EXPLOSIVE REMOVAL OF STRUCTURES: FISHERIES IMPACT ASSESSMENT

Presented By
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Introduction

- In 2016, the Bureau of Ocean Energy Management (BOEM), perceived a need for an updated estimate of potential impacts to Gulf of Mexico Fisheries due to OCS explosive decommissioning of offshore oil and gas platforms.
- On June 15, 2016, the Bureau of Safety and Environmental Enforcement (BSEE) on behalf of BOEM, issued a contract to LGL Ecological Research Associates, Inc. to address this need.
- The study's focus is the federal waters of the Gulf of Mexico, Western and Central Planning Areas, from the limit of state waters to a water depth of 300 m.

Study Objectives

- Characterize the relative abundance and distribution of commercially and/or recreationally-valuable, federally-managed fish species within the lethal blast radius of explosive severance charges used during decommissioning of fixed OCS platforms;
- Develop a technique to estimate or model species-specific mortality of managed fish species due to explosive severance activities, incorporating factors such as severance methods and environmental variables;
- Compare study results with mortality estimates currently used in fisheries management plans or recent stock assessments. Quantify resulting differences in abundance or population estimates and determine if, and at what rate of explosive severance operations impact populations;
- Develop recommendations that minimize impacts to fish and fisheries to guide BOEM and (BSEE) in authorizing decommissioning activities.

Research Team

- The team assembled to conduct this research includes:
  - Benny J. Gallaway, Ph.D.
    Program Manager
    LGL Ecological Research Associates, Inc.
  - Brad Erisman, Ph.D.
    Hydroacoustics P.I.
    University of Texas Marine Science Institute
  - Stephen T. Szedlmayer Ph.D.
    Acoustic Tagging and Telemetry P.I.
    Auburn University
  - Katherine Kim, Ph.D.
    Shock Wave Propagation and Mortality P.I.
    Greeneride Sciences, Inc.
  - Scott W. Raborn Ph.D.
    Data Manager, Analyst
    LGL Ecological Research Associates, Inc.
  - William Gazey
    Stock Assessment P.I.
    Gazey Research Associates
  - Shane Cantrell
    Logistics Coordinator
    Charter Fishermans Association

Captain Mike Jennings
President
Charter Fishermans Association

Scientific Peer Review Team

- All work conducted in this project is subjected to External Scientific Peer Review

- The Peer Reviewers are:

  Dr. Gregg Gitschlag
  NOAA Fisheries Galveston
  Platform Removals

  Dr. John Walter
  NOAA Fisheries, SEFSC
  Stock Assessment

  Dr. Edward Chesney
  LUMCON
  Platform Ecology

Study Approach

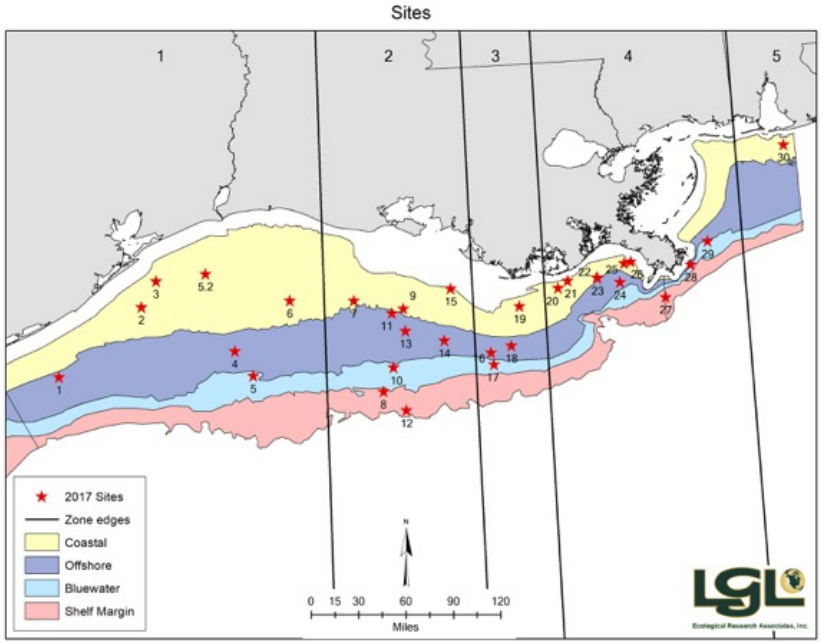
- The first task (completed) was to conduct a synthesis of current literature regarding the distribution of federally-managed fish species on or around GOM OCS structures and the expected mortality that these species might experience as a result of underwater detonations.
- This document also provided the basis for finalizing our preliminary field sampling design.
- The field studies are restricted to the May-October period and the quantity of platforms to be sampled each year is restricted to 30 structures.

