	3686	1789	1789	0	0	0	0
1990	3744	3744	1878	1878	0	0	0	0
1991	3626	3626	1853	1853	0	0	0	0
1992	3539	3539	1845	1845	0	0	0	0
1993	3607	3607	1881	1881	0	0	0	0
1994	3696	3696	1928	1928	0	0	0	0
1995	3907	3907	1986	1986	0	0	0	0
1996	3923	39?3	2046	2046	0	0	0	0
1997	4044	4044	2109	2109	0	0	0	0
1998	4166	4166	2173	2173	0	0	0	0
1999	4294	4294	2240	2240	0	0	0	0
2000	4429	4429	2311	2311	0	0	0	0

The projections of employment and population were prepared by Alaska Consultants, Inc.

TABLE 4.31

YAKUTAT POPULATION AND EMPLOYMENT PROJECTIONS.
A comparison OF THE BASE CASE AND THE LOW FIND CASE

	Population		Employment		Change from the Base Case			
					Absolute Change		Percentage in	
Year	Base Case	Low Case	Base Case	Low Case	Population	Employment	Population	Employment
1981	604	708	302	354	104	52	17.22	17.22
1982	622	692	311	346	70	35	11.25	11.25
1983	634	670	343	361	36	18	5.68	5.25
1984	634	642	352	356	8	4	1.26	1.14
1985	639	639	365	365	0	0	0	0
1986	651	651	372	372	0	0	0	0
1987	677	677	387	387	0	0	0	0
1988	693	693	396	396	0	0	0	0
1989	695	695	397	397	0	0	0	0
1990	746	746	439	439	0	0	0	0
1991	765	765	450	450	0	0	0	0
1992	787	787	463	463	0	0	0	0
1993	828	828	473	473	0	0	0	0
1994	847	847	484	484	0	0	0	0
1995	877	877	501	501	0	0	0	0
1996	894	894	511	511	0	0	0	0
1997	902	902	501	501	0	0	0	0
1998	927	9,27	515	515	0	0	0	0
1999	927	927	515	515	0	0	0	0
2000	934	934	519	519	0	0	0	0

The projections of employment and population were prepared by Alaska Consultants, Inc.

Mean Find Cases

The OCS labor requirements in Seward resulting from lease sale No. 55 and/or lease sale No. 46 are not expected to have a significant impact on the Seward commercial fishing industry. With the exception of a few years, the OCS labor requirements are not substantial and/or they are matched by projected increases in population, indicating that the supply of labor will increase to meet the OCS labor requirements (see Tables 4.32 and 4.33).

The OCS labor requirements in Kodiak resulting from lease sale No. 46 are minimal and are not expected to affect the Kodiak commercial fishing industry (see Table 4. 34).

The mean case OCS labor requirements in Cordova resulting from lease sale No. 55 are expected to be too small to affect the Cordova commercial fishing industry prior to the production phase, during which the employees of the Hinchinbrook Island marine oil terminal and LNG plant are assumed to live in Cordova (see Table 4.35). The year in which these employees establish residence in Cordova, the population and employment growth is substantial enough to be disruptive of the local economy. Once 'this growth has been accommodated, the increased population will result in a larger labor force being available to the fishing industry. The availability of a larger year-round labor force will facilitate the development that is projected for the commercial fishing industry.

For Yakutat, the OCS employment requirements are substantial throughout the forecast period; therefore, beyond the first few years of OCS operations

TABLE 4.32

SEWARD (NORTHERN GULF) POPULATION AND EMPLOYMENT PROJECTIONS,
A COMPARISON OF THE BASE CASE AND THE MEAN FIND CASE

	Population		Employment		Change from the Base Case			
					Absolute Change		Percentage in	
Year	Base Case	Mean Case	Base Case	Mean Case	Population	Employment	Population	Employment
1981	2696	2720	1172	1184	24	12	O*8Q	1.02
1982	2732	2764	1188	1204	32	16	1.17	1.35
1983	2786	2846	1232	1262	60	30	2.15	2.44
1984	2896	2964	1303	1337	68	34	2.35	2.61
1985	3041	3209	1392	1476	168	84	5.52	6.03
1986	3052	3186	1422	1489	134	67	4.39	4.71
1987	3064	3202	1454	1523	138	69	4.50	4.75
1988	3077	3291	1487	1594	214	107	6.95	7.20
1989	3242	3628	1596	1789	386	193	11.91	12.09
1990	3384	3744	1698	1878	360	180	10.64	10.60
1991	3416	3626	1748	1853	210	105	6.15	6.01
1992	3449	3539	1800	1845	90	45	2.61	2.50
1993	3553	3607	1854	1881	54	27	1.52	1.46
1994	-3660	3696	1910	1928	36	18	0.98	0.94
1995	3771	3907	1968	1986	136	18	3.61	0.91
1996	3887	3923	2028	2046	36	18	0.93	0.89
1997	4008	4044	2091	2109	36	18	0.90	0.86
199P	4130	4166	2155	2173	36	18	0.87	0.84
1999	4258	4294	2222	2240	36	18	0.85	0.81
2000	4393	4429	7293	2311	36	18	0.82	0.78

The projections of employment and population were prepared by Alaska Consultants, Inc.

TABLE 4.33

SEWARD (WESTERN GULF) POPULATION AND EMPLOYMENT PROJECTIONS,
A COMPARISON OF THE BASE CASE AND THE MEAN FIND CASE

	Population		Employment		Change from the Base Case			
					Absolute Change		Percentage in	
Year	Base Case	Mean Case	Base Case	Mean Case	Population	Employment	Population	Employment
1981	2720	2772	1184	1210	52	26	1.91	2.20
1982	2764	2816	1204	1230	52	26	1.88	2.16
1983	2846	2872	1262	1274	26	12	0.91	0.95
1984	2964	2964	1337	1337	0	0	0	0
1985	3645	3699	1476	1503	54	27	1.48	1.83
1986	3235	3293	1489	1518	58	29	1.79	1*95
1987	3202	32?0	1523	1532	18	9	0.56	0.59
1988	3320	3332	1594	1600	12	6	0.36	0.38
1989	3686	3686	1789	1789	0	0	0	0
1990	3744	3744	1878	1878	0	0	0	0
1991	3626	3626	1853	1853	0	0	0	0
1992	3539	3539	1845	1845	0	0	0	0
1993	3607	3607	1881	1881	0	0	0	0
1994	3696	3696	1928	1928	0	0	0	0
1995	3907	3907	1986	1986	0	0	0	0
1996	3923	3923	2046	2046	0	0	0	0
1997	4044	4(-)44	2109	2109	0	0	0	0
1998	4166	4166	2173	2173	0	0	0	0
1999	4294	4294	2240	2240	0	0	0	0
2000	4429	4429	2311	2311	0	0	0	0

The projections of employment and population were prepared by Alaska Consultants, Inc.

TABLE 4.34

KODIAK POPULATION AND EMPLOYMENT PROJECTIONS,
A COMPARISON OF THE BASE CASE AND THE MEAN FIND CASE

	Population		Employment		Change from the Base Case			
					Absolute Change		Percentage in	
Year	Base Case	Mean Case	Base Case	Mean Case	Population	Employment	Population	Employment
1981	7782	7804	6694	6705	22	11	0.28	0.16
1982	8317	8339	7028	7039	22	11	0.26	0.16
1983	8876	8888	73?7	7383	12	6	0.14	0.08
1984	9500	10063	7765	7812	563	47	5.93	0.61
1985	10046	10112	8100	8133	66	33	0.66	0.41
1986	10498	10596	8373	8422	98	49	0.93	0.59
1987	10887	10967	8609	8649	80	40	0.73	0.46
1988	11268	11378	8840	8895	110	55	0.98	0.62
1989	11496	11558	8982	9013	62	31	0.54	0.35
1990	11791	11853	9163	9194	62	31	0.53	0.34
1991	12170	12232	9331	9362	62	31	0.51	0.33
1992	12743	12810	9610	9648	67	38	0.53	0.40
1993	13149	13225	9789	9827	76	38	0.58	0.39
1994	13517	13593	9944	9982	76	38	0.56	0.38
1995	13879	13955	10094	10132	76	38	0.55	0.38
1996	14159	14235	10196	10234	76	38	0.54	0.37
1997	14449	14525	10302	10340	76	38	0.53	0.37
1998	14660	14736	10363	10401	76	38	0.52	0.37
1999	15052	15122	10524	10559	70	35	0.47	0.33
2000	15344	15344	10628	10628	0	0	0	0

The projections of employment and population were prepared by Alaska Consultants, Inc.

TABLE 4.35

CORDOVA POPULATION AND EMPLOYMENT PROJECTIONS,
A COMPARISON OF THE BASE CASE AND THE MEAN FIND CASE

	Population		Employment		Change from the Base Case			
					Absolute Change		Percentage in	
Year	Base Case	Mean Case	Base Case	Mean Case	Population	Employment	Population	Employment
1981	3002	3010	1501	1505	8	4	0.27	0.2?
1982	3054	3068	1527	1534	14	7	0.46	0.46
1983	3104	3126	1552	1563	22	11	0.71	0.71
1984	3156	3182	1578	1591	26	13	0.82	0.82
1985	3208	3240	1604	1620	32	16	1.00	1.00
1986	3264	3318	1632	1659	54	27	1.65	1.65
1987	3322	3388	1661	1694	66	33	1.99	1.99
1988	3382	3988	1691	1969	606	278	17.92	16.44
1989	3440	4038	1720	2019	598	299	17.38	17.38
1990	3498	4098	1749	2049	600	300	17.15	17.15
1991	3568	4214	1704	2107	646	323	18.11	18.11
1992	3642	4290	1821	2145	648	324	17.79	17.79
1993	3714	4378	1857	2189	664	332	17.88	17.88
1994	3794	4458	1896	2228	664	332	17.50	17.51
1995	3872	4536	1936	2268	664	332	17.15	17.15
1996	3954	4632	1977	2316	678	339	17.15	17.15
1997	4044	4722	2022	2361	678	339	16.77	16.77
1998	4130	4812	2065	2404	682	339	16.51	16.42
1999	4220	4898	2110	2449	678	339	16.07	16.07
2000	4322	5000	2161	2500	678	339	15.69	15.69

The projections of employment and population were prepared by Alaska Consultants, Inc.

when the growth generated by OCS activity may be disruptive to the fishing industry, the increases in population are expected to increase the supply of seasonal and year-round labor available to the fishing industry and facilitate the expansion that is projected for the fishing industry. The larger population base and the resulting increase in the year-round labor force is of particular importance to the development of the groundfish industry (see Table 4.36).

The nature of the OCS labor force will tend to dimish any adverse impacts and increase the beneficial impacts. The OCS labor force is expected to consist primarily of head of households who are part of the primary labor force of an area, not part of the secondary labor force which consists of spouses and children who work to supplement the income generated by the head of the household. The latter section of the total labor force is a principal source of labor for fish processing plants. The importance of a large secondary labor force and the ability of fish processing plants to compete very successfully for such labor in an expanding economy is demonstrated by the recent growth in fish processing in the Anchorage area.

During the years in which the most rapid increases in employment and population occur, the growth will tend to disrupt the local economy; that is, local employers, including fish processing plants, may find it very difficult to meet their labor requirements. There are two reasons for this; the relatively high wage employment opportunities generated directly and indirectly by OCS activities will be available and attractive to local residents; and the rapidly increasing living costs that are expected during

TABLE 4.36

YAKUTAT POPULATION AND EMPLOYMENT PROJECTIONS,
A COMPARISON OF THE BASE CASE AND THE MEAN FIND CASE

Year	Population		Employment		Change from the Base Case			
					Absolute Change		Percentage in	
	Base Case	Mean Case	Base Case	Mean Case	Population	Employment	Population	Employment
1981	604	690	302	345	86	43	14.24	14.24
1982	622	726	31”1	363	104	52	16.72	16.72
1983	634	810	343	431	176	88	27.?6	25.66
1984	634	810	352	440	176	88	27.76	25.00
1985	639	815	365	453	176	88	27.54	24.11
1986	651	949	372	521	298	149	45.78	40.05
1987	677	1047	387	572	370	185	54.65	47.80
1988	693	1105	396	629	412	233	59.45	58.84
1989	695	1487	397	793	792	396	113.96	99.75
1990	746	2148	439	1140	1402	701	187.94	159.68
1991	765	2221	450	1178	1456	728	190.33	161.78
1992	787	2153	463	1146	1366	683	173.57	147.52
1993	828	2154	473	1024	1326	551	160.14	116.49
1994	847	2131	484	1126	1284	642	151.59	132.64
1995	877	2175	501	1050	1298	549	148.00	109.58
1996	894	2235	511	1183	1341	672	150.00	131.51
1997	902	2260	501	1180	1358	679	150.55	135.53
1998	927	2299	515	1201	1372	686	148.00	133.20
1999	927	2299	515	1201	1372	686	148.00	133.20
2000	934	2306	519	1205	1372	686	146.90	132.18

The projections of employment and population were prepared by Alaska Consultants, Inc.

such periods will make it difficult for local residents to maintain their current standard of living without accepting the new higher paying employment opportunities.

High Find Cases

With the exception of a six-year period beginning in 1988, the OCS labor requirements in Seward resulting from lease sale No. 55 are not substantial and are, therefore, not expected to affect the fishing industry (see Table 4.37). The increase in employment is so heavily concentrated in 1988 that the growth may prove disruptive to the community and the fishing industry. However, in subsequent years, increases in population that are projected to parallel the increases in employment may marginally increase the amount of labor that is available to the commercial fishing industry.

The OCS labor requirements in Kodiak and Seward for lease sale No. 46 are not expected to be substantial enough to affect the commercial fishing industry (see Tables 4.38 and 4.39).

The projected OCS labor requirements for Cordova in the high find case of lease sale No. 55 are minimal until the late 1980s, when the production employees at the Hinchinbrook Island oil terminal and LNP plant are expected to arrive and become permanent residents of Cordova (see Table 4.40). The large increases in employment and population projected to occur in 1989 and 1990 are expected to be somewhat disruptive and, perhaps, adversely affect the commercial fishing industry. However, once the increases in

TABLE 4.37

SEWARD (NORTHERN GULF) POPULATION AND EMPLOYMENT PROJECTIONS,
A COMPARISON OF THE BASE CASE AND THE HIGH FIND CASE

	Population		Employment		Change from the Base Case			
					Absolute Change		Percentage in	
Year	Base Case	High Case	Base Case	High Case	Population	Employment	Population	Employment
1981	2696	2726	1172	1187	30	15	1.11	1.28
1982	2732	2784	1188	1214	52	26	1.90	2.19
1983	2?86	2862	1232	1270	76	38	2.73	3.08
1984	2896	3072	1303	1391	176	88	6*O8	6.75
1985	3041	3167	1392	1455	126	63	4.14	4.53
1986	3052	3180	1422	1486	128	64	4.19	4.50
1987	3064	3364	1454	1604	300	150	9.79	10.32
1988	3077	3761	148?	1829	684	342	22.23	23.00
1989	3242	3978	1596	1964	736	368	22.70	23.06
1990	3384	4098	1698	2055	714	357	21.10	21.02
1991	3416	4144	1748	2112	728	364	21.31	20.82
1992	3449	3861	1800	2006	412	206	11.95	11.44
1993	3553	3855	1854	2005	302	151	8.50	8.14
1994	3660	3816	1910	1988	156	78	4.26	4.08
1995	3771	3991	1968	2028	220	60	5.83	3.05
1996	3887	3995	2020	2082	108	54	2.78	2.66
1997	4008	4116	2091	2145	108	54	2.69	2.58
1998	4130	4238	2155	2209	108	54	2.62	2.51
1999	4258	4366	2222	2279	108	57	2.54	2.57
2000	4393	4493	2293	2343	100	50	2.28	2.18

The projections of employment and population were prepared by Alaska Consultants, Inc.

TABLE 4.38

KODIAK POPULATION AND EMPLOYMENT PROJECTIONS,
A COMPARISON OF THE BASE CASE AND THE HIGH FIND CASE

Year	Population		Employment		Change from the Base Case			
					Absolute Change		Percentage in	
	Base Case	High Case	Base Case	High Case	Population	Employment	Population	Employment
1981	7782	7802	6694	6704	20	10	0.26	0.15
1982	8317	8361	7028	7050	44	22	0.53	0.31
1983	8876	96$8	7377	7455	812	78	9,15	1.06
1984	9500	10753	7765	7905	1253	140	13019	1.80
1985	10046	11365	8100	8305	1319	205	13*13	2.53
1986	10498	11309	8373	8616	811	243	7.73	2.90
1987	10U87	12070	8609	8907	1183	298	10087	3.46
1988	11268	12573	8840	9449	1305	609	11.58	6.89
1989	11496	12792	8982	9630	1296	648	11.27	7.21
1990	11791	13093	9163	9814	1302	651	11.04	7.10
1991	12170	13440	9331	9966	1270	635	10.44	6.81
1992	12743	13993	961O	10235	1250	625	9.81	6.50
1993	13149	14361	9789	10395	212	606	9.22	6.19
1994	13517	14745	9944	10558	228	614	9.08	6.17
1995	13879	15123	0094	10716	244	622	8.96	6.16
1996	14159	15419	0196	10826	260	630	8.90	6.18
1997	14449	15709	0302	10932	260	630	8.72	6.12
1998	14660	15920	0363	10993	260	630	8.59	6.08
1999	15052	16312	10524	11154	1260	630	8.37	5.99
2000	15344	16604	10628	11258	1269	630	8.21	5.93

The projections of employment and population were prepared by Alaska Consultants, Inc.

TABLE 4.39

SEWARD (WESTERN. GULF) POPULATION AND EMPLOYMENT PROJECTIONS,
A COMPARISON OF THE BASE CASE AND THE HIGH FIND CASE

Year	Population		Employment		Change from the Base Case			
					Absolute Change		Percentage in	
	Base Case	High Case	Base Case	High Case	Population	Employment	Population	Employment
1981	2720	2764	1184	1206	44	22	1.62	1.86
1982	2764	2868	1204	1256	104	52	3.76	4.32
1983	2846	2950	1262	1314	104	52	3.65	4.12
1984	2964	3184	1337	1447	220	110	7.42	8.23
1985	3645	3960	1476	1619	315	143	8.64	9.69
1986	3235	3470	1489	1599	235	110	7.26	7.39
1987	3202	3497	1523	1656	295	133	9.21	8.73
1988	3320	3579	1594	1716	259	122	7.80	7.65
1989	3686	3916	1789	1904	230	115	6.24	6.43
1990	3744	3940	1878	1976	196	9a	5.24	5.22
1991	3626	3762	1853	1921	136	68	3.75	3.67
1992	3539	3655	1845	1903	116	58	3.28	3.14
1993	3607	3705	1881	1930	98	49	2.72	2.60
1994	3696	3792	1928	1976	96	48	2.60	2.49
1995	3907	4003	1986	2034	96	48	2.46	2.42
1996	3923	4019	2046	2094	96	48	2.45	2.35
1997	4044	4140	2109	2157	96	48	2.37	2.28
1998	4166	4262	2173	2221	96	48	2.30	2.21
1999	4294	4390	2240	2288	96	48	2.24	2.14
2000	4429	4525	.?311	2359	96	48	2.17	2.08

The projections of employment and population were prepared by Alaska Consultants, Inc.

TABLE 4.40

CORDOVA POPULATION AND EMPLOYMENT PROJECTIONS,
A COMPARISON OF THE BASE CASE AND THE HIGH FIND CASE

	Population		Employment		Change from the Base Case			
					Absolute Change		Percentage in	
Year	Base Case	High Case	Base Case	High Case	Population	Employment	Population	Employment
1981	3002	3014	1501	1507	12	b	0.40	0.40
1982	3054	3076	1527	1538	22	11	0.72	0.72
1983	3104	3136	1552	1568	32	16	1.03	1.03
1984	3156	3200	1578	1600	44	22	1.39	1.39
1985	3208	3252	1604	1626	44	22	1.37	1.37
1986	3264	3300	1632	1650	36	18	1.10	1.10
1987	3322	3436	1661	1718	114	57	3.43	3.43
1988	3382	3594	1691	1797	212	106	6.27	6.27
1989	3440	4032	1720	2016	592	296	17.21	17.21
1990	3498	4834	1749	2417	1336	668	38.19	38.19
1991	3568	4900	1784	2450	1332	666	37.33	37.33
1992	3642	4918	1821	2459	1276	638	35.04	35.04
1993	3714	4990	1857	2495	1276	638	34.36	34.36
1994	3794	5114	1896	2556	1320	660	34.79	34.81
1995	3872	52?2	1936	2611	1350	675	34.87	34.87
1996	3954	5318	1977	2659	1364	682	34.50	34.50
1997	4044	5408	2022	2704	1364	682	33.73	33.73
1998	4130	5498	2065	2747	1368	682	33.12	33.03
1999	4220	55R4	2110	2792	1364	682	32.32	32.32
2000	4322	5666	2161	2833	1344	672	31.10	31.10

The projections of employment and population were prepared by Alaska Consultants, Inc.

population and employment have been absorbed, the larger population will result in more labor being available to the fishing industry. This will be particularly beneficial to the development of the groundfish industry.

For the high find case of lease sale No. 55, the OCS labor requirements in Yakutat are substantial throughout the forecast period (see Table 4.41) and the resulting rates of growth of Yakutat employment are staggering. For example, in 1989 employment, excluding OCS construction, is projected to increase by over 55 percent and, in several years, it is projected to increase at an annual rate in excess of 20 percent. Such rapid growth is expected to be disruptive to the local economy and the fishing industry; however, equally large increases in population are projected indicating that the employment requirements generated by OCS operations will be met by net migration to Yakutat, not by reducing the labor force available to other local employers such as the fishing industry. Therefore, once the disruptions have ended, the increased population is expected to provide a larger potential labor force for the fishing industry. Once again this will be of particular importance to the development of the groundfish industry.

COMPETITION FOR OCEAN SPACE USE

Area specific information about the nature and location of ocean space use by the commercial fishing and OCS industries is presented in this section and, together with the previously presented analysis of the competition for ocean space, is used to determine the potential impact of OCS use of ocean space.

TABLE 4.41

YAKUTAT POPULATION AND EMPLOYMENT PROJECTIONS,
A COMPARISON OF THE BASE CASE AND THE HIGH FIND CASE

	Population		Employment		Change from the Base Case			
					Absolute Change		Percentage in	
Year	Base Case	High Case	Base Case	High Case	Population	Employment	Population	Employment
1981	604	708	302	354	104	52	17.22	17.22
1982	622	804	311	402	182	91	29.26	29.26
1983	634	852	343	452	218	109	34.38	31.7$
1984	634	1020	352	545	386	193	60.88	54.83
1985	639	1239	365	665	600	300	93*90	82.19
1986	651	1285	372	689	634	317	97.39	85.22
1987	677	1247	387	672	570	285	84.19	73.64
1988	693	1937	396	1045	1244	649	179.51	163.89
1989	695	2687	397	1393	1992	996	286.62	250.88
1990	746	3420	439	1776	2674	1337	358.45	304.56
1991	765	3601	450	1868	2836	1418	370.72	315.11
1992	787	3501	463	1820	2714	1357	344.85	293.09
1993	828	3580	473	1849	2752	1376	332.37	290.91
1994	847	3591	484	1856	2744	1372	323.97	283.47
1995	877	3519	501	1822	2642	1321	301.25	263.67
1996	894	3540	511	1834	2646	1323	295.97	258.90
1997	902	3608	501	1854	2706	1353	300.00	270.06
1998	927	3663	515	1883	2736	1368	295.15	265.63
1999	927	3663	515	1883	2736	1368	295.15	265.63
2000	934	3670	519	1887	2736	1368	292.93	263.58

The projections of employment and population were prepared by Alaska Consultants, Inc.