Study Approach (continued)

- We structured the federal waters in the Central and Western Planning Areas of the Gulf offshore for a depth of 300 m based on biological assemblage data.
- The Western Planning Area was divided to reflect Pulley's (1952) Texas Transitional Province separate from the Northwestern Gulf Biological Province.
- The federal planning area was also divided at the mouth of the Mississippi River to separate Pulley's (1952) Northeastern Gulf from the Northwestern Gulf Biological Province.
- Each of the three provinces were further divided into depth zone assemblages generally following Gallaway and Lewbel (1982): Coastal (20 to 30 m), Offshore (31 to 60 m), Bluewater (61 – 90 m) and Shelf edge (91 to 300 m).

Study Approach (continued)

- The number of fixed platforms and well protectors occurring in each province and depth zone was used as the basis for randomly selecting 30 sampling sites from the overall study area.

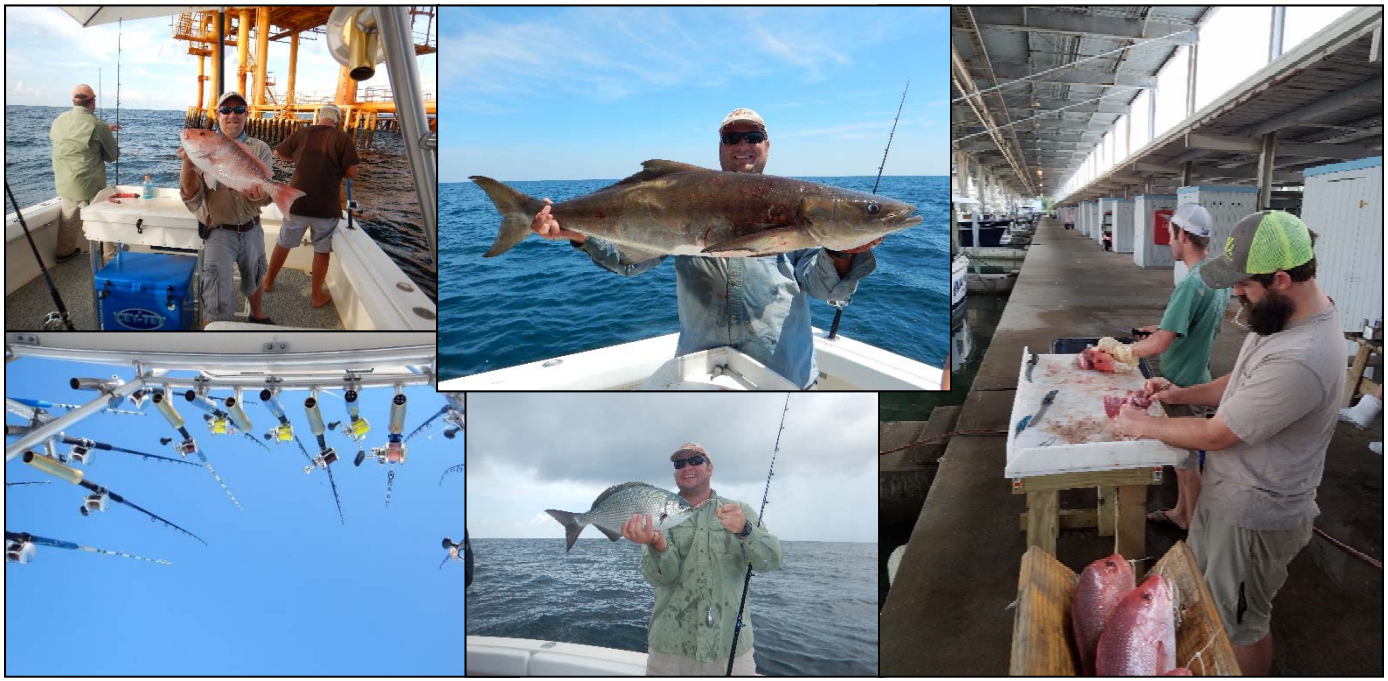


Study Approach (continued)

- Hydroacoustic Surveys and Submersible Rotating Video Cameras (SRVs) are used to estimate the total numbers of fish present, and the species composition of fish at all 30 sites.

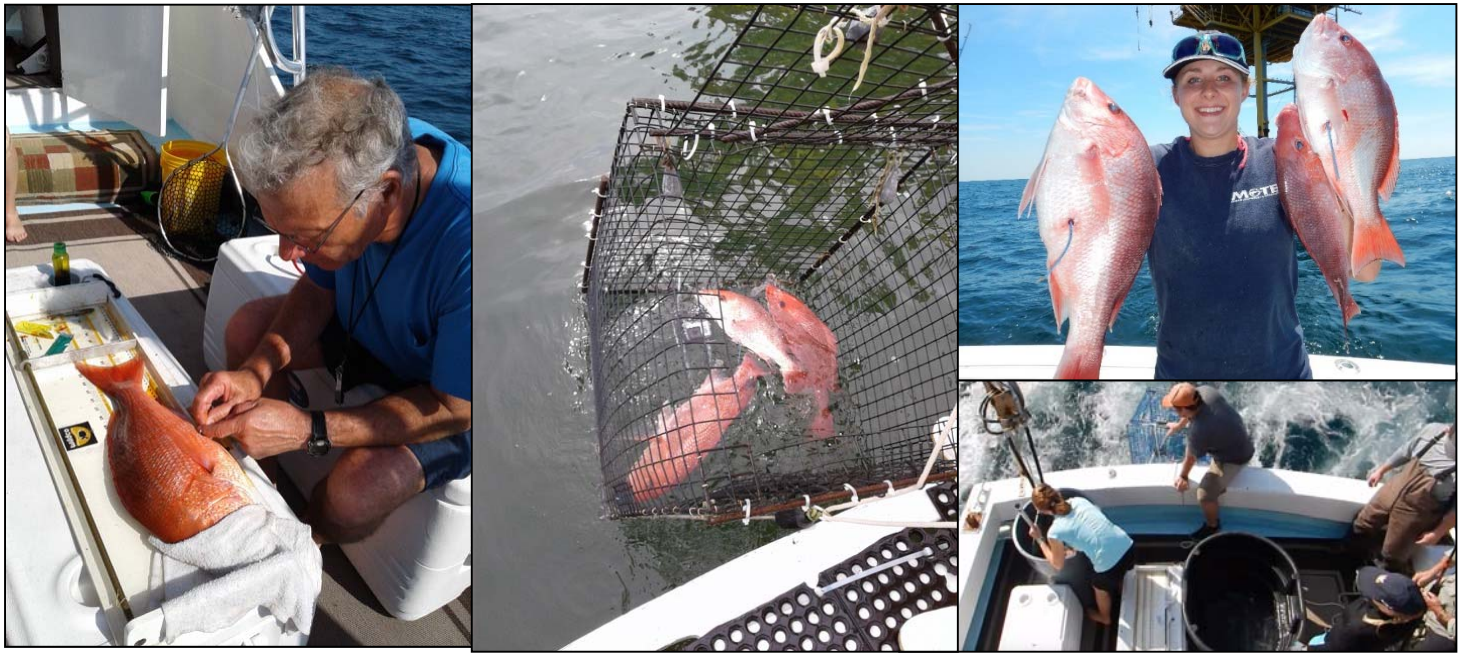
Study Approach (continued)

- Hook and line sampling is conducted at all 30 sites, also supplemented by SRV surveys. Fish are identified to species and sex, weighed, measured and the otoliths are extracted.



Study Approach (continued)

- At a subset of 10 of these platforms, mark/recapture studies are conducted to obtain independent population estimates for Red Snapper.



Study Approach (continued)

- A subset of 3 three platforms provides the basis for acoustic telemetry studies to determine site fidelity.

- Vertical profiles of temperature, salinity, dissolved oxygen and turbidity are taken synoptically with each sampling event.

Study Approach (continued)

- Effects of explosive decommissioning activities on fish are estimated using Under Water Calculator, Version 1 (Dzwileski and Fenton 2003).
- User input includes explosive type and weight, pile specifications, charge depth and fish depth.
- Fish number and depth is obtained from the hydroacoustic surveys.