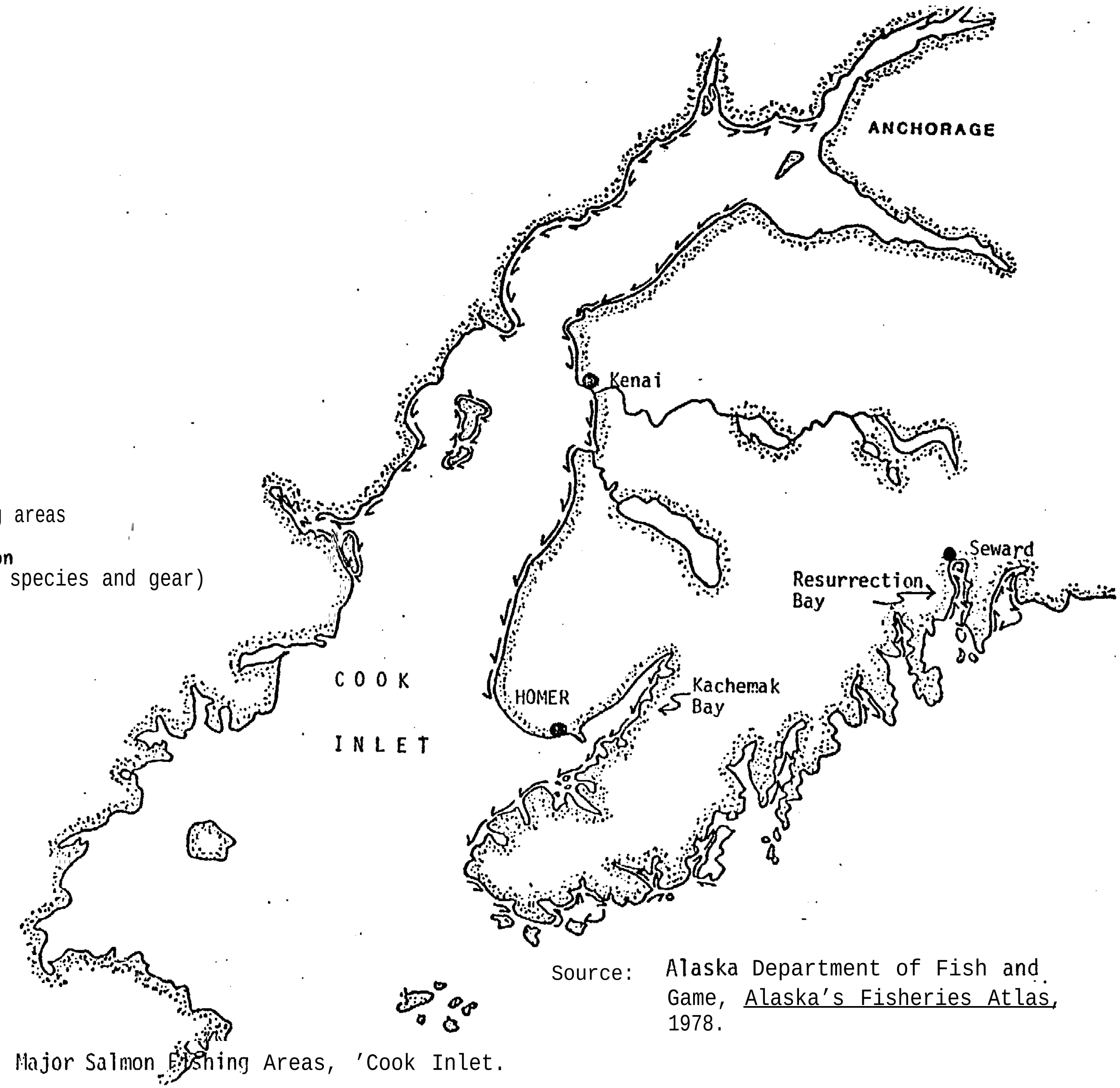
The extent to which OCS uses of ocean space will increase fishing costs in a particular fishery will depend on the extent to which the fishing grounds of each fishery are used for OCS operations, and on the nature of the fishing and OCS operations in areas of joint use. There are a number of fisheries that will not compete with the OCS industry for ocean space because their principal fishing grounds are not included in areas identified for OCS use. These fisheries include:

- all the Cook Inlet fisheries with the exception of minor herring and trawl shrimp fisheries in Resurrection Bay and the groundfish fishery that is beginning to develop (see Figures 4.1 through 4.7),
- the salmon, herring, king crab, Dungeness crab, shrimp and razor clam fisheries of Prince William Sound (see Figures 4.8 through 4.11),
- the salmon, Dungeness crab, Tanner crab, and pot shrimp fisheries of Yakutat (see Figure 4.12 through 4.14),
- the shrimp and razor clam fisheries of Kodiak (see Figure 4.15).

The exception to the absence of OCS ocean space use on the fishing grounds of these fisheries includes the offshore pipeline corridor that crosses nearshore salmon and Dungeness crab fishing grounds near Yakutat and the shrimp fishery in Ugak Bay, which has been closed in recent years to allow the recovery of the resource. The OCS activity along the pipeline corridor is expected to minimally reduce the area available for fishing, but not to adversely affect the catch as a whole. However, those set gillnet salmon fishermen who have established property rights to the area of the

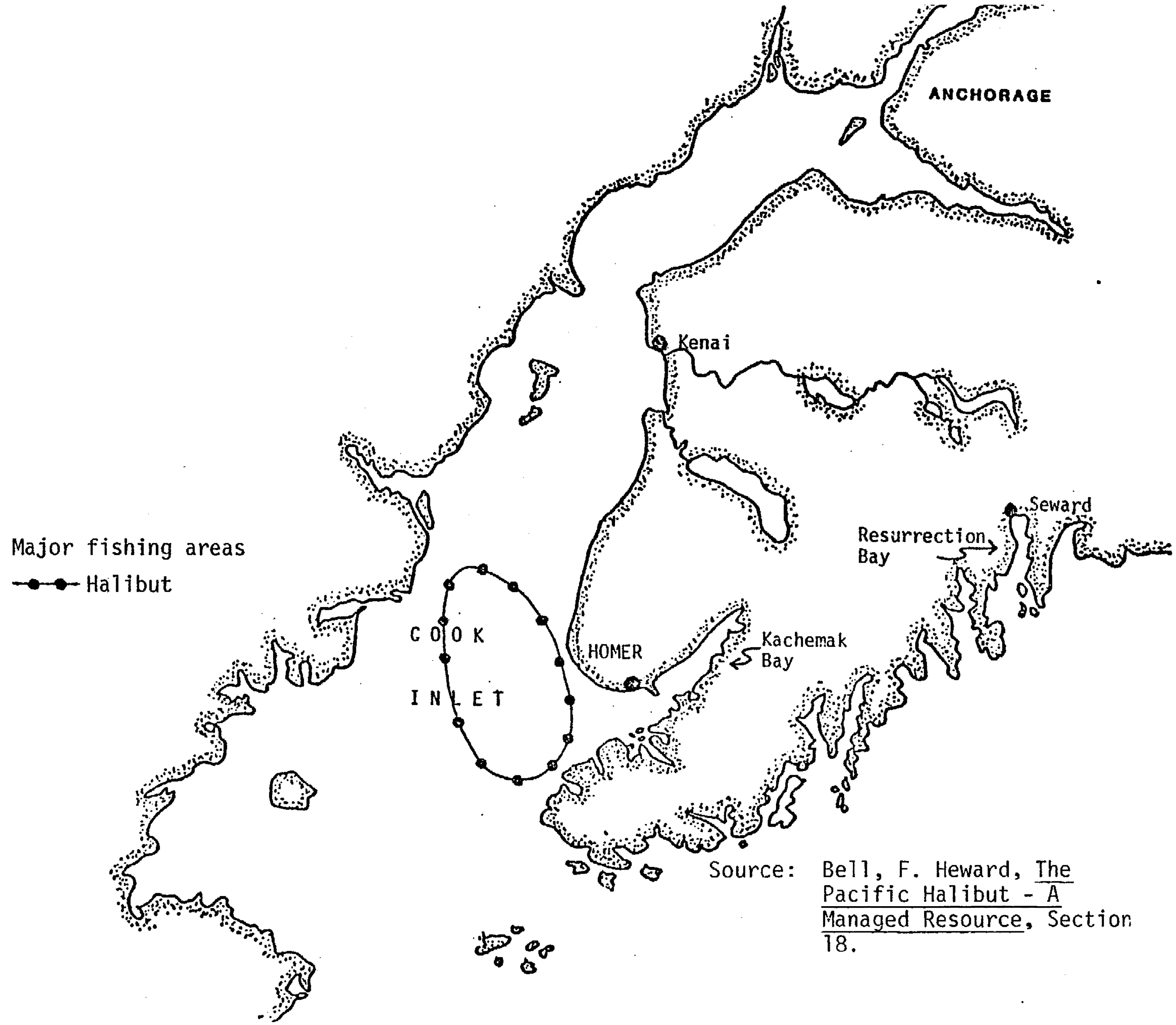
Major fishing areas

→ **Salmon**
(all species and gear)



Source: Alaska Department of Fish and Game, Alaska's Fisheries Atlas, 1978.

Figure 4.1 Major Salmon Fishing Areas, 'Cook Inlet.



Source: Bell, F. Heward, The Pacific Halibut - A Managed Resource, Section 18.

Figure 4 2 Major Halibut Fish ng Areas, Cook Inlet.

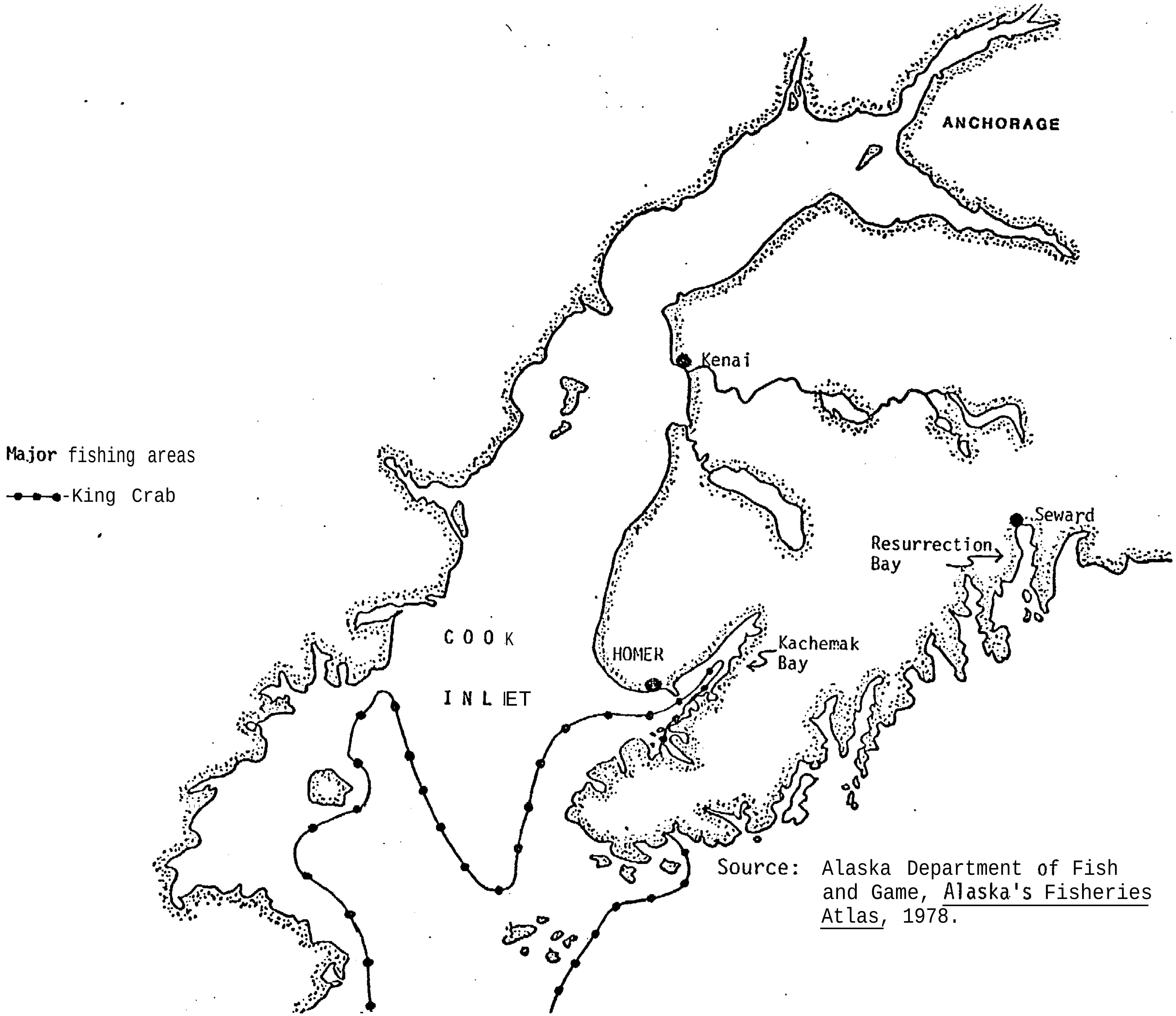
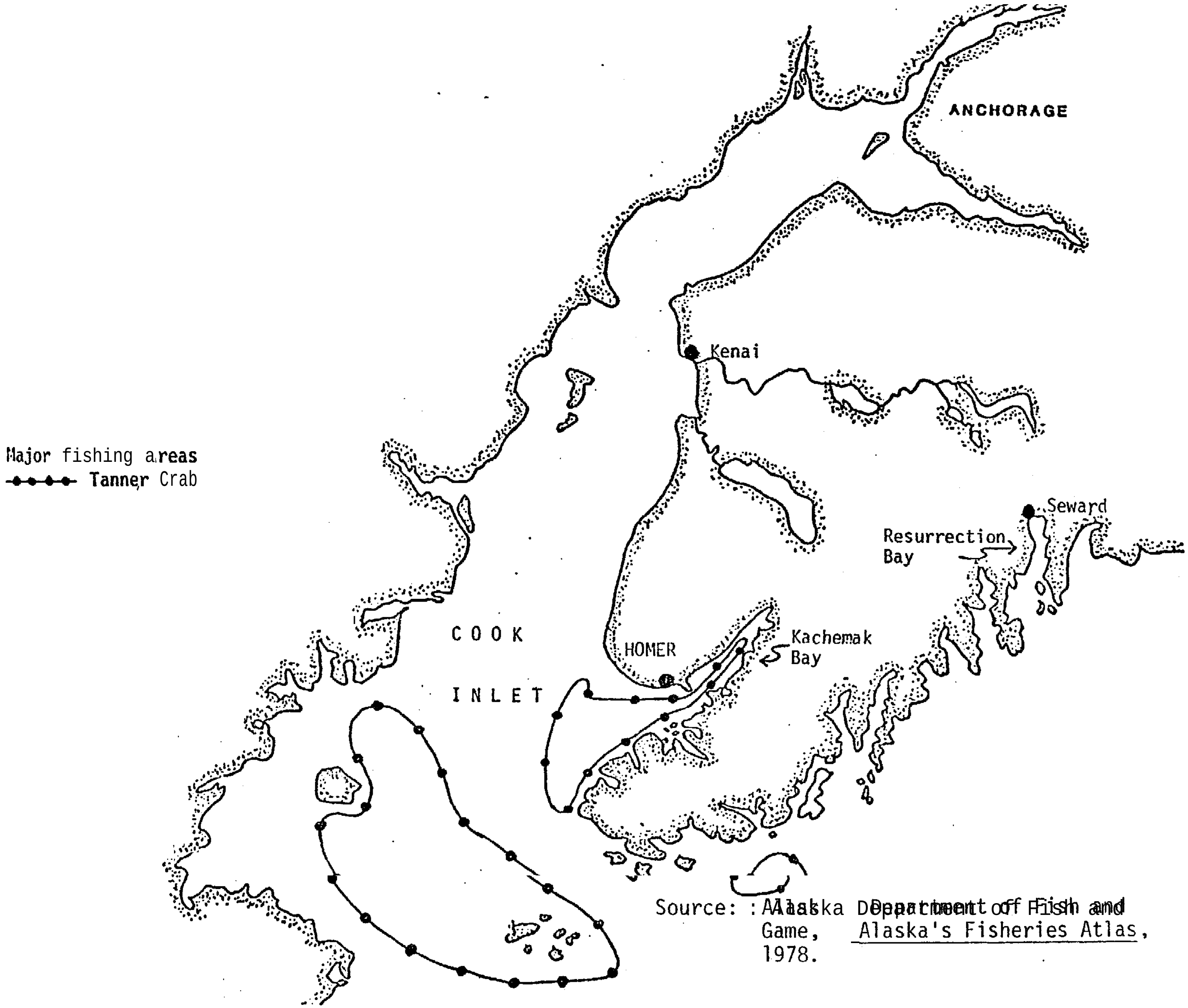


Figure 4.3 Major King Crab Fishing Areas, Cook Inlet.

Source: Alaska Department of Fish and Game, _Alaska's Fisheries Atlas_, 1978.



Source: Alaska Department of Fish and Game, Alaska's Fisheries Atlas, 1978.

Figure 4.4 Major Tanner Crab Fishing Areas, Cook Inlet.

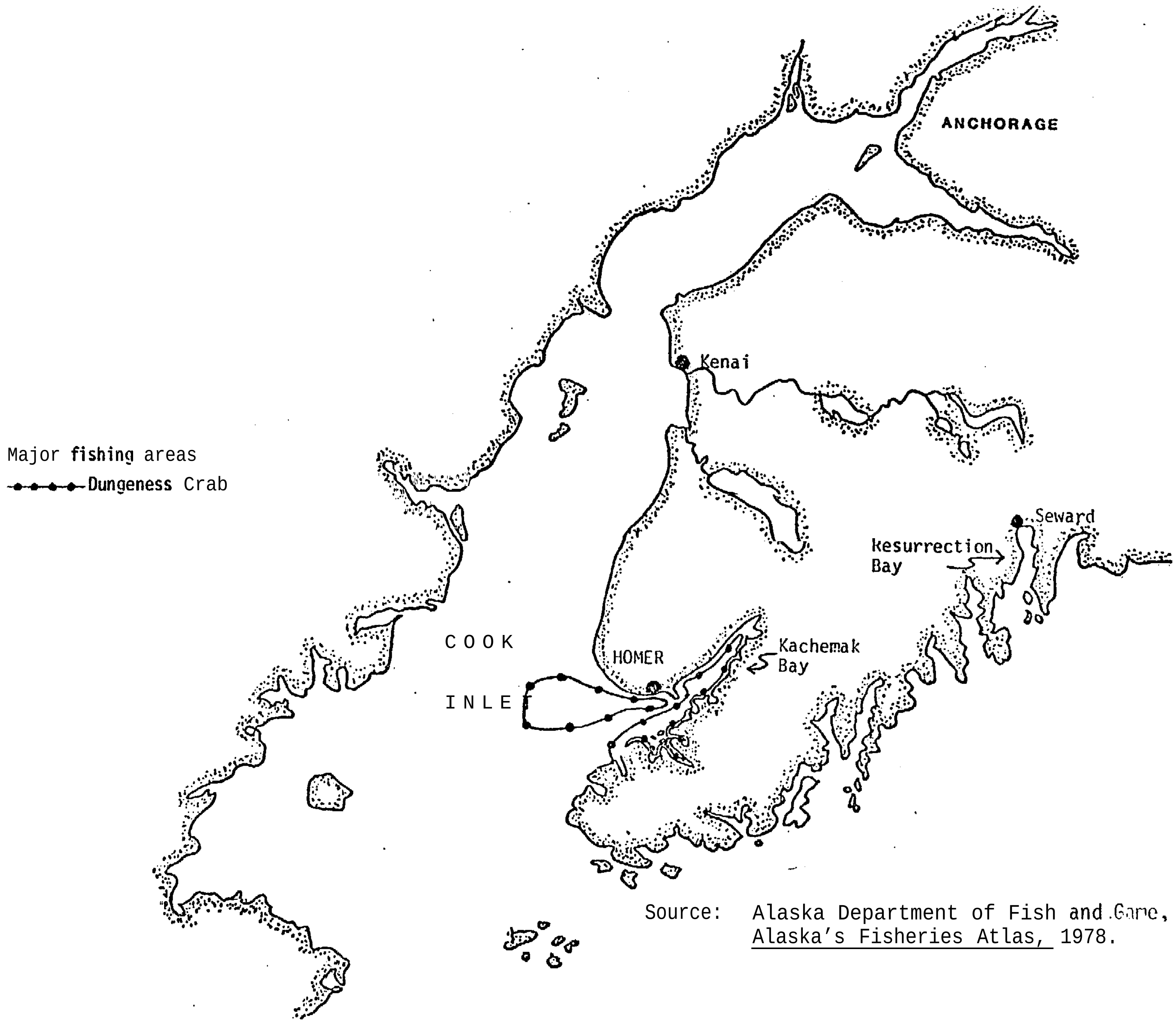
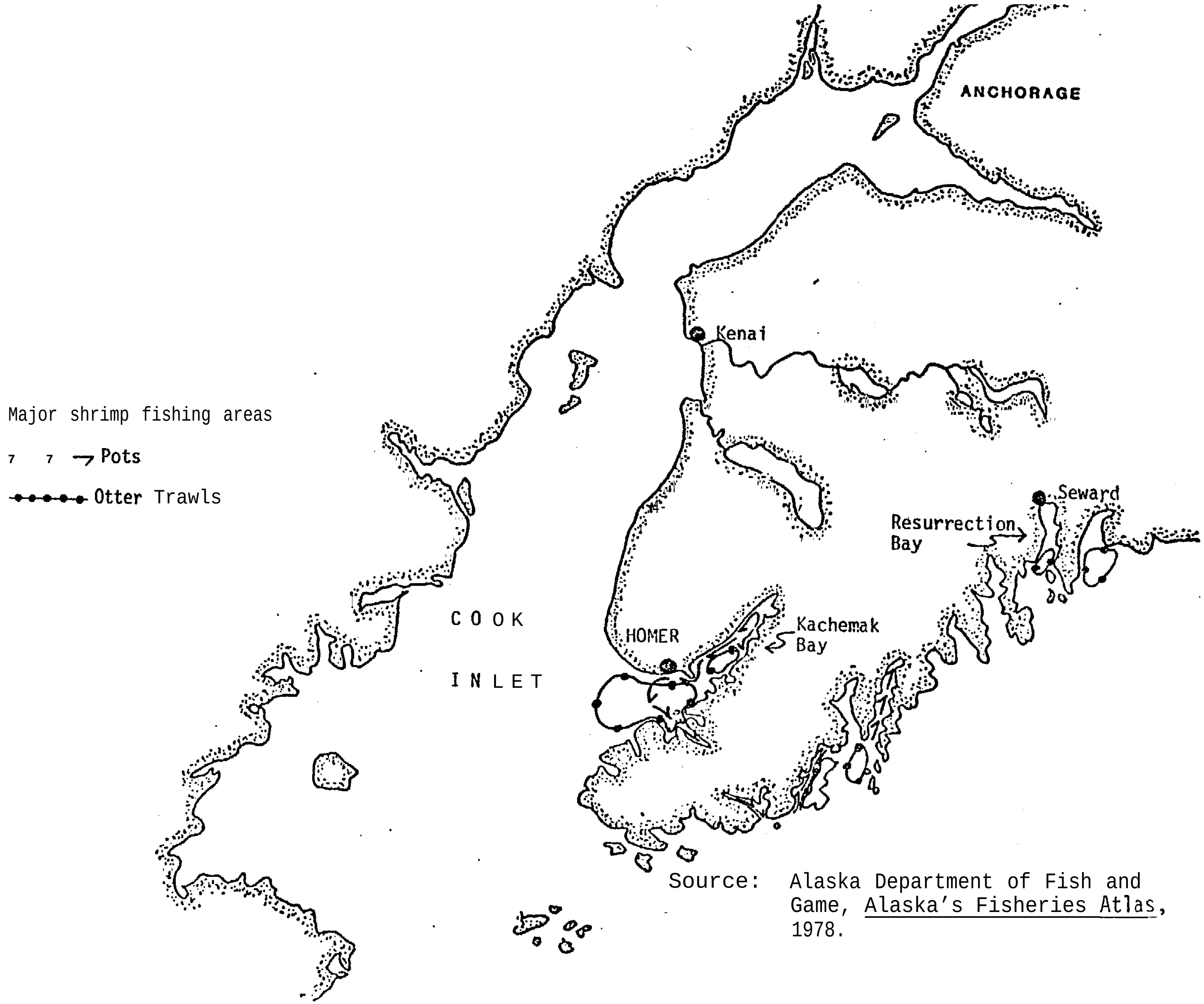
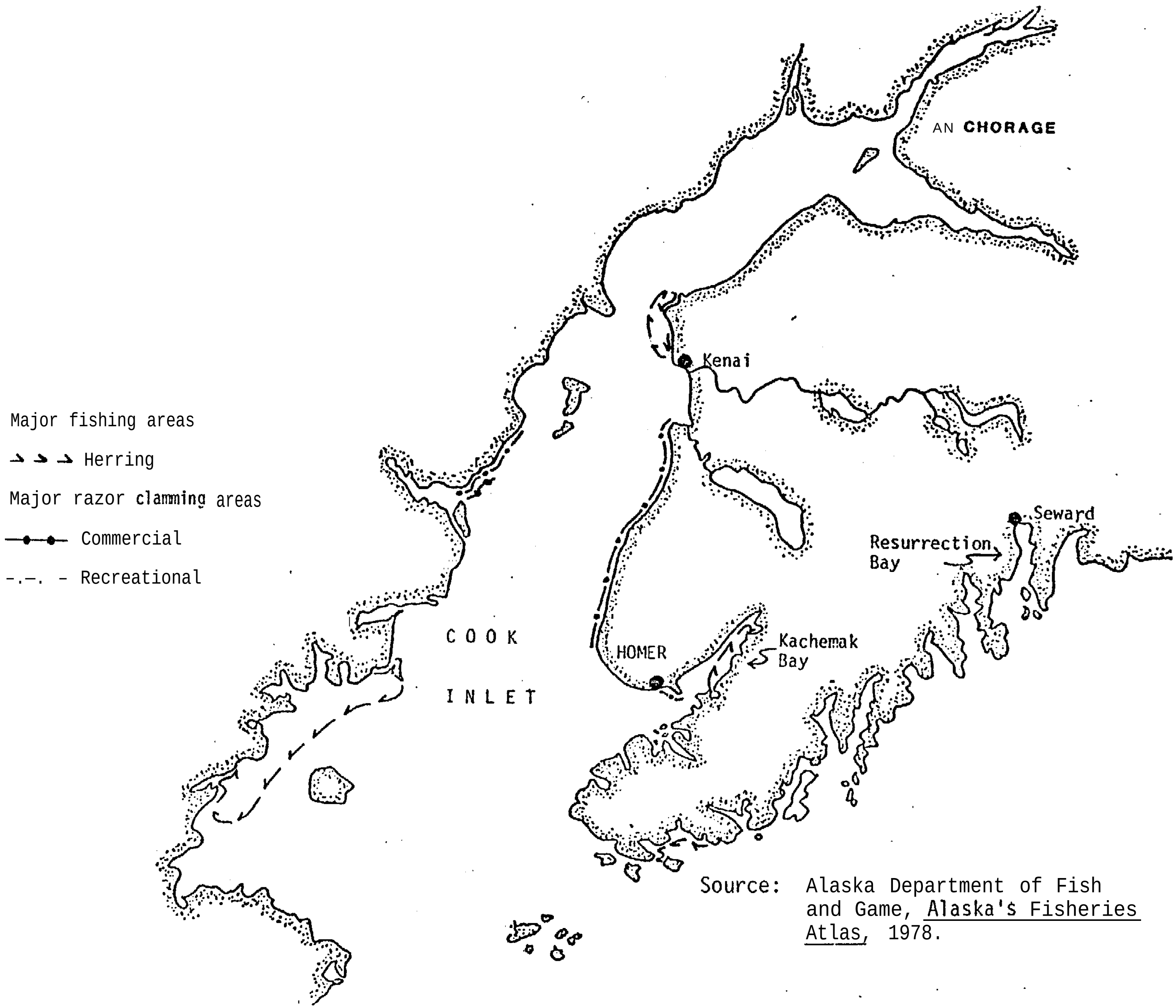


Figure 4.5 Major Dungeness Crab Fishing Areas, Cook Inlet.



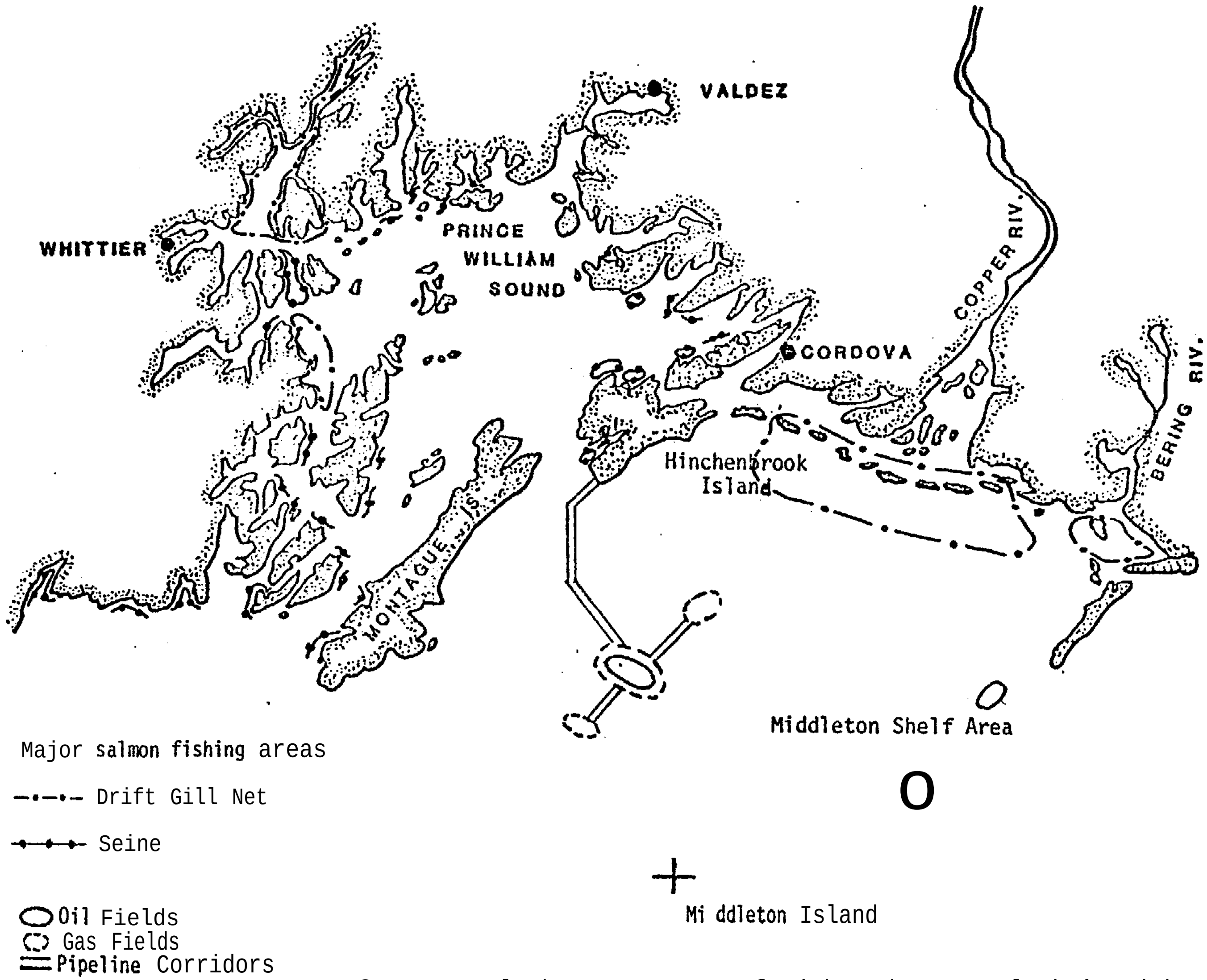
Source: Alaska Department of Fish and Game, Alaska's Fisheries Atlas, 1978.

Figure 4.6 Major Shrimp Fishing Areas, Cook Inlet.



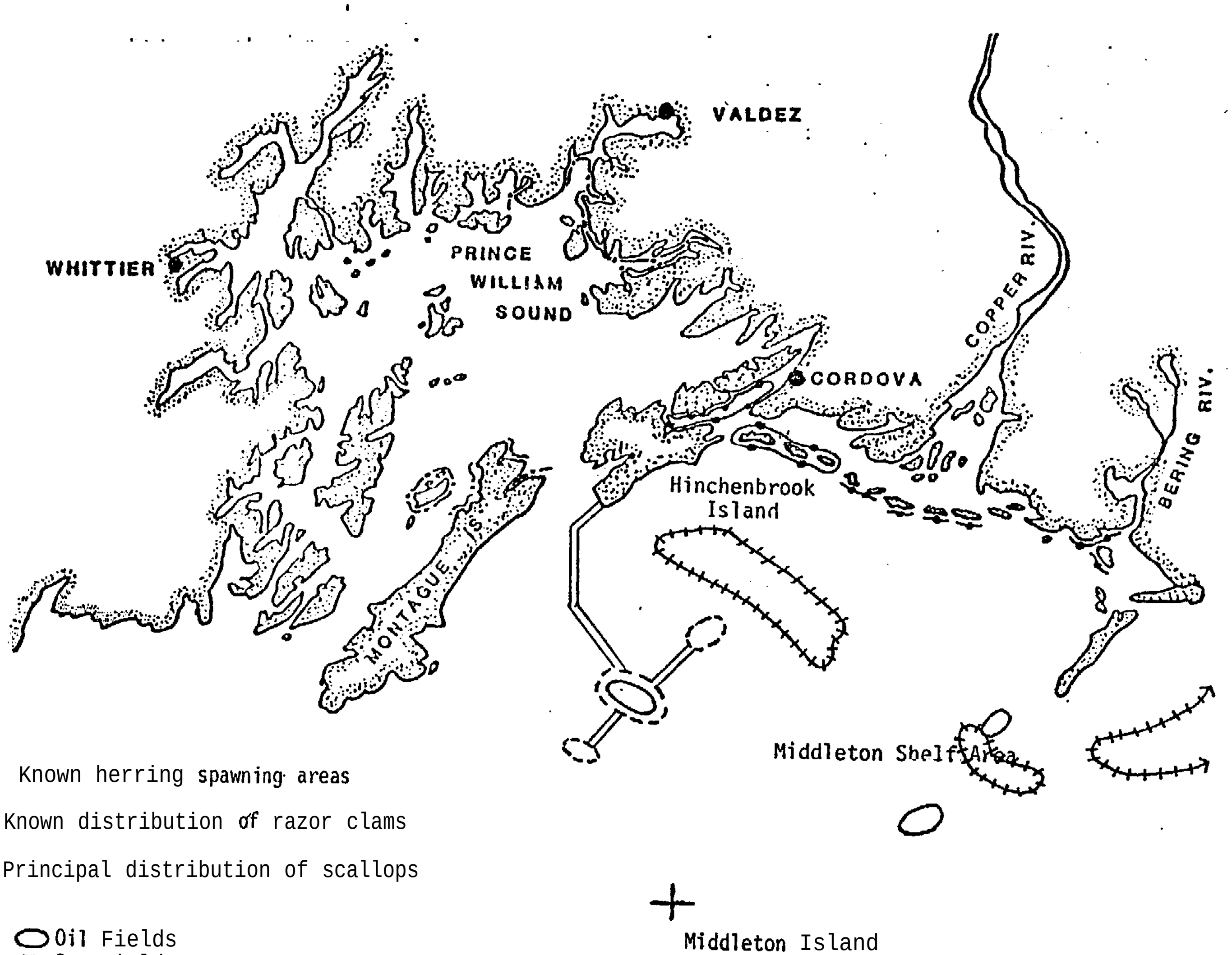
Source: Alaska Department of Fish and Game, Alaska's Fisheries Atlas, 1978.

Figure 4.7 Major Herring Fishing and Razor Clamming Areas, Cook Inlet.



Source: Alaska Department of Fish and Game, Alaska's Fisheries Atlas, 1978.

Figure 4.8 Major Salmon Fishing Areas, Prince William Sound.



Known herring spawning areas

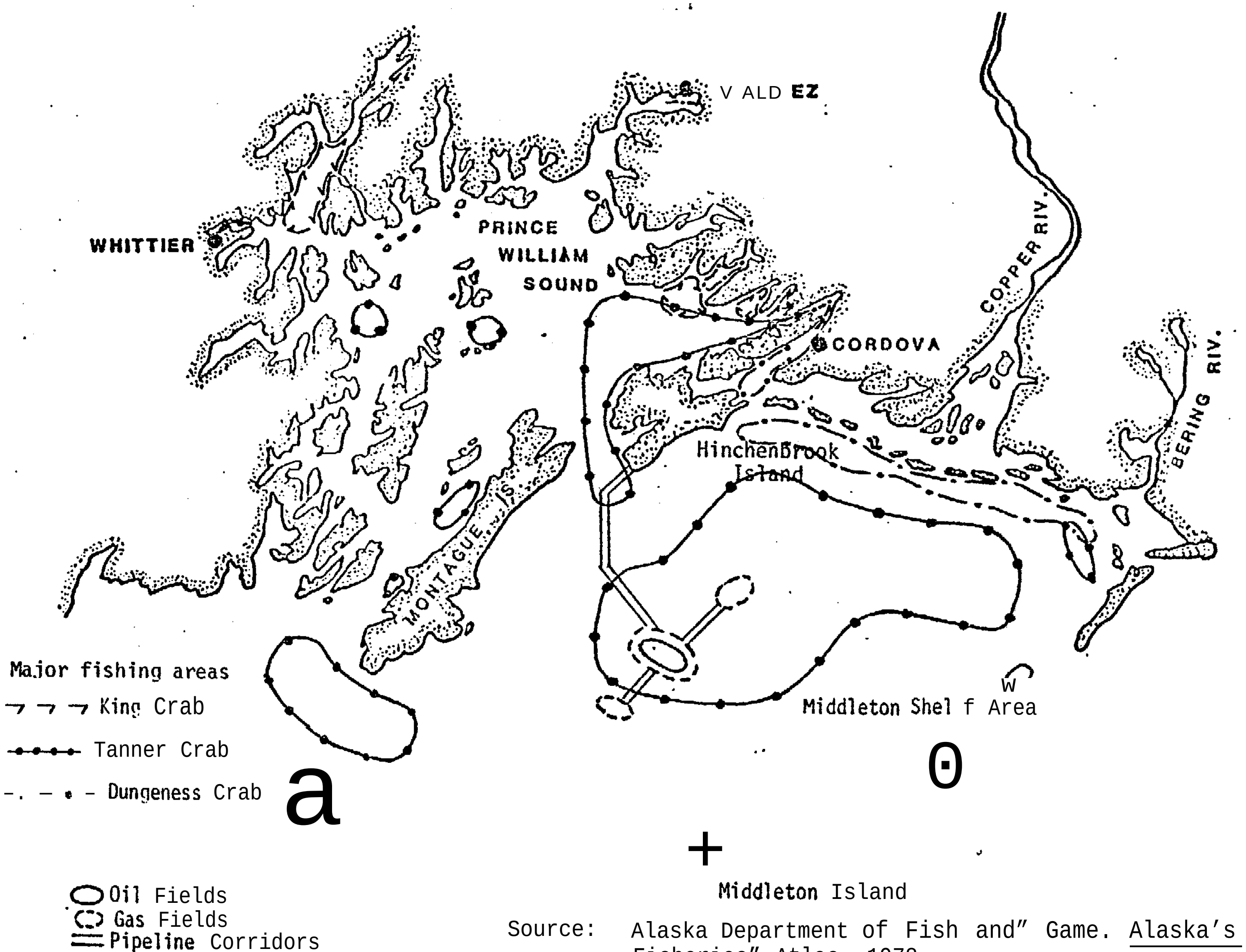
Known distribution of razor clams

Principal distribution of scallops

Oil Fields
Gas Fields
Pipeline Corridors

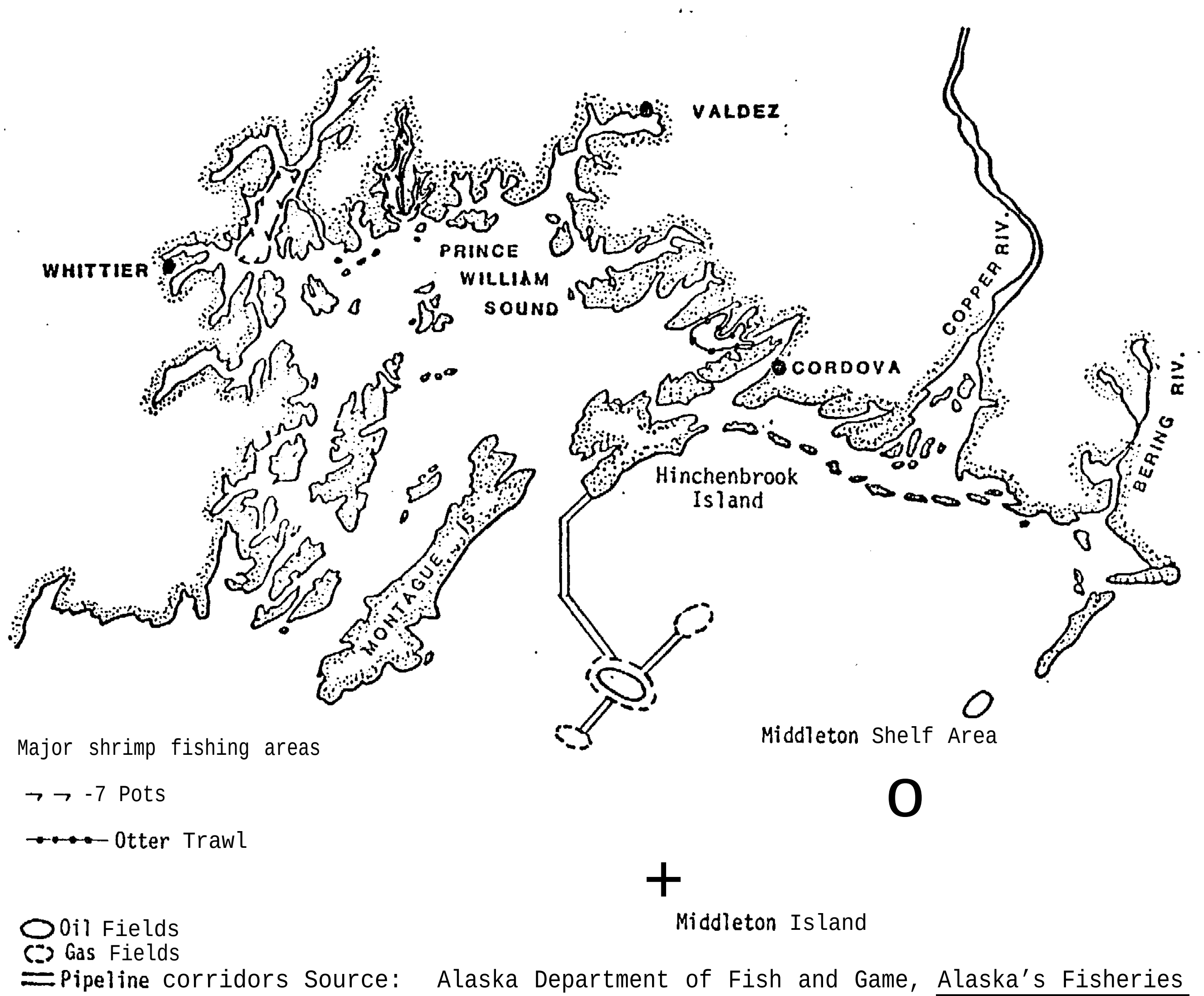
Source: Alaska Department of Fish and Game, <u>Alaska's Fisheries Atlas,</u> 1978.

Figure 4.9 Known Distribution of Scallops and Razor Clams and Known Herring Spawning Areas, Prince William Sound.



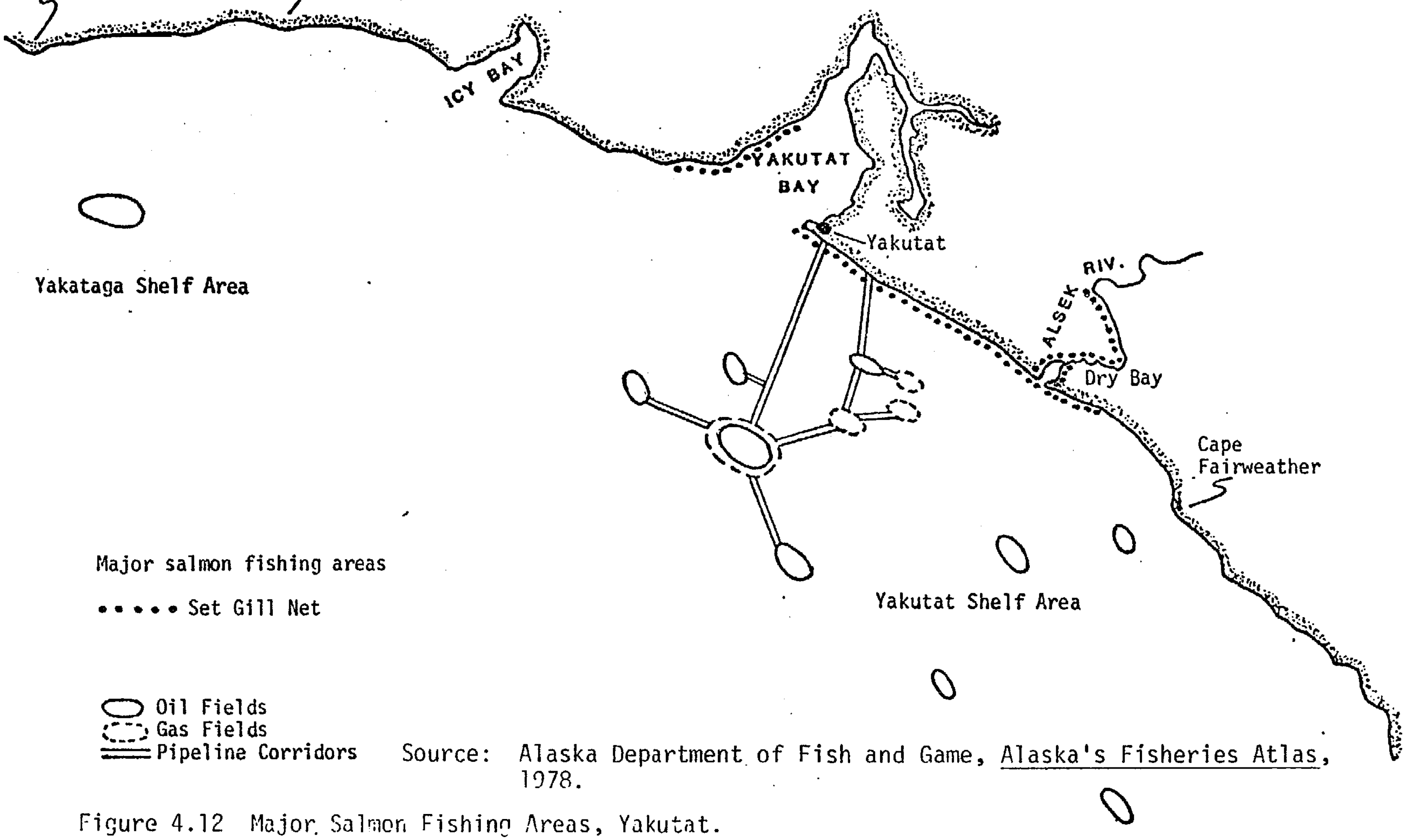
Source: Alaska Department of Fish and" Game. <u>Alaska's Fisheries" Atlas</u>, 1978.