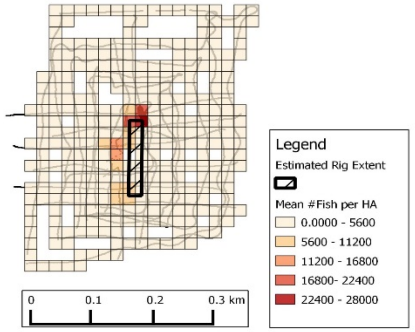
Preliminary Results

- We are near the end of our first field season.
- Progress as of 16 August 2017 is reflected below.

	Planned	Completed	% Complete
Hydroacoustic Surveys	30	30	100
Biological Sampling	30	26	87
Marking Studies	10	9	90
Recapture Studies	10	7	70
Telemetry	3	3	100
	83	75	
		90%	

Hydroacoustic Survey Results

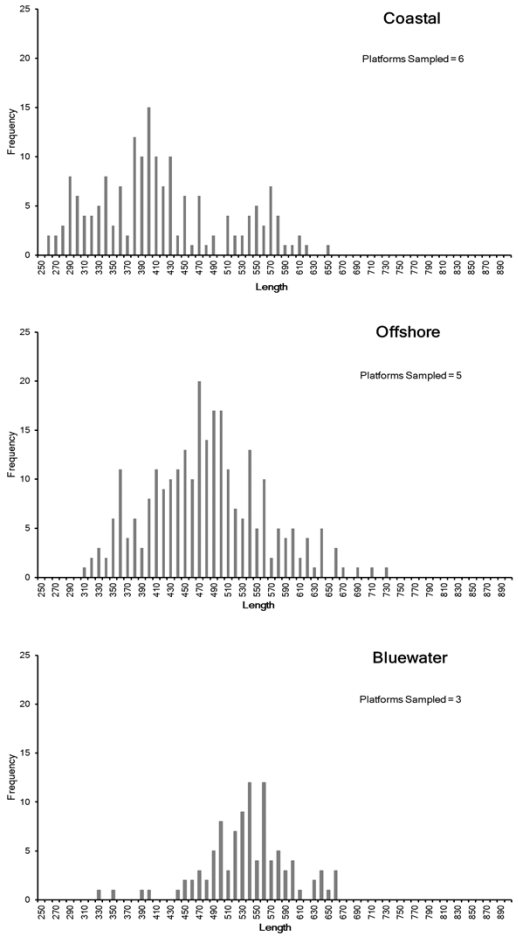
- Hydroacoustic surveys for the first field season have all been completed.
- Preliminary results are available for our initial test site, Site 30 offshore Alabama.



- At this site, the total number of fish present was 10,176 of which 3,053 were Red Snapper.
- Based on the Red Snapper population estimates derived from mark/recapture studies, we are 95% confident that the population of Red Snapper at this site exceeds 3,000 fish.