Figure 4.10 Major Crab Fishing Areas, Prince William Sound.



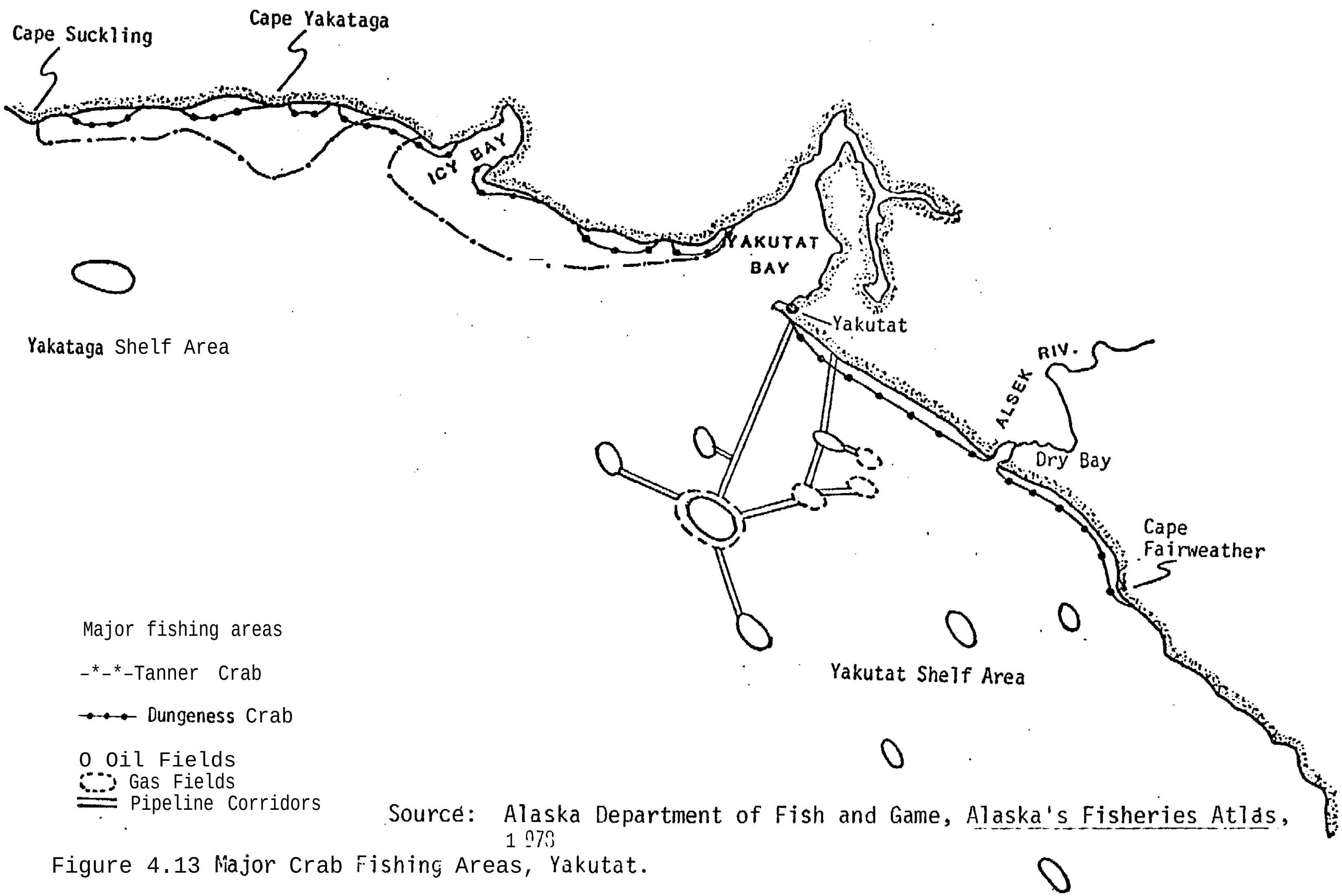
Source: Alaska Department of Fish and Game, Alaska's Fisheries Atlas, 1978.

Figure 4.11 Major Shrimp Fishing Areas, Prince William Sound.



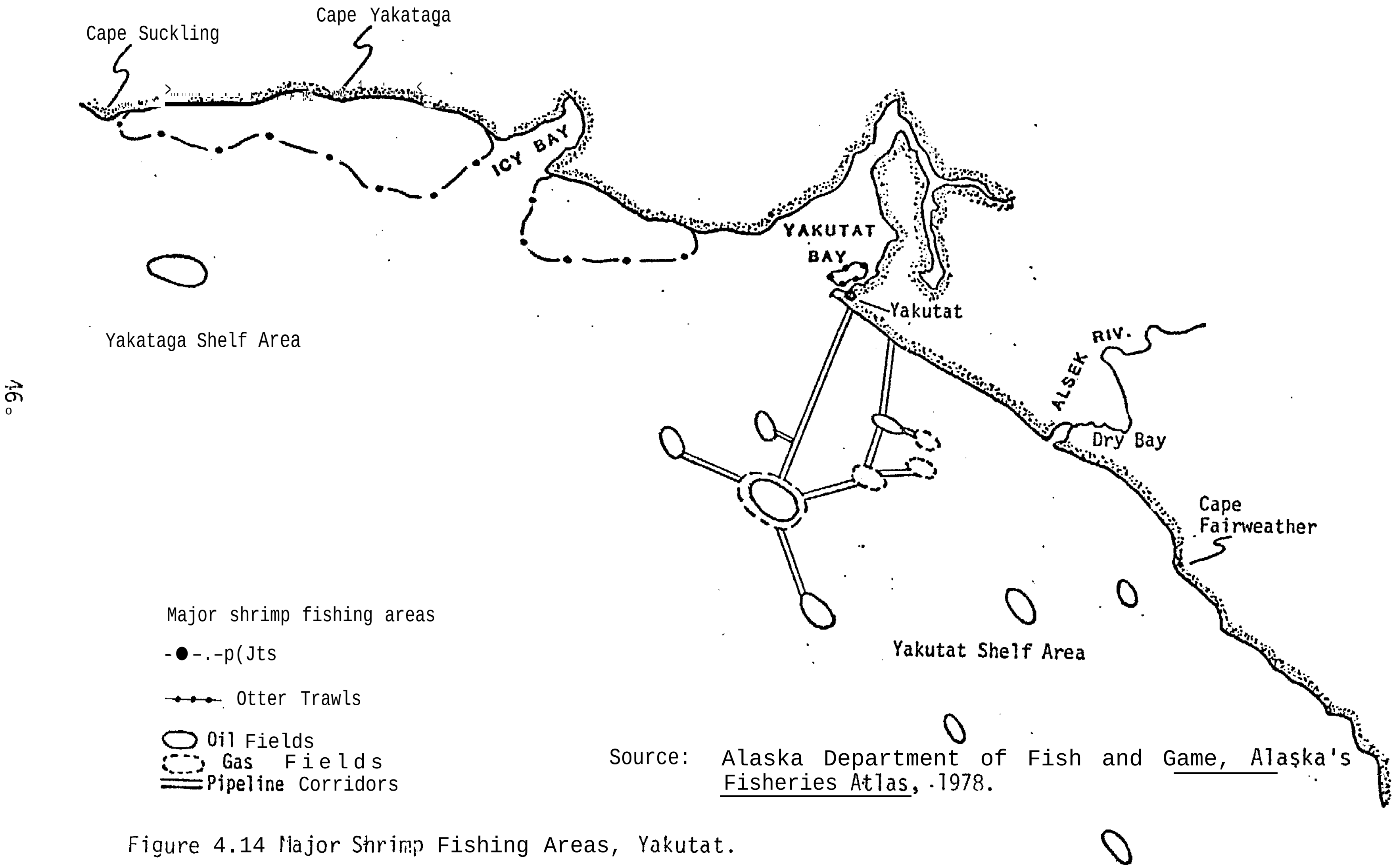
Source: Alaska Department of Fish and Game, Alaska's Fisheries Atlas, 1978.

Figure 4.12 Major Salmon Fishing Areas, Yakutat.



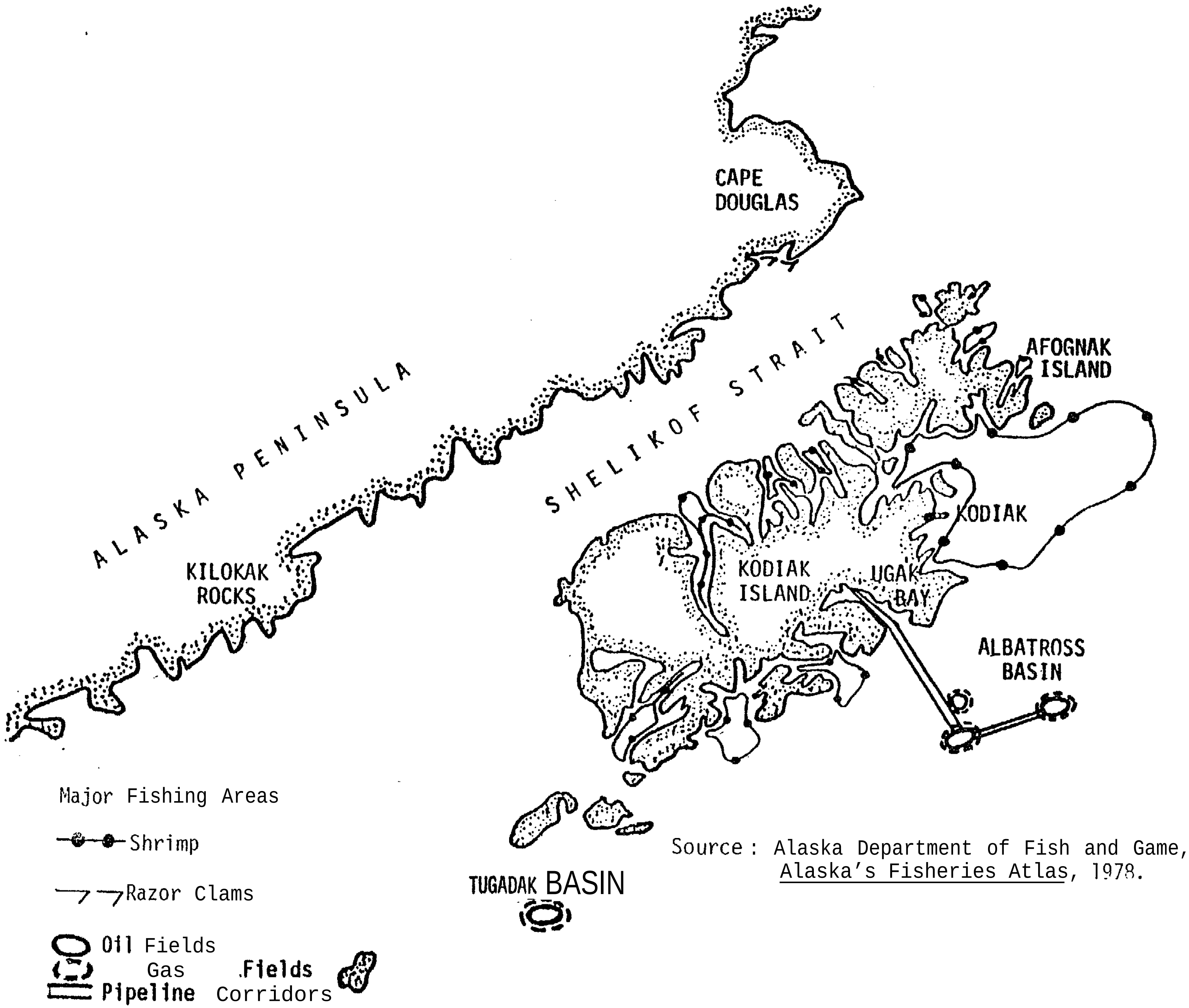
Source: Alaska Department of Fish and Game, Alaska's Fisheries Atlas, 1978

Figure 4.13 Major Crab Fishing Areas, Yakutat.



Source: Alaska Department of Fish and Game, Alaska's Fisheries Atlas, 1978.

Figure 4.14 Major Shrimp Fishing Areas, Yakutat.



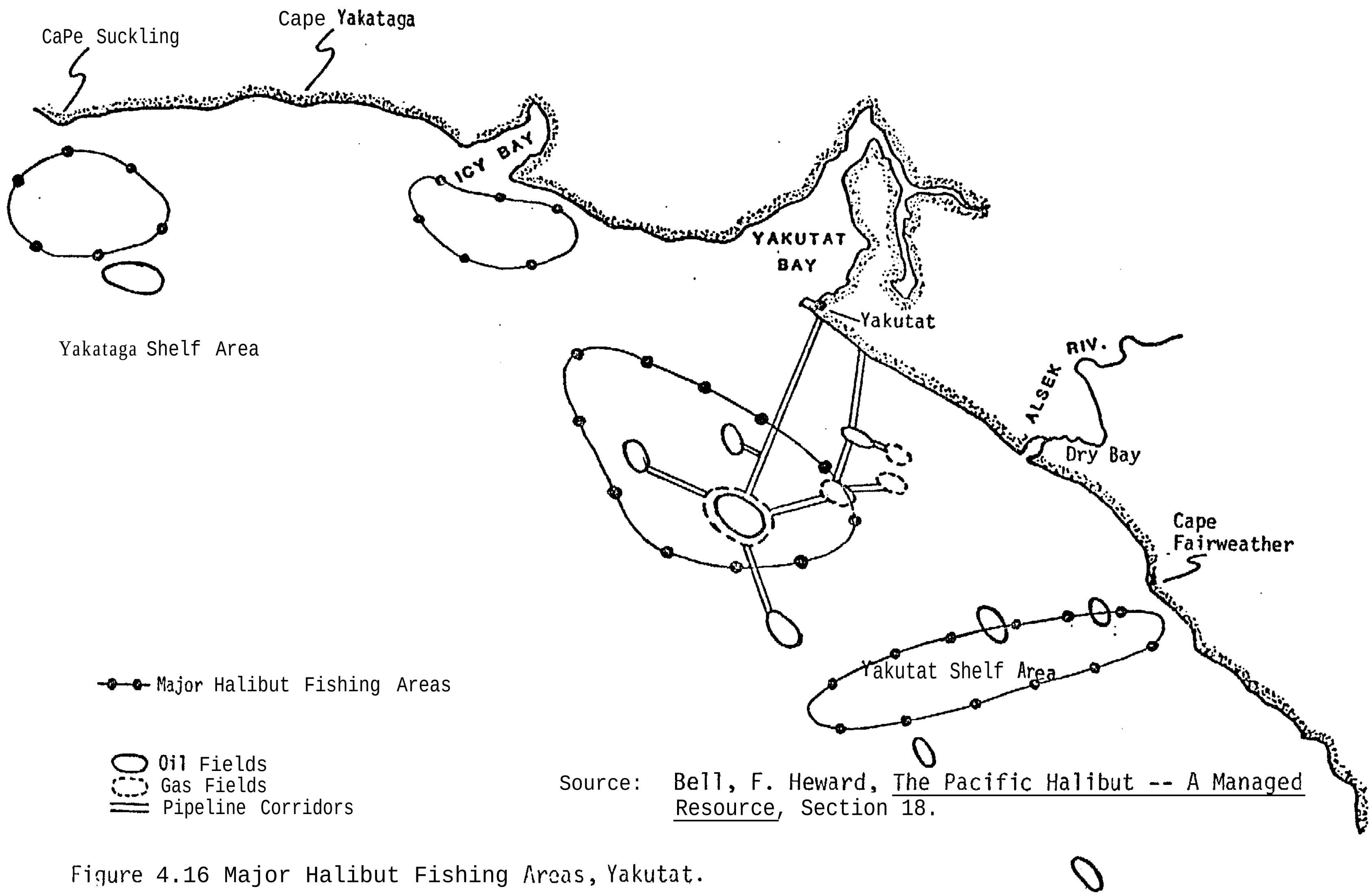
Source : Alaska Department of Fish and Game, <u>Alaska's Fisheries Atlas</u>, 1978.

Figure 4.15 Major Shrimp Fishing and Razor Clamming Areas, Kodiak.

pipeline corridor will suffer a loss unless equally productive areas are available to them. Perhaps no more than one to two set gillnet sites will be preempted by each pipeline corridor, and if the pipeline is buried, the sites would only be affected during the year in which the pipeline is constructed. The real gross income per gillnet boat is not expected to exceed $53,000 by the year 2000.

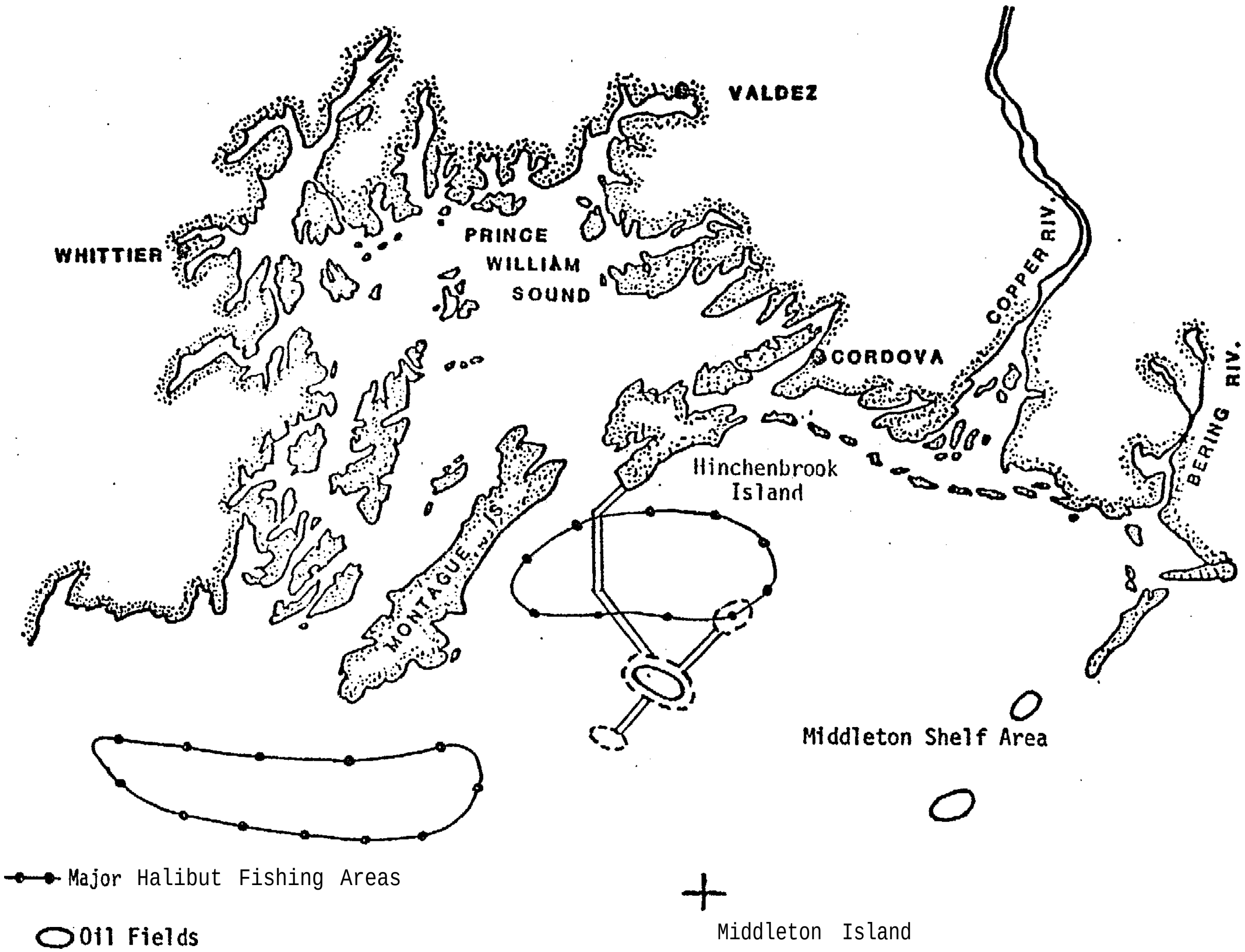
The longline halibut fleet operates throughout the Gulf of Alaska and, as is indicated in Figures 4.16 through 4.18, the OCS operations off of Yakutat, Hinchinbrook Island, and Kodiak are on major halibut grounds. The longline gear is particularly susceptible to losses to OCS survey vessels and other OCS vessels that tow underwater gear or are of great draft. Gear losses are expected to occur and fishing costs are expected to increase. However, since the binding constraint in the halibut fishery is stock abundance, the increased fishing costs are not expected to adversely affect harvesting effort. The magnitude of the gear losses will to a great extent be determined by the actions taken by the fishing and OCS industries and others to reduce the probability of gear losses.

The crab fisheries use pot gear which is left unattended. The high concentration of the gear in some areas results in a very high probability that gear losses will occur if other vessels enter the areas. Figures 4.10, 4.13, and 4.19 through 4.21 indicate that OCS ocean space use will occur in the Yakutat Dungeness crab grounds, the Prince William Tanner crab grounds, and the Kodiak king, Tanner, and Dungeness crab grounds. Gear losses are, therefore, expected to occur in these areas. With the exception of the Dungeness crab fisheries, the binding constraint on these fisheries is resource abundance; therefore, the increases in fishing costs



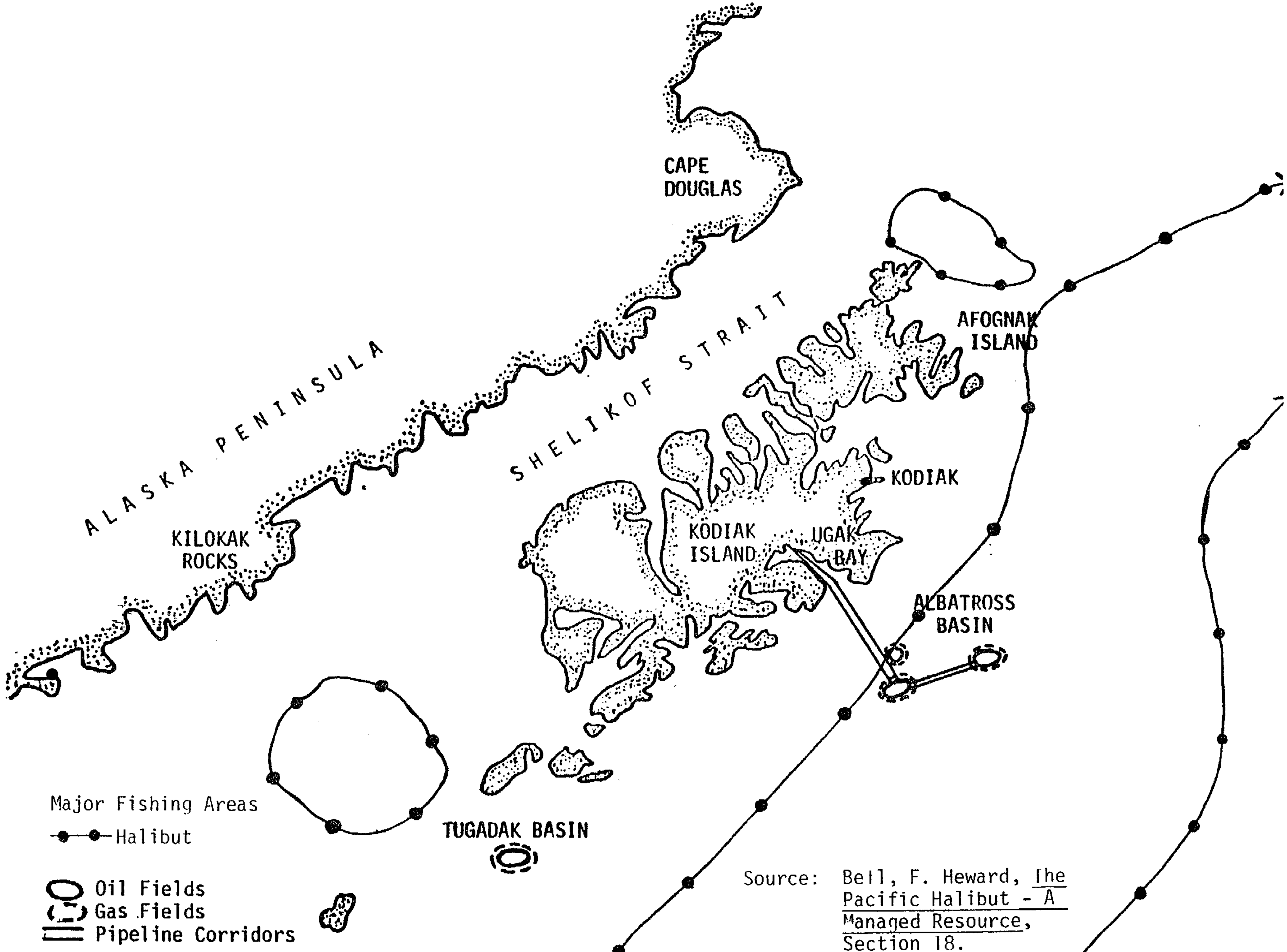
Source: Bell, F. Heward, The Pacific Halibut -- A Managed Resource, Section 18.

Figure 4.16 Major Halibut Fishing Areas, Yakutat.



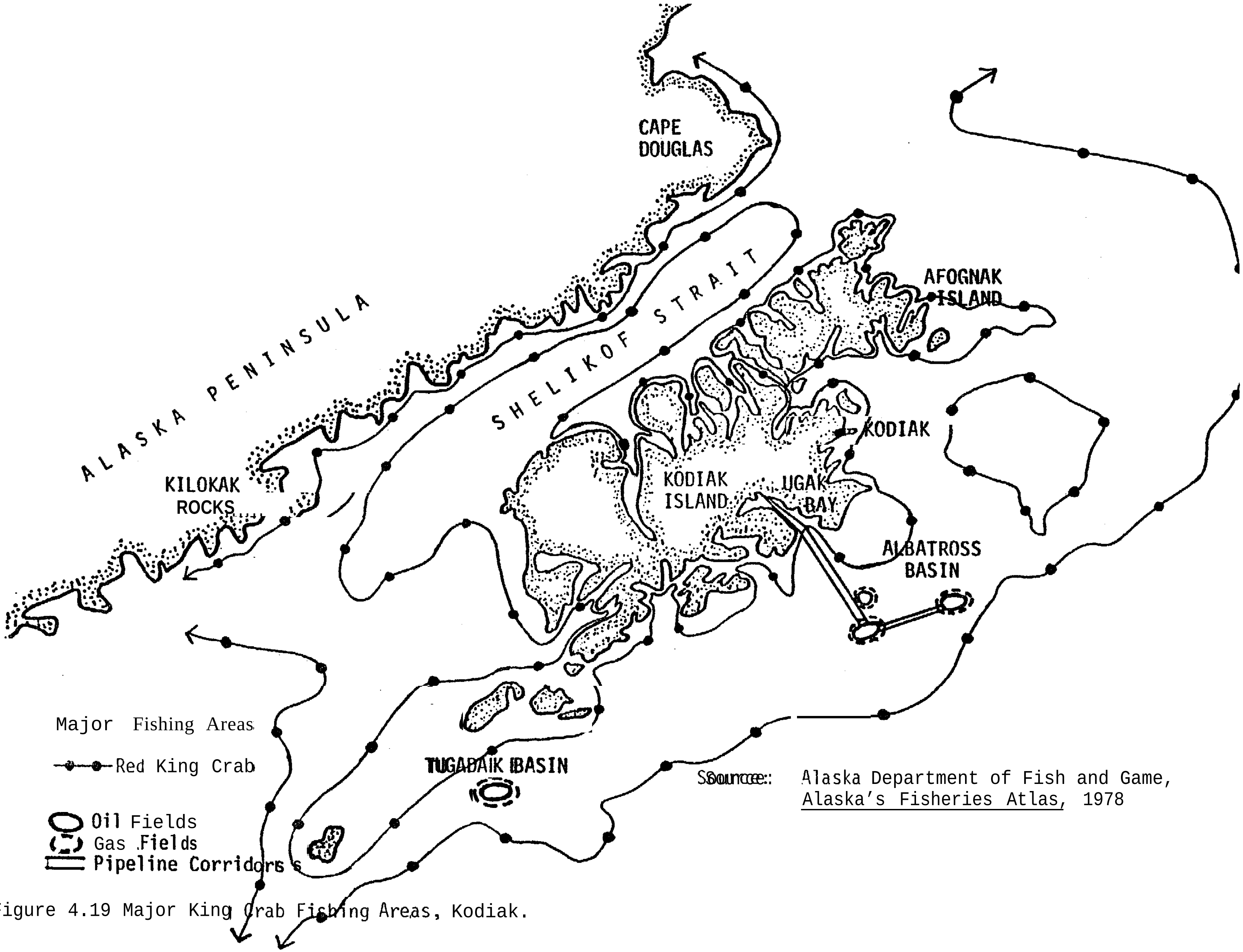
Source: Bell, F. Heward, The Pacific Halibut -- A Managed Resource, Section 18.

Figure 4.17 Major Halibut Fishing Areas, Prince William Sound.



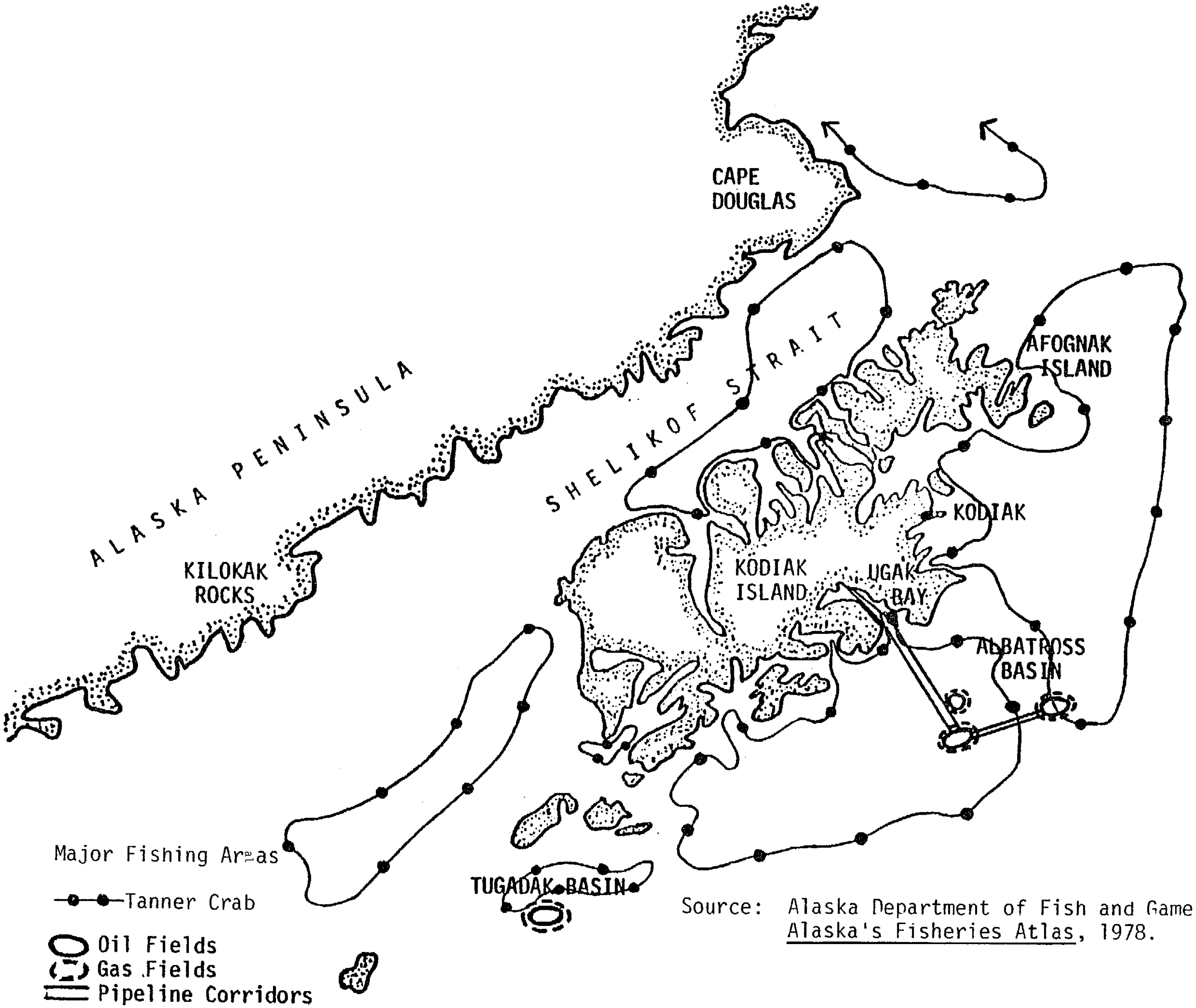
Source: Bell, F. Heward, The Pacific Halibut - A Managed Resource, Section 18.

F·gure 4. 8 Major Halibut Fishing Areas, Kodiak.



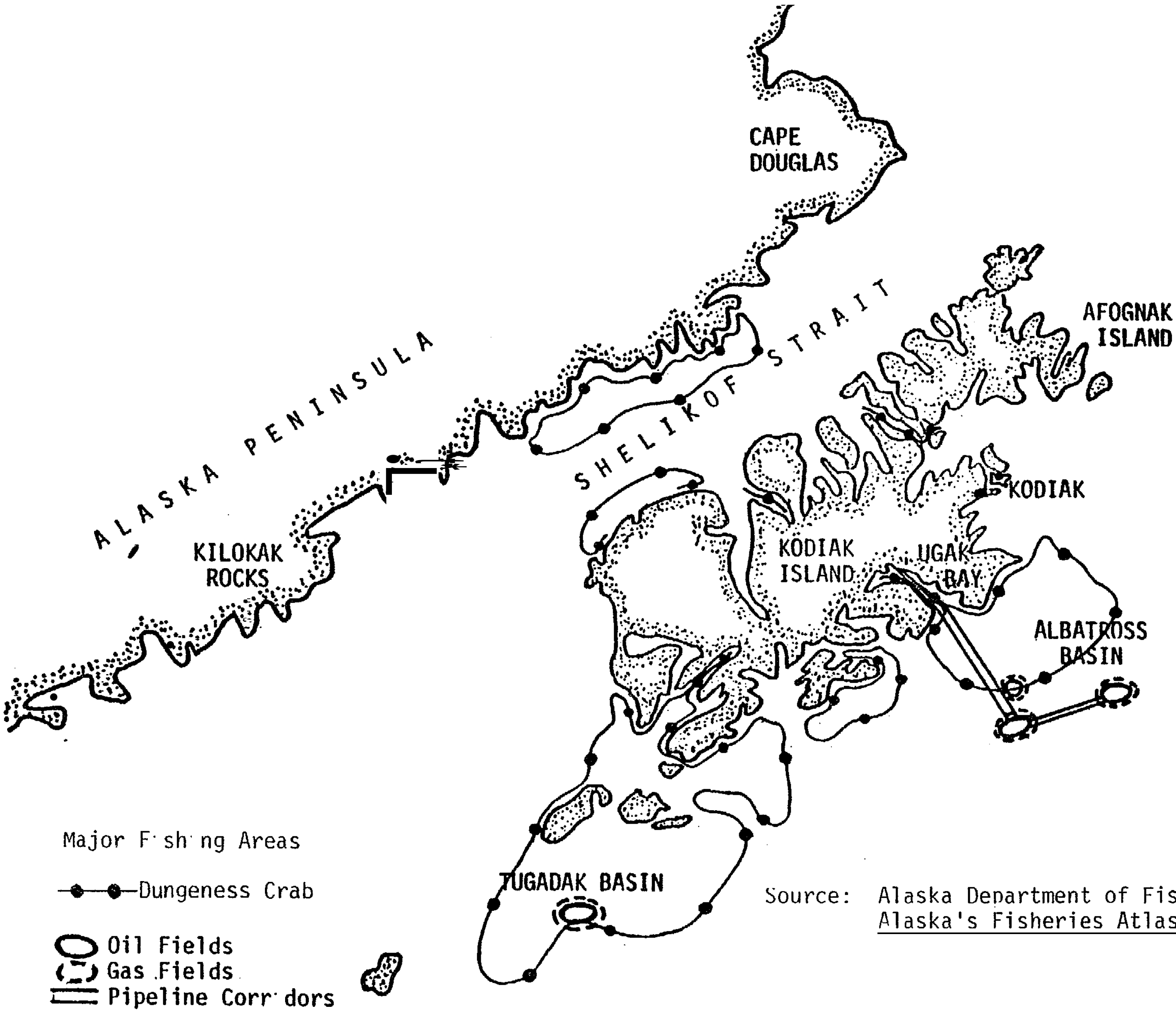
Source: Alaska Department of Fish and Game, Alaska's Fisheries Atlas, 1978

Figure 4.19 Major King Crab Fishing Areas, Kodiak.



Source: Alaska Department of Fish and Game, Alaska's Fisheries Atlas, 1978.

Figure 4.20 Major Tanner Crab Fishing Areas, Kodiak.



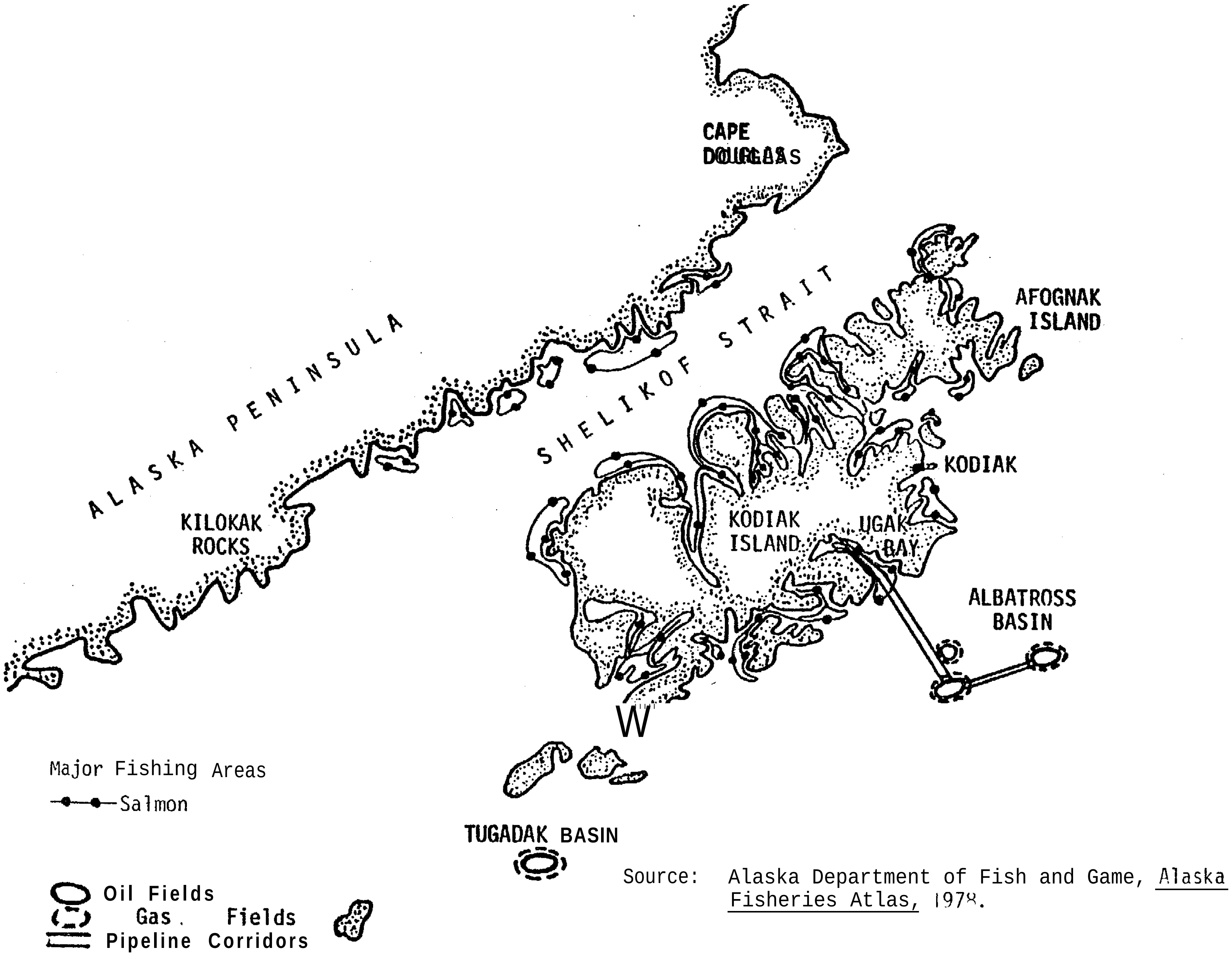
F·gure 4.21 Major Dungeness Crab Fishing Areas, Kod·ak.

Source: Alaska Department of Fish and Game, Alaska's Fisheries Atlas. 1978.

that result from OCS offshore operations may have a relatively minor impact on harvesting effort although they will adversely affect the income of fishermen and/or boat owners. The increased fishing costs are expected to decrease harvesting effort including catch in the crab fisheries in which market conditions are the binding constraints. As with other fisheries, the magnitude of the gear losses and increases in fishing costs will principally be determined by the efforts of the fishing and OCS industries and others to minimize the conflicts. In the absence of such efforts the losses may be substantial enough that the OCS activity effectively preempts other uses of ocean space in specific areas.

OCS offshore operation out of Womens Bay and Ugak Bay will compete with the Kodiak salmon fisheries for ocean space (see Figure 4.22). This competition will increase fishing costs; however, since the binding constraint in these fisheries is resource abundance, fishing effort may not be adversely affected. The net income of fishermen and/or boat owners is expected to decrease marginally for the fishery as a whole; the decrease in income may, however, be substantial for specific individuals.

The groundfish grounds in the Gulf of Alaska encompass the potential areas of OCS offshore operations, therefore, the cost of fishing will increase as a result of OCS operations. The increases are, however, with the possible exception of those due to gear losses to OCS debris, expected to be minimal since the groundfish grounds are so expansive, and by the time the domestic fishery has fully developed, OCS ocean space use will consist primarily of tanker traffic in well established lanes.



Source: Alaska Department of Fish and Game, Alaska Fisheries Atlas, 1978.

Figure 4.22 Major salmon fishing area. Kodiak.

Gear losses are expected to be a major part of the increase in fishing costs in areas in which the two industries will compete for ocean space. Although the magnitude of the gear losses resulting from OCS operations cannot be determined, current gear losses in absolute terms or in terms of total fishing costs are of interest. CFEC data indicate that in the mid-1970s, the average annual gear loss of vessels participating in Alaska shellfish fisheries was approximately $8,400. This was about 13 percent of the total value of the gear used by these vessels or about 17 percent of the fishing costs excluding labor costs. These gear loss estimates include the cost of gear itself and do not include the cost associated with lost fishing time. Ocs operations are typically not expected to double gear losses.

Another aspect of the increased fishing cost is the cost associated with collisions between fishing vessels and OCS vessels or structures. It is not possible to determine the magnitude of these costs, but there are reasons for expecting them to be minor for the fishing industry as a whole. The probability of a collision increases as the volume of traffic increases, and OCS and fishing operations are expected to significantly increase the volume of marine traffic in the study area. However, as is indicated in the Technical Report Number 31, the volume of traffic is expected to be insignificant compared to the capacity of the system; therefore, the projected increase in traffic is not expected to measurably increase the probability of a collision.

Fishing vessel accident data indicate, for the United States as a whole, collisions account for approximately 18 percent of fishing boat accidents and 45 percent of the collisions result from neglecting the rules of the road.

The implication is that additional vessel traffic will not substantially increase the cost of vessel accidents, particularly if more attention is paid to the rules of the road (see Appendix B).

COMPETITION FOR THE SERVICES OF THE INFRASTRUCTURE

The OCS requirements for electric power and water are expected to be greatest for the high find cases; therefore, a comparison of the requirements of the OCS and commercial fishing industries in the high find case with the projections of the availability of electric power and water can be used to determine whether adequate supplies will be available for both industries. Such a comparison is presented below by community.

The water requirements of the Yakutat commercial fishing industry are expected to increase more rapidly than the area wide water requirements in the high find case. However, the abundant groundwater supply and the ability of seafood processing plants to use salt water to supplement the supply of fresh water should prevent the availability of water from constraining the projected growth of the fishing industry. The availability of commercially generated electric power is not expected to constrain the fishing industry because the seafood processing plants are expected to continue to generate their own electric power unless a lower cost source of power becomes available. The low cost electric power that may be available from the LNG plant would be particularly beneficial to the industry in that it would be available in the early 1990s, just when the industry's demand for electric power is projected to increase rapidly due to the development of the groundfish fishery.

The water requirements for the fishing industry are expected to increase less rapidly than the water requirements for Cordova as a whole; therefore, adequate water is expected to be available for the projected long-run development of the industry. The industry's requirement for electric power is not expected to increase substantially until the early 1990s; by that time the growth in demand for electric power due to OCS operations will have subsided, It is, therefore, believed that the ability of the commercial fishing industry to acquire adequate electric power will not be adversely affected by OCS activity.

The water and electric power requirements of the Seward commercial fishing industry are not expected to increase significantly until the early 1990s. By that time, the growth in demand generated by OCS operations is projected to be minor. It would, therefore, appear that the availability of water and electric power to the fishing industry will not be adversely affected by OCS activities subsequent to lease sale No. 55 and/or lease sale No. 46.

In Kodiak, the modest rate at which the fishing industry's demand for water is expected to increase and the moderate OCS requirements for water are expected to assure that the projected growth of the industry will not be adversely affected by OCS operations. There are two reasons why the community's ability to meet the fishing industry's demand for electric power projected for the 1990s is not expected to be adversely affected by the OCS requirements for electric power. The ability of a community to meet the demand for electric power is more dependent on the rate of growth in demand, and the OCS requirements for electric power are expected to be relatively stable during the 1990s and will, therefore, not increase the rate of growth in demand.