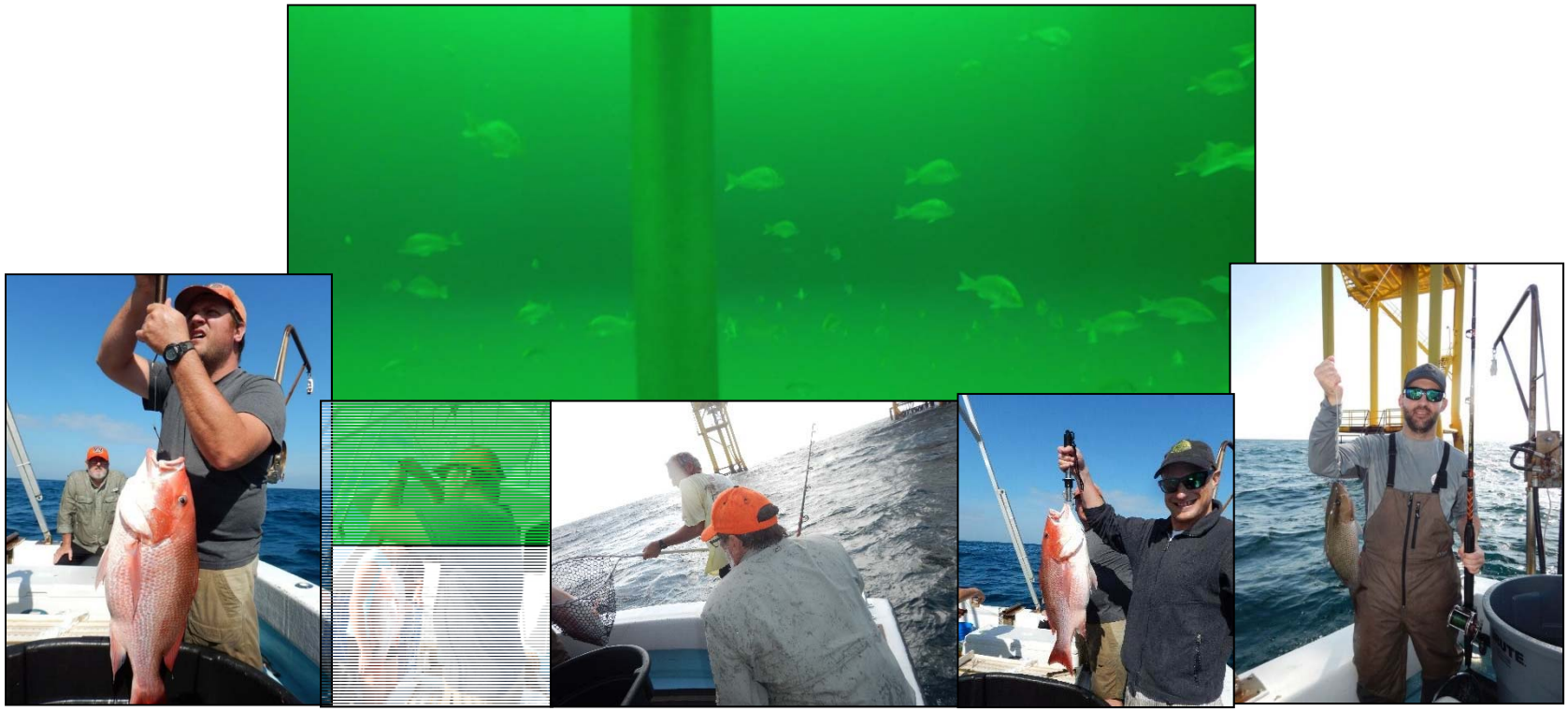
Biological Sampling

- Size/frequency (and age frequency data) are being generated by this program component, as well as
- Species composition and
- Water quality data

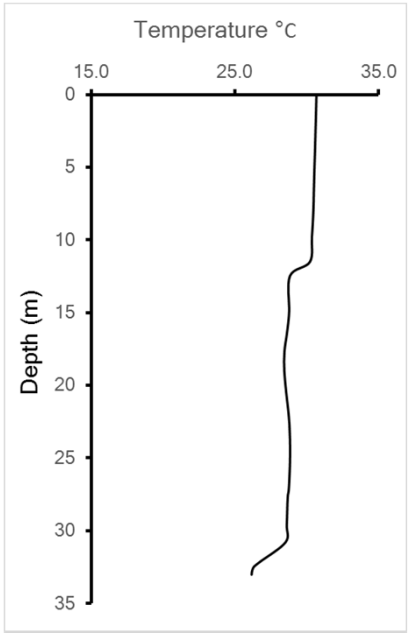


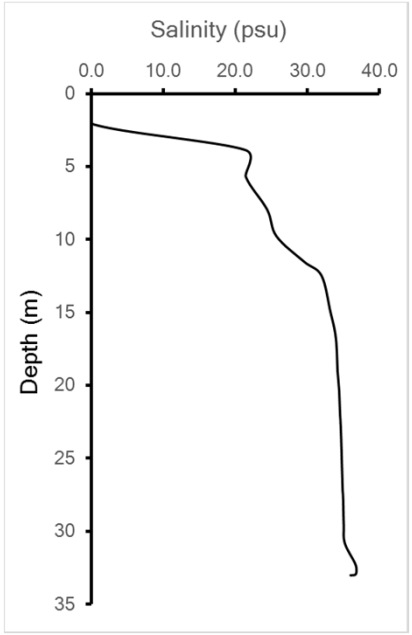
Biological Sampling (continued)

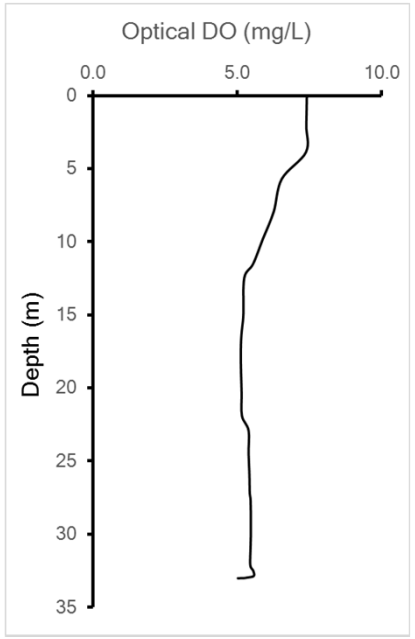
- Species Composition determined using SRVs and Hook-and-line sampling.

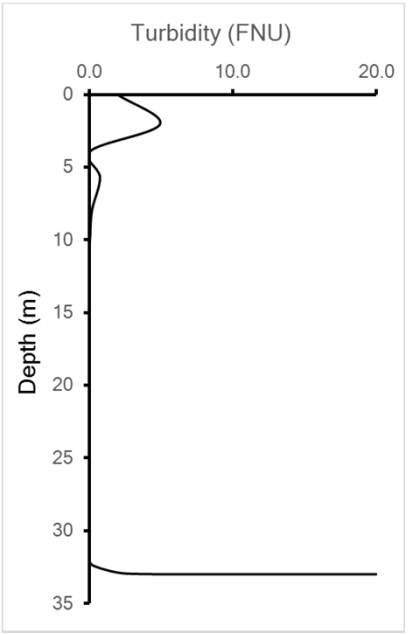


Biological Sampling (continued)









Red Snapper Mark/Recapture Studies

- Preliminary Red Snapper population estimates can be calculated for 6 of the 7 sites for which complete data are available at this time.
- At Site 4, sharks interfered with sampling success, 62 Red Snapper were released and no tagged fish were observed among the 212 fish taken in the recapture sample.

- This platform is located at a depth of 46 m, and is offshore the Texas-Louisiana border.

Red Snapper Mark/Recapture Studies (continued)

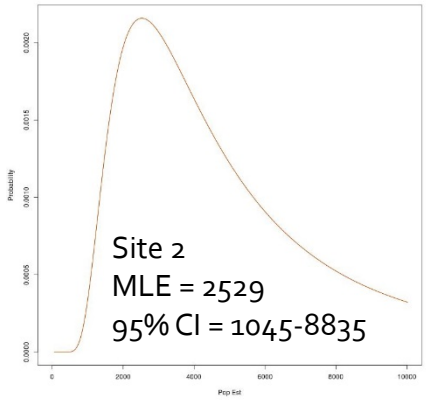
- Mark/recapture estimates of Red Snapper abundance have been made for sites 02, 07, 09, 11, 13, and 30:

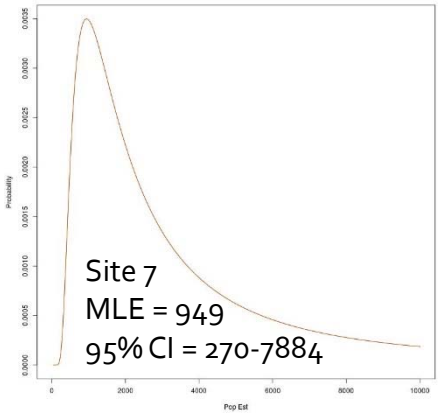
Site	Depth (m)/zone	MLE	95% CI
2	12/Coastal	2,529	1,045 to 8,834
7	29/Coastal	949	270 to 7884
9	30/Coastal	829	230 to 7,635
11	29/Offshore	453	264 to 900
13	42/Offshore	527	349 to 864
30	19/Coastal	6,609	2,952 to 19,840

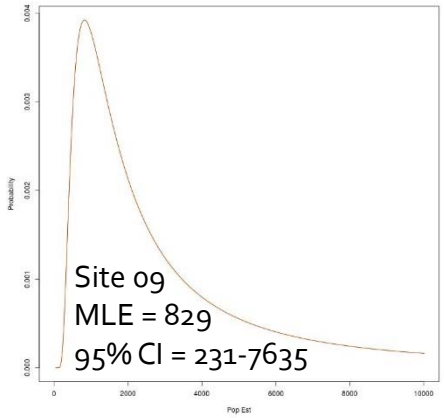
- Mark/recapture estimates were made using a sequential Bayes algorithm following Gazey and Staley (1986).