Due to the inability of existing small boat harbors to serve OCS vessels, such vessels are not expected to compete with fishing boats for moorage space in the small boat harbors; however, due to the overflow conditions that currently exist in the small boat harbors of Alaska, fishing boats are forced to use other moorage facilities including those which OCS vessels will compete for prior to the construction of permanent service bases. The OCS competition for moorage facilities is, therefore, expected to adverse"ly affect the fishing industries during the exploration phase. The impact is expected to be greatest in those fisheries in which the boats are most mobile in terms of where fish can be landed; however, since the same adverse conditions are expected to occur at competing points of landing in the Gulf of Alaska, the competitiveness of one community relative to the others may not change sufficiently to affect its ability to attract boats. The impact will then be that fishing boats will be forced to use less convient and, therefore, more costly moorage facilities in each community.

The port facilities that are used by the freighters and barges servicing the commercial fishing industries in Kodiak and Seward will also serve the OCS industry prior to the completion of permanent OCS service bases. The Studies Program Transportation reports indicate that the port facility in Seward has sufficient capacity to serve both industries but that the Kodiak facility is close to capacity. OCS use of the Kodiak pert facility is, therefore, expected to adversely affect the Kodiak fishing industry. The existing service base facility in Yakutat and the limited OCS marine traffice projected for Cordova reduce the probability that similar impacts will occur in Yakutat or Cordova.

Summary of Potential Impacts

This section briefly summarizes the potential impacts of OCS operations by scenario and by community.

LEASE SALE NO. 55, LOW FIND CASE

Yakutat

- The competition for labor is expected to be substantial enough to adversely affect the amount of labor available to the fishing industry, particularly the processing sector.
- The competition for ocean space is expected to be minimal and, therefore, only marginally increase fishing costs.
- The OCS requirements for services are not expected to be large enough to adversely affect the fishing industry.

Cordova

- The labor requirements of the OCS activities are not expected to be large enough to affect the fishing industry.
- The OCS vessel traffic on the Prince William Sound fishing grounds is expected to be insignificant and not measurably

affect harvesting.

- The OCS requirements for services are not expected to be significant enough to affect the fishing industry.

Seward

- The projected OCS labor requirements are minimal and are not expected to affect the industry.
- With few exceptions, OCS offshore activity is not expected to occur in major fishing grounds; the impact of the competition for ocean space use is, therefore, expected to be minimal.
- The service requirements of the two Industries are projected to increase at rates which can be met by increases in the availability of inputs. The one exception is moorage facilities outside the small boat harbor. The competition for such facilities is expected to be decremental to the fishing industry.

LEASE SALE NO 55, MEAN FIND CASE

Yakutat

- The substantial OCS labor requirements are expected to disrupt the supply of labor to the fishing industry during the years of the most rapid growth, but to benefit the industry in subsequent years by increasing the supply of labor available to the fishing industry.

- The competition for ocean space use is expected to have a minor adverse impact on the industry.
- The competition for services will be limited by each industry's ability to provide their own.

Cordova

- Prior to the Hinchinbrook Island oil terminal and LNG plant labor force being housed in Cordova, the OCS labor impact is expected to be too small to affect the fishing industry. The disruptive growth that may occur the year these personnel become residents of Cordova will tend to temporarily disrupt the supply of labor to the fishing industry; however, in the long-run the larger population will increase the supply of labor to the industry.
- There are expected to be few areas of ocean space that will be used jointly by the two industries. The OCS uses of ocean space are, therefore, not expected to significantly affect the Cordova fishing industry.
- The OCS requirements for services are not expected to adversely affect the industry.

Seward

- The OCS labor requirements in Seward are not expected to significantly affect the fishing industry.

- With few exceptions, the Cook Inlet fisheries and OCS off-shore operations will not compete for ocean space; the Seward fishing industry is, therefore, not expected to be measurably affected by such operations.
- With the exception of moorage facilities, the service or facilities requirements of the fishin9 and OCS industries are not expected to be competitive. The competition for moorage, which will be limited to the exploration phase, is expected to adversely affect the industry.

LEASE SALE NO 55, HIGH FIND CASE

Yakutat

- The impact of the competition for labor is expected to be similar to that of the mean find case. It is expected to be adverse during the years of explosive growth but beneficial in the long-run.
- The competition for ocean space is expected to adversely affect the groundfish, salmon, and crab fisheries by marginally increasing fishing costs.
- The ability of each industry to provide its own services is expected to prevent the competition for services from adversely affecting the fishing industry.

Cordova

- The impacts of the competition for labor, ocean space, and services are expected to be similar in nature to those of the mean find case.

Seward

- The concentration of the OCS labor requirements in 1988 may be sufficient to partially disrupt the supply of labor to the fishing industry. In the remainder of the period, the larger population is expected to marginally increase the supply of labor available to the fishing industry.
- The competition for ocean space is expected to be minimal in all but the halibut and groundfish fisheries. The impact on the halibut fishery is expected to be smaller than that on the groundfish fishery since the former is constrained by resource abundance while the latter is constrained by market conditions.
- The projected increases in OCS fishing industry service requirements are consistent with the projections of the availability of services; the OCS competition is, therefore, not expected to be decremental. The one exception is the adverse effect that is expected from the competition for moorage facilities prior to the completion of a permanent OCS service base.

LEASE SALE NO. 46, LOW FIND CASE

Kodiak

- The OCS labor requirements are not expected to be sufficient to affect the fishing industry.
- Gear losses, particularly in the halibut and crab fisheries, are expected to occur. They are not, however, expected to significantly affect harvesting effort.
- The availability of services is expected to keep pace with the modest increases in the requirements for services of the two industries.

Seward

- The competition for labor is not expected to have a measurable impact on the fishing industry since the OCS labor requirements are not significant.
- OCS offshore operations are expected to be minimal in the major fishing grounds of Cook Inlet; therefore, the adverse effects of the competition for ocean space will be minor for the fishing industry as a whole.
- With one exception, the OCS service requirements are not expected to be large enough to affect the fishing industry. The exception is the competition for moorage which is expected to be marginally decremental to the fishing industry.

LEASE SALE NO. 46. MEAN FIND CASE

Kodiak

- The OCS labor requirements are minimal and are not expected to adversely affect the fishing industry.
- The OCS uses of ocean space are expected to increase the fishing costs in all but two of the Kodiak fisheries; however, since resource abundance is the binding constraint for most of these fisheries, the decreases in harvesting activity are not expected to be significant.
- It is believed that, with the exception of port facility services, the availability of services will increase sufficiently to meet the demands of both industries. The competition for port facility services during the exploration phase can adversely affect the fishing industry.

Seward

- The OCS labor requirements are not expected to be large enough to affect the fishing industry.
- There are expected to be few areas of joint ocean space use in the Cook Inlet management area. The increased fishing costs in the areas of joint use are not expected to have a measurable impact on the industry as a whole.
- With the exception of moorage facilities, the supply of

services is expected to be sufficient to meet the needs of both industries.

LEASE SALE NO. 46, High Find Case

Kodiak

- The OCS labor requirements are not expected to be sufficient to affect the fishing industry.
- OCS offshore operations will increase fishing costs in the major Kodiak fisheries, but this is not expected to result in a significant decrease in harvesting effort.
- With the possible exception of port facilities, the availability of services is expected to keep pace with the service requirements of the two industries.

Seward

- Since the OCS labor requirements are not substantial and since they are projected to be matched by increases in population, the competition for labor is not expected to significantly affect the fishing industry.
- The competition for ocean space is not expected to be sufficient to have more than a minor adverse effect on the industry as a whole.
- The service requirements are similar to those of the mean find use. Therefore, only the competition for moorage

during the exploration phase is expected to adversely effect the fishing industry.

APPENDIX 1

CONTENTS

Ex-vessel Price Models 486

NumberofBoatsand/orLandings Models 496

TABLE 1

SUMMARY OF EX-VESSEL PRICE MODELS

King Crab

P = -0.011 - 0.858E-6 AKL - 0.072 RW + 0.324E-3 RY + 0.621 CPI
t-statistics - 1.637 - 1.158 2.152 1.455

R^2 = 0.88 Durbin-Watson statistic = 1.85 Number of observations - 15, 1961-1975

P = ex-vessel price (statewide average)

AKL = Alaska landings of king crab in 1,000 lbs

RW = the real average hourly wage in Alaska food processing for July and August

RY = real national income in billions

CPI = Consumer Price Index (U.S., all goods, 1978 CPI = 1.0)

Dungeness Crab

P = 0.065 - 0.622E-5 AKL - 0.547E-5 OL -0.038 RW + 0.168E-3 RY +0.846 CPI
t-statistics - 1.385 - 6.171 -0.817 1.910 3.131

R^2 = 0.97 D-W = 1.60 n = 15, 1961-1975

P = ex-vessel price (statewide average)

AKL = Alaska landings of Dungeness crab in 1,000 lbs.

OL = other landings, (Oregon, Washington and California) of Dungeness crab

RW = real average hourly wage in Alaska food processing

RY = real national income in billions

CPI = Consumer Price Index (U.S. all goods, 1978 CPI = 1.0)

TABLE 1. (continued)

Halibut

1st stage:

$$
\begin{array}{llllll}
PW = & -0.778 & + 0.559E\text{-}5 \; HAKL & + 0.673E\text{-}5 \; HINV & - 0.029 \; W & \\
 & (-0.778) & (0.687) & (0.499) & (-0.178) & \\
 & -0.293E\text{-}2 \; SL & 0.979 \; HCONS/N & + 0.898E\text{-}06 \; HIMP & - 0.114E\text{-}3 \; RY & \\
 & (-1.849) & (-0.431) & (0.647) & (-0.083) & \\
 & +3.151 \; CPI & + 0.180E\text{-}5 \; OLH & & & \\
 & (1.715) & (0.109) & & &
\end{array}
$$

$R^2 = (0.975)$ D-W = 2.475 n = 15

2nd stage:

$$
\begin{array}{llllll}
P = & 0.218 & - 0.240E\text{-}5 \; HAKL & - 0.387E\text{-}5 \; HINV & + 0.986 \; \hat{PW} & - 0.652E\text{-}01 \; W \\
 & (1.867) & (-1.391) & -(1.772) & (11.942) & (-2.341)
\end{array}
$$

$R^2 = 0.993$ D-W = 1.683 n = 15, 1961-1975

PW is the wholesale price ($/lb) for dressed frozen halibut, average of monthly observations over each year (nominal dollars)

HAKL denotes Alaska landings of halibut (dressed weight) x 10^{-3} lbs;

W is average hourly wage in Alaska food processing for July and August (nominal dollars)

SL is length of fishing season in area 3A (Cape Spencer to Kupreanof Pt.) in days

HCONS is U.S. consumption of halibut in lbs

HIMP is halibut imports to the U.S. for consumption (product wt.) x 10^{-3} lbs

OLH is other U.S. landings of halibut (dressed weight) x 10^{-3} lbs

P is the Seattle ex-vessel price ($/lb) for No. 1 medium halibut, average of monthly observations over the year (nominal dollars)

N is U.S. total resident population x 10^{-3}

HINV is the halibut inventory held in cold storage

RY is real national income in billions

CPI is the Consumer Price Index (U.S. all goods, 1978 CPI = 1.0)

The t-statistics are in parentheses.

Tanner Crab

P = 0.018 + 0.156E-5 HAKL + 0.413E-7 EXJ + 0.011 RW + 0.450E-5 RY'
t-statistics (0.961) (0.03) (0.384) (0.031)

-0.026 CPI
(-0.123)

R^2 = 0.88 D-W = 1.86 N = 10 (1966-75)

Where:

P is the average Alaska ex-vessel price per pound of Tanner crab (nominal dol

HAKL denotes Alaska landings of Tanner crab {round wt.) x 10^{-3} lbs

EXJ Tanner crab exports to Japan

RW real average hourly wage in Alaska food processing for July and August (nominal dollars)

RY is real national income

CPI is the Consumer Price Index (U.S. all goods, 1978 = 1.0)

Salmon

PCH = -2.3073+ .5406 $\times 10^{-3}$ RPCYUS + .2260 $\times 10^{-2}$ AKCHMLDG + .6758 X 10^{-4}
(.1302)* (.2266 X 10^{-4}) (.2228 X 10^{-3}) (.5282 X 10^{-5})

FRCSTCHM + .9672 X 10^{-5} WRLDMCHM + .6887 X 10^{-3} PRSTEAK + .1223 $\times 10^{-1}$
(2318 $\times 10^{-5}$) (.5541 x 10^{-3}) (,6215 $\times 10^{-3}$

ATSMLDGS - .1558 X 10^{-1} PRTUNA + .8774 X 10^{-1} WAGE + .5489 $\times 10^{-4}$
(.2246 X 10^{-2}) (.5630 X 10^{-2}) (.4564 X 10^{-5})

RPCYSWED + .5062 X 10^{-3} RPCYUK - .2798 X 10^{-5} RPCYJAPN
(.7916 X 10^{-4}) (.1417 x 10^{-6})

PP = -1.3724 + .2220 $\times 10^{-3}$ RPCYUS + .3448 $\times 10^{-2}$ PRSTEAK + .1181 $\times 10^{-1}$
(.0108) (.1861 X 10^{-5}) (.6711 $\times 10^{-4}$) (.8472 $\times 10^{-4}$)

ATSMLDGS - .2404 $\times 10^{-6}$ FRCSTPNK -.7529 $\times 10^{-2}$ PRTUNA + .3882 $\times 10^{-5}$
(.2882 $\times 10^{-7}$) (.1708x 10^{-3}) (.4904 x 10^{-6})

WRLDMPNK + .5517 X 10^{-3} AKPNKLDG + .9768 X 10^{-1} WAGE -.1464 X 10^{-4}
(.7364 X 10^{-5}) (.6706 X 10^{-3} (.2667 X 10^{-4})

RPCYUK -.1367 X 10^{-5} RPCYJAPN + .3268 X 10^{-4} RPCYFRAN
(.2980 X 10^{-7}) (.2199 X 10^{-5})

* Standard error.

TABLE 1 (continued)

$$PR = -.8509 + \underset{(2.5423)}{} \; \underset{(.3325 \times 10^{-3})}{.3212 \times 10^{-3}} RPCYUS + \underset{(.1236 \times 10^{-1})}{.5306 \times 10^{-2}} PRSTEAK + \underset{(.1623 \times 10^{-1})}{.1378 \times 10^{-1}}$$

$$ATSMLDGS - \underset{(.5855 \times 10^{-1})}{.4971 \times 10^{-1}} PRTUNA + \underset{(.5284 \times 10^{-5})}{.1258 \times 10^{-5}} FRCSTSOK - \underset{(.1076 \times 10^{-3})}{.5184 \times 10^{-4}}$$

$$WRLDMSOK - \underset{(.2694 \times 10^{-2})}{.1374 \times 10^{-2}} AKSOKLDG + \underset{(.1638)}{.1397} WAGE + \underset{(.5288 \times 10^{-2})}{.1076 \times 10^{-2}} RPCYUK$$

$$- \underset{(.8994 \times 10^{-5})}{.4381 \times 10^{-5}} RPCYJAPN + \underset{(.6037 \times 10^{-3})}{.1388 \times 10^{-3}} RPCYFRAN$$

PCH = Ex-vessel price, chum, Alaska

PP = Ex-vessel price, pink, Alaska

PR = Ex-vessel price, sockeye, Alaska

RPCYUS = U.S. real per capita income

RPCYSWED = Swedish real per capita income

RPCYJAPN = Japanese real per capita income

RPCYUK = U.K. real per capita income

AKCHMLDG = Alaska chum landings

AKPNKLDG = Alaska pink landings

AKSOKLDG = Alaska sockeye landings

FRCSTCHM = Alaska chum run forecast

FRCSTPNK = Alaska pink run forecast

FRCSTSOK = Alaska sockeye run forecast

WRLDMCHM = Total world salmon landings, minus Alaska chum

WRLDMPNK = Total world salmon landings, minus Alaska pink

WRLDMSOK = Total world salmon landings, minus Alaska sockeye

ATSMLDGS = Total Atlantic salmon landings

PRTUNA = Price of tuna

PRSTEAK = Price of steak

WAGE = Average wage in food processing, Alaska

TABLE 1 (continued)

Groundfish

P	=	.001715	+4.1892 WCP	+ 0.8944 WD	
t-statistics		(.046)	(1.550)	(2.365)	

R^2 = .7919 D-W = 2.77

WCP	= .00248	- .45626E-5 WC	+ .019311 NW	+ .30845 WPGF	
	(2.223)	(-1.246)	(1.91)	(5.878)	

R^2 = .954 D-W = 1.432

P = Ex-vessel price of Alaska groundfish

WCP = World ex-vessel price of cod

WD = Wage differential (Alaska food processing wage - national wage)

WC = World groundfish catch

NW = National wage

WPGF = World wholesale price of groundfish

Table 2

PROJECTED ANNUAL PERCENTAGE CHANGE IN EX-VESSEL PRICES

Year	Percentage Change in Nominal Prices: Chum Salmon	Pink Salmon	Red Salmon	Halibut	King Crab	Tanner Crab	Dungeness Crab	Percentage Change in Real Prices: Chum Salmon	Pink Salmon	Red Salmon	Halibut	King Crab	Tanner Crab	Dungeness Crab
1981	21.95	12.20	11.86	7.86	8.41	3.60	7.42	15.59	6.35	6.03	2.23	2.76	-1.80	1.82
1982	18.00	13.04	9.09	7.77	8.22	3.71	7.33	11.85	7.15	3.40	2,15	2.58	-1.70	1*73
1983	18.64	9,62	11.11	7.51	7.94	3.84	7.12	12.46	3.90	5.32	1.90	2.31	-1,58	1*54
1984	15.71	12.28	8.75	7.39	7.73	3.96	7.00	9.68	6.43	3.08	1,79	2.12	-1.46	1.42
1985	13.58	9.,38	10.34	7.24	7.52	4.08	6.88	7.66	3.67	4.59	1.65	1.92	-1.35	1.31
1986	11.96	10.00	9,38	7*09	7.66	4.21	7.00	6.12	4.27	3.67	1.51	2.05	-1.23	1.43
1987	11.65	9.09	9.52	6.94	7.44	4.33	6.86	5.83	3,40	3.81	1.36	1.84	-1.11	1.29
198$	10.43	9.52	8,70	6.87	7.22	4.45	6.74	4.68	3.81	3.03	1*30	1.63	-1.00	1.17
1989	10.24	8.70	8*80	6.76	7.15	4.58	6.69	4.49	3.03	3*13	1.20	1.57	-0.87	1.12
1990	10,00	9.00	8,82	6.65	6.93	4.71	6.55	4.27	3.32	3.15	1.09	1.35	-0.75	0.99
1991	9*09	9.17	8.78	6.62	6.85	4,82	6.51	3.40	3.48	3.11	1.06	1.28	-0.64	0.95
1992	8.93	8.40	8.07	6.46	6.67	4.95	6.38	3.25	2.75	2.44	0.91	1,11	-0.52	0.83
1993	8.74	7.75	8.62	6.38	6.54	5.07	6.29	3.07	2.13	2.96	0.84	0.98	-0.40	0.75
1994	8,04	8.63	7,94	6.36	6.47	5*19	6.26	2.41	2.97	2.31	0.82	0.92	-0.29	0.72
1995	8.37	7.95	8.33	6.30	6.39	5*31	6.21	2.72	2.32	2.69	0.76	0.85	-0.18	0.67
1996	7*73	7.98	8.14	6.16	6.24	5.43	6.09	2.11	2.35	2.51	0.63	0.70	-0.07	0.56
1997	7.57	7*95	7.95	6.20	6.24	5.54	6.11	1.96	2.33	2.32	0.66	0.70	0.(-)4	0.57
1998	7.41	7.89	7.75	6.08	6.11	5.65	6.01	1.81	2.27	2.13	0.55	0.58	0.14	0.48
1999	7.59	7.32	7.55	6.01	6.03	5.76	5*95	1.98	1.72	1.95	0.48	0.50	0.25	0.43
2000	7.05	7.73	7.69	5.59	5.99	5.86	5.94	1*47	2.11	2.08	0.09	0.46	0.34	0.41

Source: Alaska Sea Grant Program.

NOTE: The percentage changes in the ex-vessel prices of king and coho salmon are expected to equal those of red salmon.

TABLE 3

ACTUAL AND PROJECTED VALUES OF THE EX-VESSEL PRICE MODEL EXPLANATORY VARIABLE

Actual Values

YEAR	Y	RY	Y/N	RY/N	N
1961	430.000	[illegible]	2349.33	5221.02	[illegible]
1962	461.000	1016.54	2491.55	5472.00	185771
1963	485.000	1055.53	2573.18	5599.95	188483
1964	522.000	1122.58	2730.97	5873.05	191111
1965	562.000	1205.94	2935.01	6231.44	193526
1966	625.000	1279.43	3175.69	6541.34	195576
1967	658.000	1316.00	3332.37	6664.74	197467
1968	718.000	1371.54	3600.82	6878.36	199399
1969	775.000	1418.12	3848.35	7041.81	201385
1970	879.000	1511.41	4312.84	7416.75	203810
1971	949.000	1569.29	4601.90	7612.74	206219
1972	1040.00	1656.05	4994.38	7952.84	208234
1973	1171.00	1766.21	5579.94	8416.19	209859
1974	1255.00	1699.33	5936.92	8039.16	211369
1975	1332.00	1648.51	6252.58	7738.34	213032

Projected Values

YEAR	Y	RY	Y/N	RY/N	N
1980	2012.14	[illegible]	9032.91	8115.64	222756
1981	2139.03	1864.21	9739.37	8294.18	224761
1982	2331.43	1922.37	10501.1	8476.66	226734
1983	2590.84	1982.34	11322.6	8663.14	228825
1984	2918.61	2044.19	12207.9	8853.73	230894
1985	3066.41	2107.96	13162.7	9048.51	232962
1986	3335.99	2173.73	14192.1	9247.58	235059
1987	3629.27	2241.54	15302.1	9451.03	237174
1988	3949.33	2311.47	16498.9	9658.95	[illegible]
1989	4295.44	2383.59	17789.3	9871.45	[illegible]
1990	4673.07	2457.05	[illegible]	10088.6	[illegible]
1991	5083.90	2534.63	20680.7	10310.6	[illegible]
1992	5530.25	2613.71	22298.1	10537.4	[illegible]
1993	6017.08	2695.25	24042.0	10769.2	[illegible]
1994	6546.07	2779.34	[illegible]	11006.1	[illegible]
1995	7121.56	2866.05	[illegible]	11248.3	[illegible]
1996	7747.64	2955.46	30135.7	11495.7	[illegible]
1997	8428.77	3047.67	[illegible]	11748.7	[illegible]
1998	9169.78	3142.75	[illegible]	12007.1	[illegible]
1999	9975.93	3240.80	[illegible]	12271.3	[illegible]
2000	10852.9	3341.90	[illegible]	12541.2	[illegible]

TABLE 3 (continued

Actual Values

YEAR	CPI	W	RW	AKLTANN	SJAP
1961	[illegible]	[illegible]	[illegible]	0.	.
1962	0.453500	[illegible]	6.70842	0.	
1963	[illegible]	[illegible]	6.13711	0.	
1964	[illegible]	[illegible]	6.34409	0.	
1965	0.471000	[illegible]	6.50297	0.	
1966	[illegible]	[illegible]	6.46879	0.200000	[illegible]
1967	0.500000	[illegible]	6.66000	118.000	0.700000
1968	0.522500	[illegible]	6.39924	3248.00	1.15000
1969	[illegible]	[illegible]	6.36790	11207.0	[illegible]
1970	[illegible]	[illegible]	6.12210	14473.0	[illegible]
1971	[illegible]	[illegible]	6.99752	[illegible]	[illegible]
1972	[illegible]	[illegible]	7.10191	30135.0	[illegible]
1973	0.663000	[illegible]	6.44042	61179.0	[illegible]
1974	0.738500	[illegible]	7.25796	63906.0	[illegible]
1975	0.808000	[illegible]	7.37624	46857.0	[illegible]