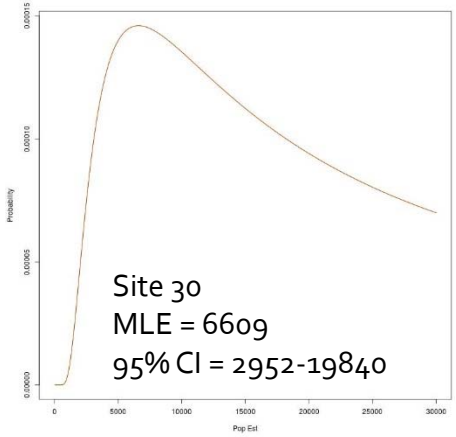
Red Snapper Mark/Recapture Studies (continued)

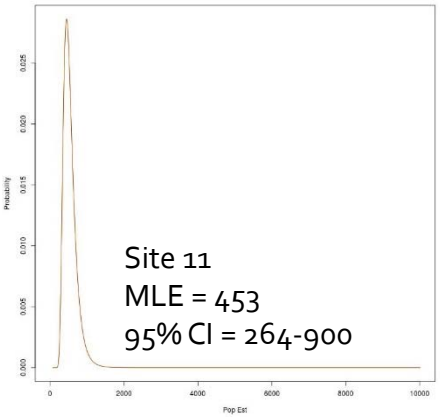
Coastal

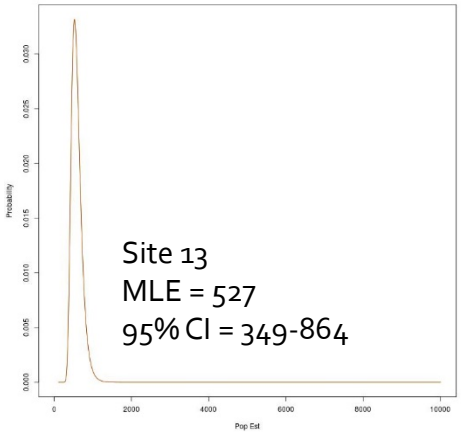








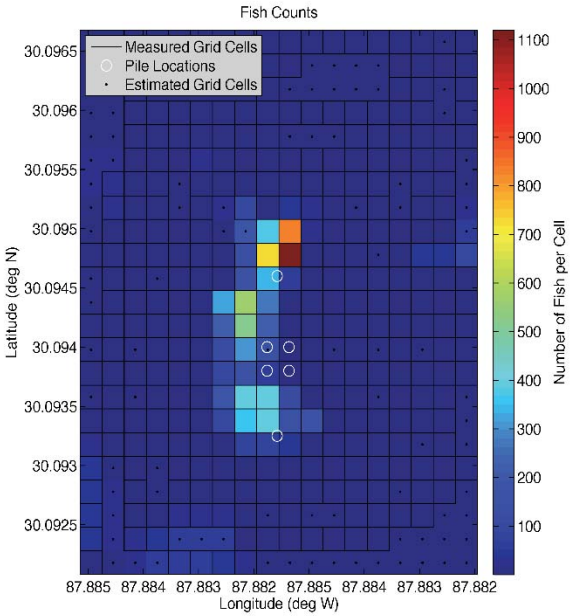


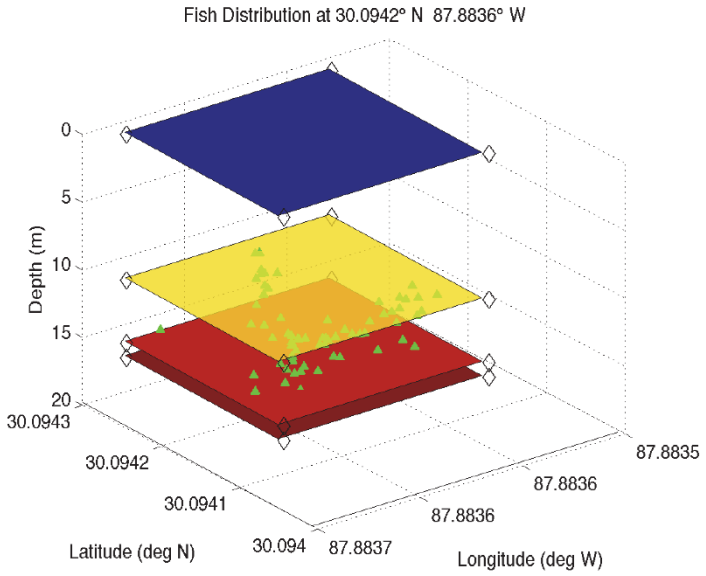


Offshore

Effects of Explosive Decommissioning

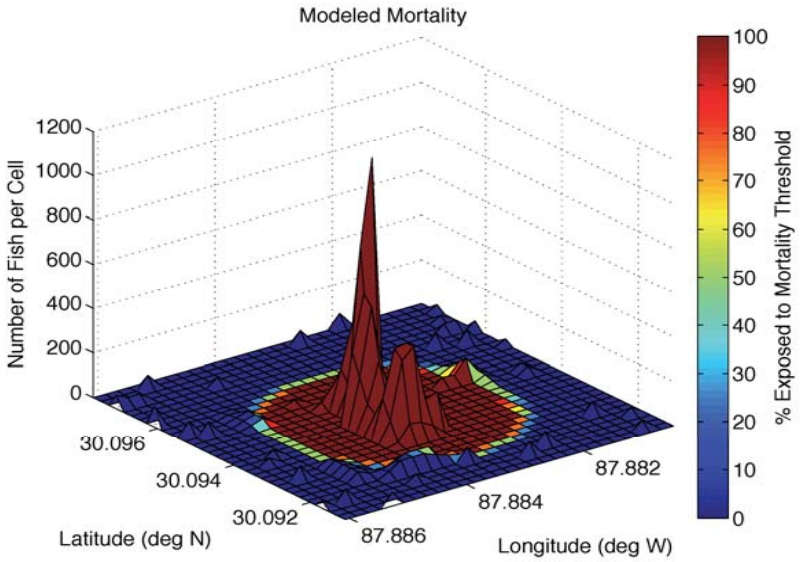
- Hydroacoustic and SRV survey data are used to determine the number and types of fish present and their distribution.





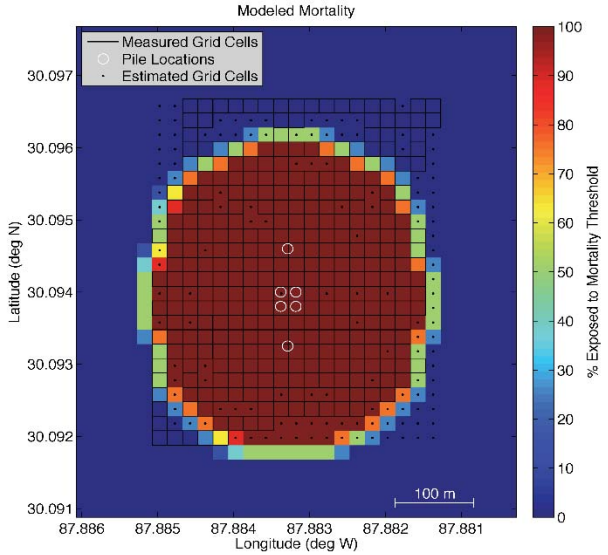
Effects of Explosive Decommissioning (continued)

- The model predicts the percentage of fish exposed to a lethal dose based upon a mortality threshold.



Effects of Explosive Decommissioning (continued)

- Using data from Site 30, virtually all fish present were predicted to be killed under the removal scenario evaluated.



Literature Cited

- Dzwilewski, P.T., and G. Fenton. 2003. Shock wave/sound propagation modeling results for calculating marine protected species impact zones during explosive removal of offshore structures. U.S. Dept. of the Interior, Minerals Management Service, Gulf of Mexico OCS Region, New Orleans, LA. OCS Study MMS 2003-059. 39 pp.

- Gallaway, B.J., and G.S. Lewbel. 1982. The ecology of petroleum platforms in the northwestern Gulf of Mexico: A community profile. U.S. Fish and Wildlife Service, Office of Biological Services, Washington, D.C. FWS/ OBS-82/27. 106 p. +Plates.

- Gazey, W.J., and M.J. Staley. (1986). Population estimation from mark-recapture estimates using a sequential Bayes algorithm. Ecology 67 (4): 941-951.

- Pulley, T.E. 1952. A zoogeographic study based on the bivalves of the Gulf of Mexico. Ph.D. thesis. Harvard University, Cambridge, MA. 215 pp.

Questions