Projected Values

YEAR	CPI	W	RW	AKLTANN	SJAP
1980	1.11302	[illegible]	[illegible]	[illegible]	[illegible]
1981	1.17424	[illegible]	7.30190	[illegible]	1.00000
1982	[illegible]	[illegible]	7.37120	96653.0	[illegible]
1983	[illegible]	9.72517	7.44107	104244.	[illegible]
1984	[illegible]	10.3573	7.51150	112432.	[illegible]
1985	1.45468	11.0306	7.58290	121262.	[illegible]
1986	1.53469	11.7475	7.65468	[illegible]	[illegible]
1987	1.61999	12.5111	7.72723	[illegible]	[illegible]
1988	1.70914	[illegible]	7.80043	152132.	[illegible]
1989	[illegible]	14.1906	7.87442	164085.	1.18000
1990	1.90121	15.1123	7.94906	176973.	1.20600
1991	2.00577	[illegible]	8.02440	[illegible]	1.23000
1992	2.11609	17.1413	8.10046	205863.	[illegible]
1993	[illegible]	[illegible]	8.17725	222032.	[illegible]
1994	2.35526	[illegible]	8.25475	239470.	[illegible]
1995	2.48460	[illegible]	8.33300	258278.	1.33700
1996	2.62147	22.0517	8.41193	278563.	1.36500
1997	2.76565	23.4351	8.49172	300441.	1.39400
1998	2.91776	25.0116	8.57221	[illegible]	[illegible]
1999	3.07823	[illegible]	[illegible]	[illegible]	[illegible]
2000	[illegible]	[illegible]	8.73549	[illegible]	[illegible]

TABLE 3 (continued)

Actual Values

YEAR	HINV	HIMP	HSL	OCH	HCONS/N
1961	[illegible]	[illegible]	105.000	16944.[illegible]	[illegible]
1962	12944.0	31946.0	94.0000	16973.0	[illegible]
1963	21431.0	[illegible]	92.0000	16216.0	[illegible]
1964	23885.0	28129.0	110.000	12209.0	0.372000
1965	14699.0	27595.0	117.000	8890.00	0.326000
1966	16469.0	25195.0	98.0000	8384.00	0.302000
1967	19801.0	23944.0	159.000	10664.0	[illegible]
1968	17917.0	29027.0	164.000	12859.0	[illegible]
1969	12629.0	28571.0	138.000	9979.00	[illegible]
1970	13844.0	24714.0	149.000	7516.00	[illegible]
1971	16069.0	25720.0	178.000	5117.00	[illegible]
1972	10616.0	29480.0	136.000	2893.00	[illegible]
1973	16873.0	21441.0	144.000	2297.00	0.216000
1974	15515.0	8992.00	121.000	1255.00	[illegible]
1975	7909.00	12521.0	128.000	1691.00	[illegible]

Projected Values

YEAR	HINV	HIMP	HSL	OCH	HCONS/N
1980	11700.0	16000.0	126.000	2000.00	[illegible]
1981	11700.0	16000.0	126.000	2000.00	0.133600
1982	11700.0	16000.0	126.000	2000.00	0.137300
1983	11700.0	16000.0	126.000	2000.00	0.141000
1984	11700.0	16000.0	126.000	2000.00	0.144800
1985	11700.0	16000.0	126.000	2000.00	[illegible]
1986	11700.0	16000.0	126.000	2000.00	[illegible]
1987	11700.0	16000.0	126.000	2000.00	[illegible]
1988	11700.0	16000.0	126.000	2000.00	0.161000
1989	11700.0	16000.0	126.000	2000.00	0.165400
1990	11700.0	16000.0	126.000	2000.00	0.169900
1991	11700.0	16000.0	126.000	2000.00	0.174400
1992	11700.0	16000.0	126.000	2000.00	0.179200
1993	11700.0	16000.0	126.000	2000.00	[illegible]
1994	11700.0	16000.0	126.000	2000.00	[illegible]
1995	11700.0	16000.0	126.000	2000.00	[illegible]
1996	11700.0	16000.0	126.000	2000.00	[illegible]
1997	11700.0	16000.0	126.000	2000.00	[illegible]
1998	11700.0	16000.0	126.000	2000.00	[illegible]
1999	11700.0	16000.0	126.000	2000.00	[illegible]
2000	11700.0	16000.0	126.000	2000.00	[illegible]

TABLE 3 (continued)

Actual Values

YEAR	AKLHAL	AKLKING	AKLDUNG	LOD
1961	[illegible]	[illegible]	[illegible]	[illegible]
1962	[illegible]	52732.0	[illegible]	[illegible]
1963	[illegible]	73740.0	[illegible]	[illegible]
1964	[illegible]	86721.0	12709.0	[illegible]
1965	[illegible]	131671.	[illegible]	[illegible]
1966	[illegible]	159202.	5053.00	[illegible]
1967	[illegible]	127723.	11598.0	[illegible]
1968	[illegible]	[illegible]	13242.0	[illegible]
1969	[illegible]	[illegible]	11304.0	[illegible]
1970	[illegible]	[illegible]	[illegible]	[illegible]
1971	[illegible]	[illegible]	3749.00	[illegible]
1972	[illegible]	[illegible]	5448.00	[illegible]
1973	[illegible]	[illegible]	6423.00	[illegible]
1974	[illegible]	[illegible]	3813.00	[illegible]
1975	[illegible]	[illegible]	3034.00	[illegible]

Projected Values

YEAR	AKLHAL	AKLKING	AKLDUNG	LOD
1980	[illegible]	[illegible]	[illegible]	17331.0
1981	[illegible]	[illegible]	3527.00	17331.0
1982	[illegible]	101722.	3890.00	17331.0
1983	[illegible]	105265.	4290.00	17331.0
1984	20173.0	[illegible]	4731.00	17331.0
1985	[illegible]	113000.	5200.00	17331.0
1986	[illegible]	113000.	5200.00	17331.0
1987	[illegible]	113000.	5200.00	17331.0
1988	[illegible]	113000.	5200.00	17331.0
1989	[illegible]	113000.	5200.00	17331.0
1990	[illegible]	113000.	5200.00	17331.0
1991	[illegible]	113000.	5200.00	17331.0
1992	[illegible]	113000.	5200.00	17331.0
1993	[illegible]	113000.	5200.00	17331.0
1994	[illegible]	113000.	5200.00	17331.0
1995	[illegible]	113000.	5200.00	17331.0
1996	[illegible]	113000.	5200.00	17331.0
1997	[illegible]	113000.	5200.00	17331.0
1998	[illegible]	113000.	5200.00	17331.0
1999	38173.0	113000.	5200.00	17331.0
2000	[illegible]	113000.	5200.00	17331.0

TABLE .4

MODELS USED TO PROJECT THE NUMBER OF BOATS AND/OR LANDINGS

Kodiak

SALMON

Purse Seine

L = -2,262	+	0.090 C	+	13.96 B	
T-statistics		(8.23)		(3.46)	$R^2 = 0.953$

Beach Seine

L = -14.28	+	0.027 C	+	$0.00029\ C^2$	+	4.49 B	
		(0.21)		(1.74)		(3.82)	$R^2 = 0.965$

Set Gill Net

L = -588	+	1.37 C	$0.000147\ C^2$	
		(3.79)	(-2.85)	$R^2 = 0.842$

HALIBUT

C = 0.40 C3

B = C/37 (where 37 is catch per vessel in 1977)

L = 4 B

HERRING

L = 3B

3 = mean number of landings per boat 1974-1976

TABLE 4 (continued)

KING CRAB

$$B = 222 - 4{>}125 \times 10^{6}\,C^{-2} - 14{,}948 \times 10^{6}\,CL^{-2}$$

(-1 .00) (-3.70) R^2=0.896

$$L = 2{,}696 + 0.0331\,c + 6.97\,B + 820 \times 10^{6}\,Y^{-3}$$

(7.67) (15.1) (10.6) R^2=0.991

TANNER CRAB

$$B = 40.9 + 0.00225\,C + 0.000791\,CL$$

T-statistics (3.83) (1 .40) R^2 = 0.892

$$L = -2{,}296 + 0.0382\,C + 5.00\,B + 784 \times 10^{6}\,{}'r^{-3}$$

T-statistic (6.51) (3.51) (4.72) R^2 = 0.981

DUNGENESS CRAB

$$B = 1.71 + 0.00375\,c - 10.57\,R\,P^{-1} + 668{,}000\,KC^{-1}$$

T-statistic (3.29) (-4.58) (3.44) R^2 = 0.917

$$L = -68 + 0.010\,c + 10.93\,B$$

T-statistic (1.11) (7,02) R^2 = 0.958

TABLE .4 (continued)

SHRIMP

B = (mean C/B)/C

L = (mean C/L)/C

	Otter Trawl	Beam Trawl
1969-1976 mean C/B	41,255	127.5
1969-1976 mean C/L	60	13.76

Cook Inlet

SALMON

Purse seine

L = - 151	+	0.126 c	+	6.256 B		
t-statistics		(3.08)		(1.41)		R^2 = .80

Drift gillnet

L = - 1,858	+	0.167 C	+	9.346 B		
t-statistics		(1.56)		(1.87)		R^2 = .71

Set gillnet

L = 4,068	+	0.418 C	-	2.225 B		
t-statistics		(1.98)		(0.46)		R^2 = .52

HALIBUT

c = 0.30 C3

B = C/37 (where 37 is catch in 1,000 lbs. per vessel in 1977)

L = 4B

TABLE 4 (continued)

HERRING

L = 6.3B

6.3 = Mean number of landings per boat 1974-1976

KING CRAB

B	=	66.177	+	0.0015C	- 29.794	(1/T)
t-statistics				(0.232)	- (-1.72)	R^2 = 0.52

L		49.883	+	0.253C	
t-statistics				(3.61)	R^2 = 0.68

TANNER CRAB

B	=	6.781	+	0.0108C	i- 9.475	(1/Y)	
t-statistics				(6.[illegible])	(0.62)		R^2 = 0.94

L	+	228.720	+	0.128C	
t-statistics				(4.35)	R^2 = 0.76

DUNGENESS CRAB

B	=	39.224	+	0.021C	- 0.806	(1/RP)	
t-statistics				(1.21)	(-2.53)		R^2 = 0.71

L	=	-111.996	+	0.401C	+	10.951B	
t-statistics				(4.63)		(8.45)	R^2 = 0.98

TABLE 4 (continued)

POT SHRIMP

$$B = 10.422 + 0.0615C$$
t-statistics (4.01) $R^* = 0.73$

$$L = 52.919 + 1.732C$$
t-statistics (14.00) $R^* = 0.97$

TRAWL SHRIMP

$$L = -141.730 + 0.101C + 231.364\ (1/T)$$
t-statistics (4.38) (2.25) $R^* = 0.81$

No regression equation has been found that adequately explains the variance in the number of boats in the fishery. The variance was relatively small. The following equation was used to forecast the number of boats:

$$B = C\ (meanB/meanC)$$

Prince William Sound

SALMON

Purse seine

$$l = -151 + 0.099C + 6.87B$$
t-statistics (6.16) (3.80) $R^2 = .97$

Drift gillnet

$$L = 4{,}215 + 0.853C$$
t-statistics (3.47) $R^2 = .67$

TABLE 4 (continued)

HALIBUT

c= 0.03 C3

B = C/37 (where 37 is catch in 1,000 lbs. per vessel in 1977)

L = 4 B

HERRING

Purse Seine

L= 2.4B

2.4 = Mean number of landings per boat 1974-1976

Roe on Kelp

L = 5.5B

5.5 = Mean number of landings per boat 1974-1976

KING CRAB

B		12.627	+	0.0433C			
t-statistics				(2.79)		$R^2 = 0.56$	
L	=	37.802	+	0.407C	+	0.433B	
t-statistics				(2.39)		(0.14)	$R^2 = 0.74$

TANNER CRAB

B	=	18.443	+	0.00315C	- 5.009	(1/Y)	$R^2 = 0\ 92$
t-statistics				(5.44)	(-0.56)		
L	=	129.913	+	0.0658C			
t-statistics				(3.11)	$R^2 = 0.92$		

TABLE 4 (continued)

DUNGENESS CRAB

B = 2.83 + 0.0506C
T-statistics (2.63) R^2 = 0.54

L = -71.56 + 0.294C + 8.191B
t-statistics (0.92) (1.78) R^2 = 0.73

Yakutat

SALMON

Set Gill Net

L = - 161.97 + 0.797 C + 11.376 B
t-statistics (1.74) (3.75) R* = 0.80

HALIBUT

C = 0.015 C3

B = C/37 (where 37 is 'catch in 1,000 lbs. per vessel in 1977)

L = 4 B

TANNER CRAB

B = C/340

340 = 1977 catch per boat in 1,000 pounds

L = C/43

43 ' 1977 catch per landing in 1,000 pounds

TABLE 4 (continued)

DUNGENESS CRAB

B = C/165

165 = 1977 catch per boat in 1,000 pounds

L = C/18

18 = 1977 catch per landing in 1,000 pounds

KING CRAB

The king crab catch in expected to be primarily incidental catch in other crab fisheries, therefore, the king crab fishery is not expected to contribute to the number of boats or landings in the Yakutat fisheries.

THE MEANINGS OF THE PREVIOUS SYMBOLS ARE AS FOLLOW

L = number of landings

C = catch in 1,000 pounds

B = number of boats

LC = last year's catch in 1,000 pounds

Y = the year, 1969 = 1

RP = real ex-vessel price (dollars/pound)

KC = Kodiak king crab catch in 1,000 pounds

C3 = area 3 halibut catch in 1,000 pounds

REFERENCES

Alaska Dept. of Commerce and Economic Development. 1978. Alaska Power and Economic Development Program. (Preliminary) 316 pp.

Alaska Commercial Fisheries Entry Commission. 1969-1976. ADF&G Fish ticket data files.

______. 1969-1976. Commercial License files.

______. 1974-1976. Permit file.

Alaska Commission on the Conference of the Law of the Sea. 1978. The Alaska Position on the Law of the Sea.

Alaska Consultants, Inc. 1976. City of Cordova Comprehensive Development Plan. Alaska Department of Housing and Urban Development, and Div. of Community Planning, Alaska Dept. of Community and Regional Affairs. 217 pp.

______. 1976. City of Yakutat Comprehensive Development Plan. Alaska Dept. of Housing and Urban Development, and Div. of Community Planning, Alaska Dept. of Community and Regional Affairs. Anchorage, AK. 228 pp.

______. 1979. Technical Report Number 32, Northern and Western Gulf of Alaska Petroleum Development Scenarios, Local Socioeconomic Baseline. Prepared for the Bureau of Land Management, Alaska OCS office, Anchorage, AK.

______. 1979. Technical Report Number 33, Northern Gulf of Alaska Petroleum Development Scenarios, Local Socioeconomic Impacts. Prepared for the Bureau of Land Management, Alaska OCS office, Anchorage, AK.

______. 1979. Technical Report Number 40, Western Gulf of Alaska Petroleum Development, Local Socioeconomic Impacts. Prepared for the Bureau of Land Management, Alaska OCS office, Anchorage, AK.

Alaska Dept. of Community and Regional Affairs. 1974. Planning powers of Alaskan Municipalities. 11 pp.

Alaska Dept. of Fish and Game. 1961-1978. Commercial Finfish and Shellfish Fishing Regulations.

______. 1977. Intent to Operate List for 1977.

______. Various years. Catch and Production Reports.

______. Various years. Commercial Operators.

______. Various years. Annual Management Reports for: The Westward Region; Kodiak; Cook Inlet; Prince William Sound; Southeastern Areas; Yakutat District.

______. 1978. Alaska Sport Fishing Seasons and Bag Limits. Juneau, AK.

______ 1978. Alaska's Private Non-profit Hatchery Program, Information Handbook (Preliminary). Juneau, AK. 94 pp.

______. Division of Commercial Fisheries. 1978. Evaluation of Alaska Salmon Processing Capacity for the 1978 Season.

Alaska Dept. of Labor, Employment Security Divions. Data Files,

______. Research and Analysis Section. 1974. Jobs in the Fishing Industry. 25 pp.

Alaska Dept. of Public Works. 1970-1976 (Annual editions). Annual Report. Juneau, AK.

Alaska Dept. of Transportation and Public Facilities, Southeast Region. No date'. Southeastern Alaska Transportation Study. 93 pp.

______, Div. of Harbor Construction and Design. 1978. State Harbors and Boating Facilities. 72 pp.

Alaska Div. of Community Planning. 1977. Planning for Offshore Oil Development, Economic Forecasts, Lower Cook Inlet Lease Sale. Alaska Dept. of Community and Regional Affairs. 39 pp.

Alaska Div. of Economic Enterprise. 1973. Alaska Div. of Economic Enterprise Community Profiles. Alaska Dept. of Economic Development.

______, 1972. Alaska Statistical Review. Alaska Dept. of Economic Development, Juneau, AK. 198 pp.

Alaska Div. of Fisheries Rehabilitation, Enhancement and Development. 1977. Report to the 1977 Legislature. 56 pp.

Alaska Div. of Planning and Research. 1973. Bibliography of Community Planning. Office of the Governor. 89 pp.

Alaska Fisheries Development Corporation, February, 1978. Development Proposal for Bottomfish off Alaska.

Alaska Geographic Society. Alaska Geographic Magazine. Alaska Northwest Publishing Company, Edmonds, WA.

3(4) The Silver Years. 1976
1(4) Fisheries of the North Pacific. 1974
2(3) Prince William Sound. 1975
2(4) Yakutat. 1975
4(3) Kodiak. 1977
5(1) Cook Inlet. 1977

Alaska State Housing Authority. 1963. Comprehensive Plan, Cordova, Ak. 101 pp.

_____. Vol. 1, 1968; vol 2, 1970. Kenai Peninsula Borough Comprehensive Planning Program, Vol. 1: Survey and Analysis. 211 pp. vol. 2: Recommendations. 196 pp.

_____. 1968. Seward Comprehensive Plan. 115 pp.

_____. 1971. Yakutat, Alaska, Comprehensive Development Plan. 132 pp.

Archibald, J. 1974. Resources Inventory, Southcentral Region, Transportation, Communication and Utilities (Preliminary Draft). Resource Planning Team, Joint Federal-State Land Use Planning Commission. 73 pp.

Arctic Environmental Information Data Center, and Institute of Social, Economic, Government Research. 1974. The Western Gulf of Alaska, a Survey of Available Knowledge. Univesity of Alaska, Anchorage and Fairbanks. 599 pp.

Arthur D. Little, Inc. 1978. The Development of a Bottomfish Industry: Strategies for the State of Alaska, Executive Summary. Prepared for the Office of the Governor.

Beals, J. B. 1965. A Review of Trawling Explorations on the Alaska Shrimp Resource. Alaska Dept. of Fish and Game. Informational Leaflet 68. Juneau, AK. 47 pp.

Blackburn, J. E. 1978. Demersal Fish and Shellfish Assessment in Selected Estuary Systems of Kodiak Island. Alaska Dept. of Fish and Game, Kodiak, AK. 147 pp.

Bottomfish Task Force. 1979. State of Alaska, Program for Development of the Bottomfish Industry.

Brown, R. B. 1971. The Development of the Alaskan Fishery for Tanner Crab, Chionoecetes species, With Particular Reference to the Kodiak Area, 1967-1970. Alaska Department of Fish and Game. Informational Leaflet 153. Juneau, AK. 26 pp.

Browning, R. J. 1974. Fisheries of the North Pacific. Alaska Northwest Publishing Co. Anchorage, AK. 408 pp.

Bureau of Land Management. No date. Draft Environmental Impact Statement, Proposed OCS Oil and Gas Lease Sale, Western Gulf of Alaska, OCS Sale No. 46. U.S. Dept. of the Interior. Alaska OCS office, Anchorage, AK.

______. 1976. Final Environmental Otatement, 3 volumes, Proposed 1976 Outer Continental Shelf Oil and Gas Lease Sale, Lower Cook Inlet, OCS Sale No. CI. U.S. Dept. of the Interior. Alaska OCS office, Anchorage, AK.

______. 1975. Final Environmental Impact Statement, 4 volumes, Proposed OCS Oil and Gas Lease Sale, Northern Gulf of Alaska, OCS Sale No. 39. U.S. Dept. of the Interior. Alaska OCS office, Anchorage, AK.

Combs, E., and J. Hastings. 1978. Federal Law Development of United States Fisheries; and Proceedings of the 29th Alaska Science Conference.

Cooley, R. A. 1963. Politics and Conservation, the Decline of the Alaska Salmon. Harper and Row, New York. 123 pp.

Cooperative Extension Service. 1976. Alaska Resource Development Directory. University of Alaska. Publication No. 10. 73 Pp.

Dames & Moore. 1979. Technical Report Number 29, Norther Gulf of Alaska Petroleum Development Scenarios. Prepared for the Bureau of Land Managemnt, Alaska OCS office, Anchorage, AK.

______. 1979. Technical Report Number 35, Western Gulf of Alaska Petroleum Development Scenarios. Prepared for the Bureau of Land Management, Alaska OCS office, Anchorage, AK.

Energy Resources Company, Inc. and E. G. Frankel, Inc. 1978. Study to Assess the Impact of Alaska Petroleum Development on the Coast Guard Through the Year 2000. Prepared for the U.S. Coast guard.

Federal Field Committee for Development Planning in Alaska. 1971. Alaska Community Inventory. 231 pp.

Fishing Vessel Capital Construction Fund, National Fishery Education Center.

Foster, W. C., 1968. Fishery Regulation by State or Federal Government.

Governor's Study Group on Limited Entry. 1973. A Limited Entry Program for Alaska's Fisheries. 307 pp.

Gray, G. W., Jr., and R. J. Simon. 1965. Development of the King Crab Fishery off Kodiak Island. Alaska Dept. of Fish and Game. Informational Leaflet 52. Juneau, AK. 16 pp.

Haynes, E. B., and G. C. Powell. 1968. A Preliminary Report on the Alaska Sea Scallop - Fishery Exploration, Biology and Commercial Processing. Alaska Dept. of Fish and Game. Informational Leaflet 125. Juneau, AK. 20 pp.

Heighway, A. J., Publication, Ltd. Monthly. Fishing News International. London, England.

Interim Committee on Resource Matters. 1978. The Potential for Expanding into an Alaskan Bottomfish Industry. A report to the 10th Alaska State Legislature, Second Session.

International North Pacific Fisheries Commission. 1974. Statistical Yearbook 1974. Vancouver, B.C., Canada. 95 pp.

Institute of Social and Economic Research. 1979. Technical Report Number 34, Northern Gulf of Alaska Petroleum Development Scenarios. Economic and Demographic Impacts. Prepared for the Bureau of Land Management, Alaska OCS office, Anchorage, AK.

_____. 1979. Technical Report Number 38. Western Gulf of Alaska Petroleum Development Scenarios. Economic and Demographic Impacts. Prepared for the Bureau of Land Managemnt, Alaska OCS office, Anchorage, AK.

Jackson, D. P. Monthly. National Fisherman. Journal Publications, Inc. Camden, ME.

Jackson, P. B. 1968. Development and Growth of the Kodiak Island Shrimp Fishery. Alaska Department of Fish and Game. Informational Leaflet 120, Juneau, AK. 24 pp.

Jaeger, S. 1978. Comparative Trawl Analysis in 200-Mile Fishery, Testimony submitted before the subcommittee on Fisheries and Wildlife Conservation and the Committee on Merchant Marine Fisheries. House of Representatives, Ninety-fifth Congress. Serial 95-28, pp. 365-393.

Jensen, K., ed. 1976. Aquiculture 1976, A Digest of Sea Grant Research. Sea Grant Program, University of Delaware. Report DEL-SG-22-76. 41 pp.

Katz, P. L., and L. J. Bledsoe. 1977. Alaska Shellfish Regulations: Present Impacts on Fishery Participants. Pages 505-529. TRANSACTIONS OF THE AMERICAN FISHERIES SOCIETY. 106(6).

Kisner, W. Semi-monthly. The Fishermen's News. Seattle, WA.

Kramer, Chin and Mayo, Inc. 1978. Study Element 7: Environmental Impact Analysis, Working Paper A. 40 pp. Kodiak Island Borough Regional Plan and Development Strategy. Seattle, WA.

_____. 1968. Summary Report (Draft). Kodiak Island Borough Regional PI an and Development Strategy. Seattle, WA. 78 pp.

Kristjonsson, H., ed. Fish Finding, Purse Seining and Aimed Trawling. Modern Fishing Gear of the World: 3. Fishing News (Books) Ltd., London, England.

Laevastu, T. and F. Favorite. 1978. The control of pelagic fisheries resources in the eastern Bering Sea (a numerical eco-system study of factors affecting fluctuations of pelagic fishery resources with emphasis on herring.) NMFS, NW and AK Fish. Center, Seattle, WA. 64 pp.

Larson, D. M. 1979. Processing Groundfish. Personal communication. Telephone conversation with Jon Black, New England Fish Company, Kodiak, AK.

Liao, D. S., and J. B. Stevens. 1975. Oregon's Dungeness Crab Fishery: An Economic Analysis of Productivity and Profitability. Sea Grant Program, Oregon State University. Publication no. 0RESU-T-75-O05. Corvallis, OR. 18 pp.

Martin, J. B. 1978. An Evaluation of the Economic Feasibility of Pollock Processing in Southeast Alaska. Unpublished M. S. thesis Oregon State University, Corvallis, OR.

Mathematical Sciences Northwest, Inc. 1975. A Social and Economic Impact Study of Oil Related Activities in the Gulf of Alaska. Bellevue, WA. 319 pp.

McClean, R. F., W. A. Bucher, and B. A. Cross. 1977. A compilation of fish and wildlife resource information for the State of Alaska: Volume 3 - Commercial fisheries. Alaska Dept. of Fish and Game, Anchorage, AK. 606 pp.

McClean, R. F. and C. J. Delaney. 1977. A fish and wildlife resource inventory of Southeastern Alaska: Volume 2 - Fisheries. Alaska Dept. of Fish and Game, Anchorage, AK. 355 pp.

McClean, R. F., K. J. Delaney, and B. A. Cross. 1977. A fish and wildlife inventory of the Alaska Peninsula, Aleutian Islands, and Bristol Bay: Volume 2 - Fisheries. Alaska Dept. of Fish and Game, Anchorage, AK. 556 pp.

_____. 1977. A fish and wildlife resource inventory of the Cook Inlet - Kodiak areas: Volume 2 - Fisheries. Alaska Dept. of Fish and Game, Anchorage, AK. 443 pp.

National Fisherman. 1973-1978. Pacific Packers Report (annually). National Fisherman, Seattle, WA.

National Marine Fisheries Service (NMFS). (monthly). Current Fishery Statistics. NOAA. Washington, D.C.

__. 1977. High Seas Salmon Fisheries of Japan, and King and Tanner Crabs of the Eastern Bering Sea. Environmental Impact Statement/Preliminary Management Plans. NOAA.

_____. (monthly). Marine Fisheries Review. NOAA. Seattle, WA.

Naional Oceanic and Atmospheric Administration. 1977. Environmental Assessment of Alaskan Continental Shelf. Sponsored by the Bureau of Land Management. Environmental Research Laboratories, Boulder, CO. Numerous volumes.

Nautilus. Weekly. Coastal Zone Management. Washington, D.C.

_____. Weekly. Ocean Science News. Washington, D.C.

Nickerson, R. B., 1975. A Critical Analysis of Some Razor Clam (Siliqua Patula Dixon) Populations in Alaska. Alaska Dept. of Fish and Game.

NOAA, 1977. Report to the Congress on Ocean Pollution, Overfishing and Offshore Development, Part III.

North Pacific Fishery Management Council. 1978. Fishery Management Plan for the Gulf of Alaska Groundfish Fishery During 1978.

_____. 1978. Fishery Management Plan for the Commercial Tanner Crab Fishery off the coast of Alaska.

_____. 1978. Management Plan and Final Environmental Impact Statement for the Groundfish Fishery in the Bering Sea/Aleutian Island area.

_____. 1977. Fishery Management Plan for Alaskan King Crab.

Officer of the Governor, et al., 1964 and 1965. Alaska Bureau of Vital Statistics - Community Gazetteer of Alaska. Jointly by the Alaska Legislative Council, Alaska Dept. of Labor, Alaska Dept. of Health and Welfare, and the Office of the Governor.

Orth, F., C. Smelter, H. M. Feder and J. Williams. 1975. The Alaska Clam Fishery: A Survey and Analysis of the Economic Potential. University of Alaska. Institute of Marine Science Technical Report R75-3.

_____. 1977. Financing Alaska Commercial Fisheries Businesses: Problems and Alternative Solutions.

_____. 1978 Market Structure of the Alaska Seafood Processing Industry, Vol. I: Shellfish; Vol. II: Finfish, Preliminary Draft. Sea Grant Program, University of Alaska. Fairbanks, AK.

Pacific Packers Report 1976. Directory of West Coast Fisheries Organizations. National Fisherman, Camden, ME. pages 57 & 58.

Paul, T. 1976. For Bio-Dry Making Money is Offal Business. Alaska Industry, December 1976: 30-50.

Peter Eakland and' Associates. 1979. Technical Report Number 31, Northern Gulf of Alaska Petroleum Development Scenarios, Transportation Systems Impact. Prepared for the Bureau of Land Management, Alaska OCS office, Anchorage, AK.

_____. 1979. Technical Report Number 37, Western Gulf of Alaska Petroleum Development Scenarios. Prepared for the Bureau of Land Management, Alaska OCS office, Anchorage, AK.

Richardson, J. A., and F. L. Orth. 1978. The Historical Role of Regulations of Foreign Fishing in the Development of Alaska's Shellfish Industry. Unpublished. Sea Grant Program, University of Alaska, Fairbanks, AK. 19 pp.

Ritchie, T. 1977. A comprehensive Review of the Commercial Clam Industries in the United States, U.S. Dept. of Commerce, NOAA, DEL-SG-26-76, March 1977.

Rosenberg, D. H. ed. 1975. Proceedings of the Conference to Review the Draft Study Plan for Social and Economic Impact Assessment of Alaska Outer Continental Shelf Petroleum Development. Sea Grant Program, University of Alaska. Report 75-14. Fairbanks, AK. 144 pp.

Schneider, D. M., ed. 1977. Planning for Onshore Development: Discussion Papers. U.S. Dept. of the Interior and U.S. Environmental Protection Agency. American Society of Planning Officials, Chicago, IL.

Stoles, R. G. 1978. Operation of Seward Government and Influence of Commercial Fisheries upon the City. Personal communication. Personal interview and telephone conversations with Johnny Johnson, City Manager of Seward, AK.

_____. 1978. History and present status of Seward small boat harbor and port facilities. Personal communication. Personal interview and telephone conversations with Foster Singleton, Harbormaster of Seward, AK.

_____. 1978. History and present status of Kodiak small boat harbor. Personal communication. Personal interview and telephone conversations with George (Corky) McCorkle, Harbormaster of Kodiak, AK.

_____. 1978. History and present status of Cordova small boat harbor and port facilities. Personal communication. Personal interview and telephone conversations with Joe Gunderson, Harbormaster of Cordova, AK.

______. 1978. History and present status of Cordova utilities. Personal communication. Personal interview and telephone conversations with Doug Bechtel, Employee of City of Cordova, AK.

______. 1978. Market structure information, and contacts within the commercial fisheries industry. Personal communication. Personal interviews with Jim Wilson and Jim Richardson, conducting market structure research of seafood industry, Alaska Sea Grant Program, University of Alaska, Fairbanks, AK.

______. 1978. Commercial fisheries and coastal zone planning. Personal communication. Personal interview with M. E. (Pete) Isleib, commercial fisherman and member of Alaska Coastal Policy Council, Cordova, AK. June 3, 1978.

______. 1978. Commercial fisheries and bottomfish fisheries development. Personal communication. Personal interview with Connie Taylor, commercial fisherman and actively invoved with bottomfish development. Cordova, AK. June 2, 1978.

______. 1978. Status of Alaska Sea Products. Personal communication. Telephone conversations with Dave Allison, operator of Alaska Sea Products, Seward, AK. August, 1978.

______. 1978. Seward utilities records. Personal communication. Telephone interview and correspondence with Darryl Schaefermeyer, Administrative Assistant for the City of Seward, AK. August, 1978.

______. 1978. Status of Aquiculture program. Personal communication. Telephone conversation with Wally Noerenberg, of the Prince William Sound Aquiculture Corp., Cordova, AK.

______. 1978. Yakutat community facilities and development plans. Personal communication. Personal interview and telephone conversations with Larry Powell, Mayor of Yakutat, AK. June, 1978.

______. 1978. Status of Yakutat Cold Storage fish processing plant. Personal communication. Personal interview and telephone conversation with John Aker, Supt. of Yakutat Cold Storage plant, Yakutat, AK. June, 1978.

______. Status of Western Seafoods fish processing plant. Personal communication. Personal interview and telephone conversation with Marlis Koroch, Supt. of Western Seafoods processing plant, Yakutat, AK. June, 1978.

______. 1978. Cordova city government and development plans. Personal communication. Personal interview and telephone conversations with Perry Lovett, Cordova City Planner, Cordova, AK.

______. 1978. Status of Seward Fisheries processing plant. Personal communication. Telephone conversations with Don Hanson, Supt. of Seward Fisheries, Seward, AK. August, 1978.

_____. 1978. Status of Anderson Processing. personal Communication. Telephone conversation with Margaret Anderson, Owner of Anderson Processing, Seward, AK. August, 1978.

_____. 1978. History and status of Yakutat Cold Storage Coop and commercial fisheries. Personal communication. Personal interview with Jay Stevens, commercial fisherman and head of local fishermen's organization. Yakutat, AK. June 5, 1978.

_____. 1978. History and status of Kodiak port facilities. Personal communication. Personal interview and correspondence with George Cutrell, Port Operations Manager of Kodiak, AK.

_____. 1978. Fish processing, plant site needs. personal communication. Personal interview with Chuck Jensen, Supt. of Pacific Pearl Seafoods, Kodiak, AK. July 19, 1978.

_____. 1978. Data sources available within Alaska Dept. of Fish and Game. Personal communication. Personal interview and telephone conversation with Pete Jackson, Alaska Dept. of Fish and Game, OCS Study, Kodiak, AK.

_____. 1978. Fish processing, plant site needs. Personal communication. Personal interview with Lyle Negus, Supt. of B&B Fisheries, Kokiak, AK. July 19, 1978.

_____. 1978. Commercial fishing, fishermen's organizations and bargaining. Personal interview and telephone conversations with Alvin Burch, Head of Kodiak Shrimp Trawlers Assoc., Kodiak, AK.

Sevy, J., Habitat North, Inc. 1979. Technical Report Number 28, Socioeconomic Impacts of Selected Foreign OCS Development. Prepared for the Bureau of Land Management, Alaska OCS office, Anchorage, AK.

Simpson Usher Jones, Inc., Architects/Planners. 1977. Kodiak Island Borough Outer Continental Shelf Impact Study. 2 volumes, Anchorage, AK. vol. 1, 97 pp. vol. 2, 1973 pp.

Stistics and Market News Div. 3 times weekly. Fishing Market News Report. NMFS, Seattle, WA.

_____. Various Years. Fishery Statistics of the United States (annual). NMFS. U.S. Government Printing Office.

Stokes, R. L. 1978. The Economics of Alaska Groundfish Developments: A Preliminary Assessment. Proceedings of the 29th Alaska Science Conference. Alaska Fisheries: 200 Years and 200 Miles of Change. Sea Grant Report 79-6.

Terry, J. M., and R. G. Stoles. 1978. Fish processing and commercial fisheries. Personal communication. Personal interview with Jim Poor, Supt. of the St. Elias fish processing plant in Cordova, AK. June 1, 1978.

______. 1978. Fish processing and commercial fisheries. Personal communication. Personal interview with Ken Reomhildt, Supt. of the North Pacific Processors fish processing plant in Cordova, AK. June 1, 1978.

______. 1978. Fish processing and commercial fisheries. Personal communication. Personal interview with Jim Jacobson, Supt. of the New England Fish Co. fish processing plant in Cordova, AK. June 1, 1978.

______. 1978. Fish processing and commercial fisheries. Personal communication. Personal interview with John Hewitt, Supt. of the Morepack fish processing plant in Cordova, AK. June 1, 1978.

______. 1978. Fish processing and commercial fisheries. Personal communication. Personal interview with Meryle Wickett, Supt. of the Alaska Packers Assoc. fish processing plant in Cordova, AK. June 1, 1978.

Terry, J. M. 1978. Commercial fisheries, and Cordova governmental structure. Personal communication. Personal interview with Jim Paine, who is conducting socioeconomic research of Cordova for completion of a graduate degree, Cordova, AK. June 2, 1978.

______. 1978. Kodiak Electricity status. Personal communication. Personal interview with Dave Neise, Manager of Kodiak Electric Assoc., Kodiak, AK. July 19, 1978.

______. 1978. Kodiak electricity status. Personal communication. Personal interview with Larry Wolf, Kodiak Electric Assoc. employee, Kodiak, AK. July 19, 1978.

______. 1978. Reviewed records of Kodiak Electric Assoc. Personal communication. Personal interview with Mary McFarland, Kodiak Electric Assoc. employee, Kodiak, AK. July 20, 1978.

______. 1978. Commercial fishing. Personal communication. Personal interview with Oral Burch, commercial shrimp fisherman, Kodiak, AK. July 20, 1978.

______. 1978. Labor situation in Seward. Personal communication. Personal interview with Willard Dunham, Labor Officer, Seward, AK. July 20, 1978.

______. 1978. Fish processing, and to gather information about Seward Fisheries processing plant. Personal communication. Personal interview with Rick Dutton, Supt. of Seward Fisheries, Seward, AK. May 31, 1978.

. 1978. Commercial fisheries. Personal communication. Personal ‘interview with Bob Blake, commercial fisherman and head of Cordova fishermen’s group, Cordova, AK. June 3, 1978.

______. 1978. Fisheries regulation, law enforcement. Personal communication. Personal interview with Corporal John Lake, State Fish and Wildlife Dept., Cordova, AK. June 3, 1978.

______. 1978. Information concerning Kodiak Island Borough. Personal communication. Personal interview with Harry Milligan, Kodiak Borough Manager, Kodiak, AK. July 18, 1978.

______. 1978. Information about the City of Kodiak. Personal Communication. Personal interview with Ivan Widom, Kodiak City Manager, Kodiak, AK. July 17, 1978.

______. 1978. Employment situation in Kodiak. Personal communication. Personal interview with Marion Soule, Labor Dept. Manager in Kodiak, AK. July 18, 1978.

______. 1978. Kodiak water and sewage status. Personal communication. Personal interview with Herman Beukers, Supt. of Public Works, Kodiak, AK. July 18, 1978.

______. 1978. Status of shellfish fisheries in Kodiak area. Personal communication. Personal interview with Marty Eaton, Shellfish biologist for Alaska Dept. of Fish and Game, Kodiak, AK. July 20, 1978.

______. 1978. Status of finfish fisheries in Kodiak area. Personal communication. Personal interview with Paul Pedersen, Finfish biologist for Alaska Dept. of Fish and Game, Kodiak, AK. July 19, 1978.

. 1978. Commercial fisheries, fish processing, and general city 'information. Personal communication. Personal interview and telephone conversations with Craig Wiese, Marine Advisory Agent, Cordova, AK.

. 1978. Commercial fisheries, fish processing, and general city 'information. Personal communication. Personal interview and telephone conversations with Hank Pennington, Marine Advisory Agent, Kodiak, AK.

Trasky, L. L., L. B. Flagg, and D. C. Burbank. 1977. Environmental Studies of Kachemak Bay, Volume 1. Marine/Coastal Habitat Management, Alaska Dept. of Fish and Game, Anchorage, AK.

Tryck, Nyman, and Hayes. Part 1, 1968; Part 2, 1969. Kodiak Island Borough Comprehensive Plan, Part 1: General Plan; Part 2: Kodiak Urban Area Transportation and Utilities Plan. Anchorage, AK. Part 1, 230 pp.; Part 2, 172 pp.

______. 1974. Near Island Comprehensive Development Plan. Anchorage, AK. 86 pp.

United Fishermen of Alaska. Monthly. Alaska Fisherman. Juneau, AK.

U.S. Dept. of Commerce, National Marine Fisheries Service. 1973. King and Dungeness Crabs, 1947-72. Washington, D.C. Basic Economic Indicators, Current Fisheries Statistics No. 6133. NOAA XCFSA-6133. 52 pp.

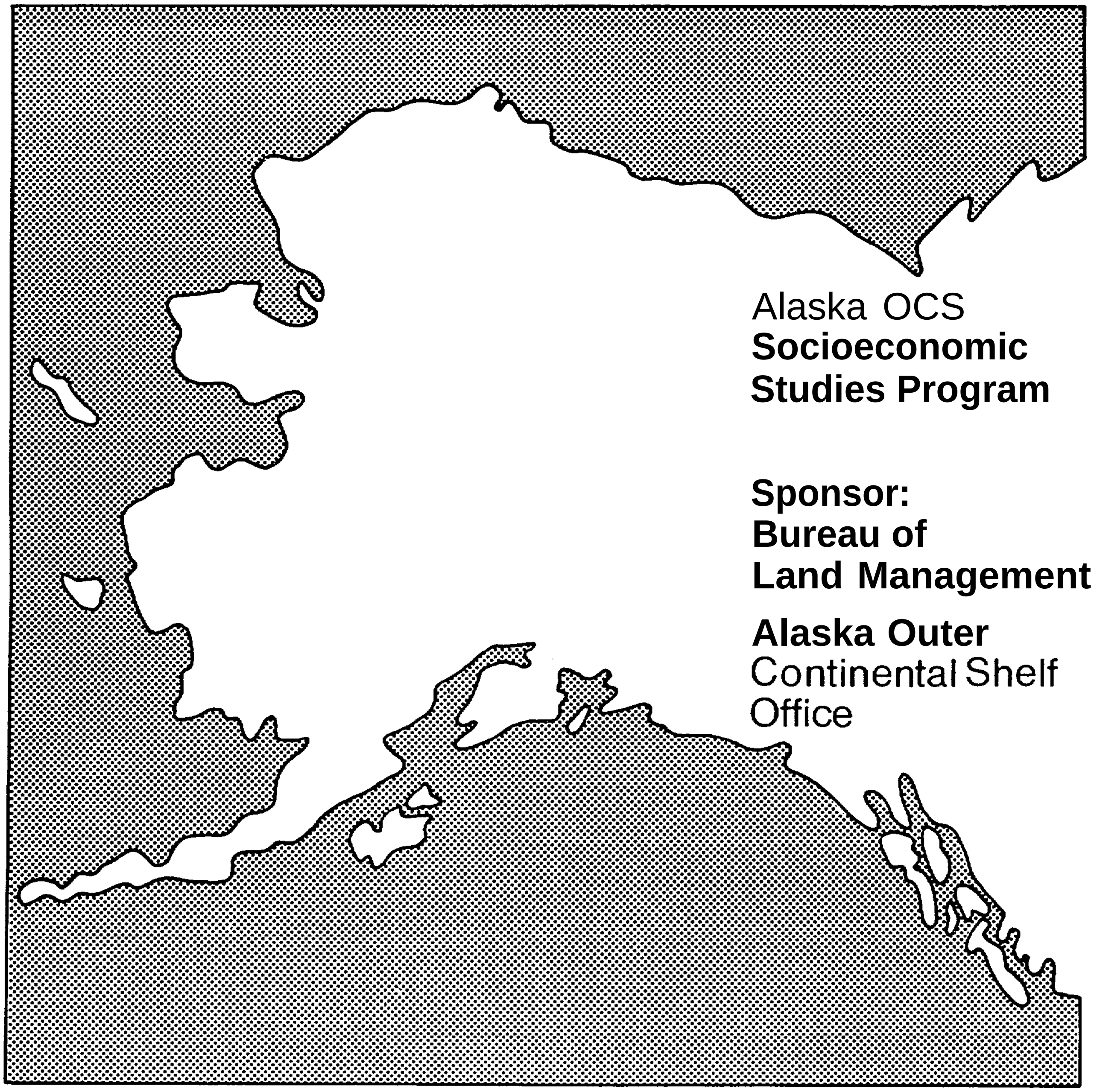
Us. Dept. of the Army, Corps of Engineers. 1960-76 (Annual editions). Part 4: Waterways and Harbors, Pacific Coast, Alaska and Hawaii. Waterborne Commerce of the United States. San Francisco, CA.

Us. Geologic Survey. Socioeconomic Impacts of Outer Continental Shelf Oil and Gas Development - A Bibliography. U.S. Dept. of the Interior. Geological Survey Circular 761. Arlington, VA.

Youde, J. G., and J. R. Wix. 1967. Economics of the Dungeness Crab Fishery. Agricultural Experiment Station, Oregon State University. Circular of Information 627. Corvallis, OR. 24 pp.

Zinn, J. 1978. Volume II: Effects on Caostal Communities. Environmental Planning for Offshore Oil and Gas. U.S. Dept. of the Interior, Fish and Wildlife Service. 60 pp.

Technical Report
Number 26



Alaska OCS
Socioeconomic
Studies Program

Sponsor:
Bureau of
Land Management

Alaska Outer
Continental Shelf
Office

Developing Predictive Indicators of Community and Population Change

The United States Department of the Interior was designated by the Outer Continental Shelf (OCS Lands Act of 1953 to carry out the majority of the Act's provisions for administering the mineral leasing and development of off-shore areas of the United States under federal jurisdiction. Within the Department, the Bureau of Land Management (BLM) has the responsibility to meet requirements of the National Environmental Policy Act of 1969 (NEPA) as well as other legislation and regulations dealing with the effects of off-shore development. In Alaska, unique cultural differences and climatic conditions create a need for developing additional socioeconomic and environmental information to improve OCS decision making at all governmental levels. In fulfillment of its federal responsibilities and with an awareness of these additional information needs, the BLM has initiated several investigative programs, one of which is the Alaska OCS Socioeconomic Studies Program.

The Alaska OCS Socioeconomic Studies Program is a multi-year research effort which attempts to predict and evaluate the effects of Alaska OCS Petroleum Development upon the physical, social, and economic environments within the state. The analysis addresses the differing effects among various geographic units: the State of Alaska as a whole, the several regions within which oil and gas development is likely to take place, and within these regions, the various communities.

The overall research method is multidisciplinary in nature and is based on the preparation of three research components. In the first research component, the internal nature, structure, and essential processes of these various geographic units and interactions among them are documented. In the second research component, alternative sets of assumptions regarding the location, nature, and timing of future OCS petroleum development events and related activities are prepared. In the third research component, future oil and gas development events are translated into quantities and forces acting on the various geographic units. The predicted consequences of these events are evaluated in relation to present goals, values, and expectations.

In general, program products are sequentially arranged in accordance with BLM's proposed OCS lease sale schedule, so that information is timely to decision making. In addition to making reports available through the National Technical Information Service, the BLM is providing an information service through the Alaska OCS Office. Inquiries for information should be directed to: Program Director (COAR), Socioeconomic Studies Program, Alaska OCS Office, P.O. Box 1159, Anchorage, Alaska 99510.