

Lophelia II: Within-Site Comparisons

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Purpose

- Compare *Lophelia* colony characteristics within and among study sites: large-scale differences
 - Depth distributions
 - Live:dead ratios
 - Associated fauna
 - Water chemistry (methane)
- Preliminary ^{14}C aging of recent and relic coral skeletons.
 - Longevity of contemporary sites
 - Potential ^{18}O temperature record for bottom water

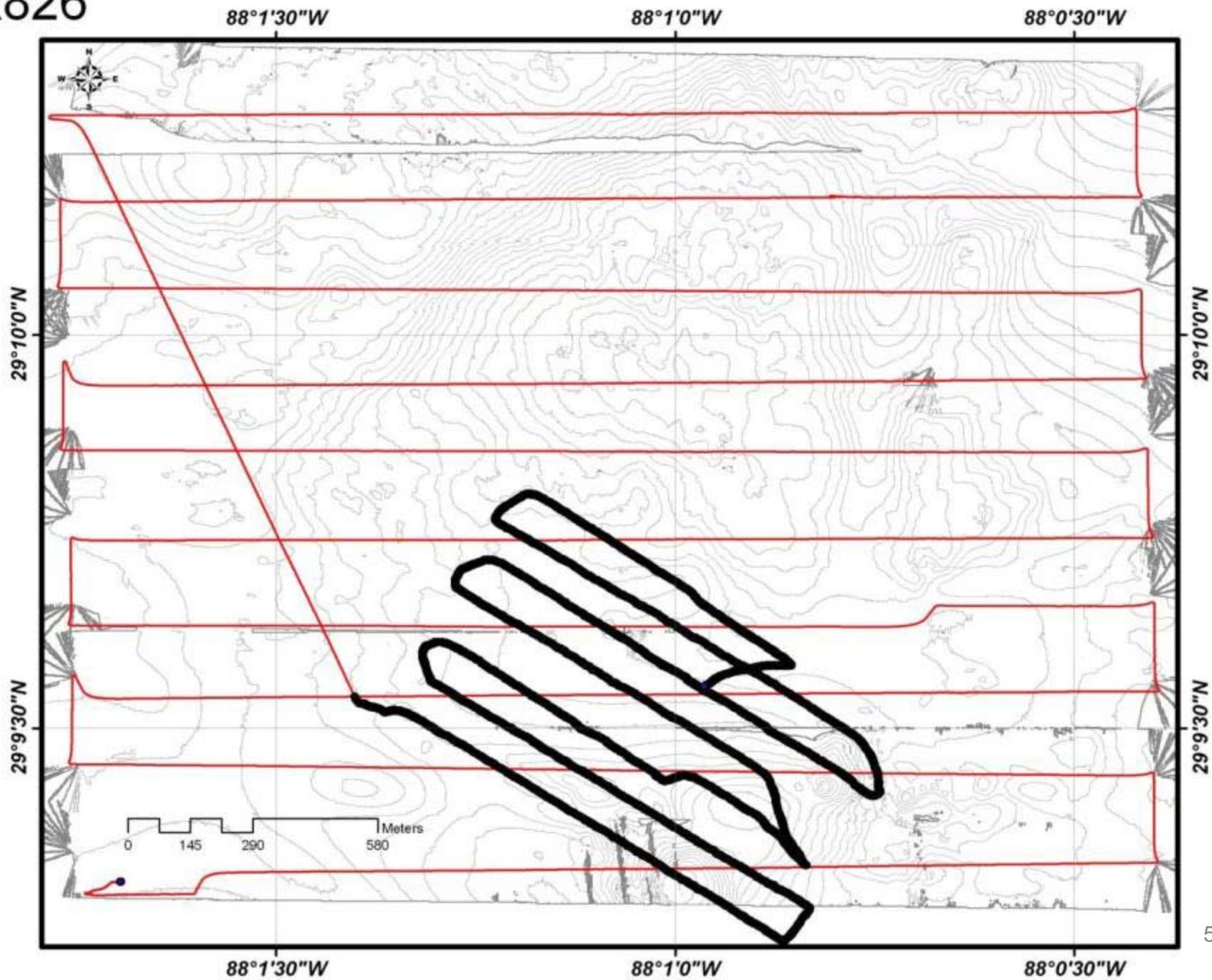
Field Methods

- Used “downward facing camera” to capture images for transects
- Sentry captured images from regular transects; *Jason* occupied “random” transects
- *Jason* used to collect coral samples with arms
- Used a Niskin bottle rack to capture bottom water samples
- CTD cast used to bottom water samples at deep point at beginning of sites with Niskin bottles

AUV Sentry

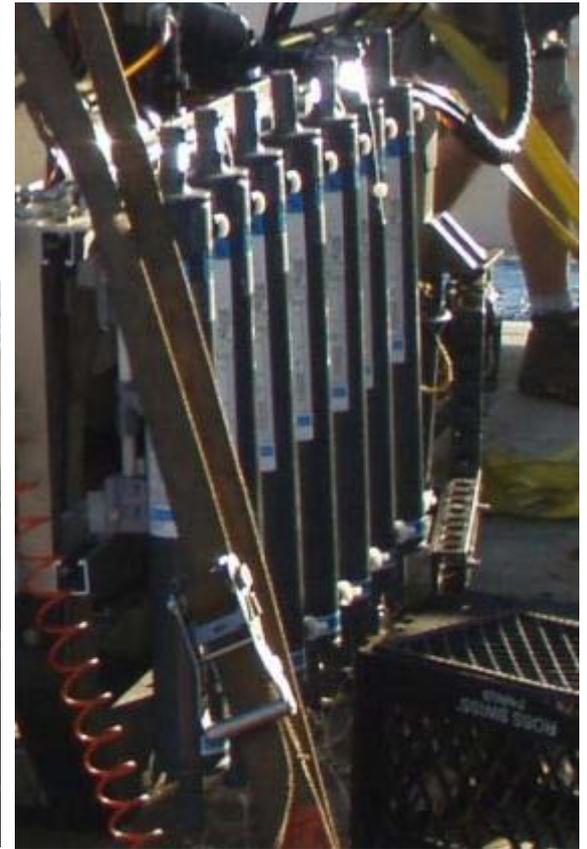


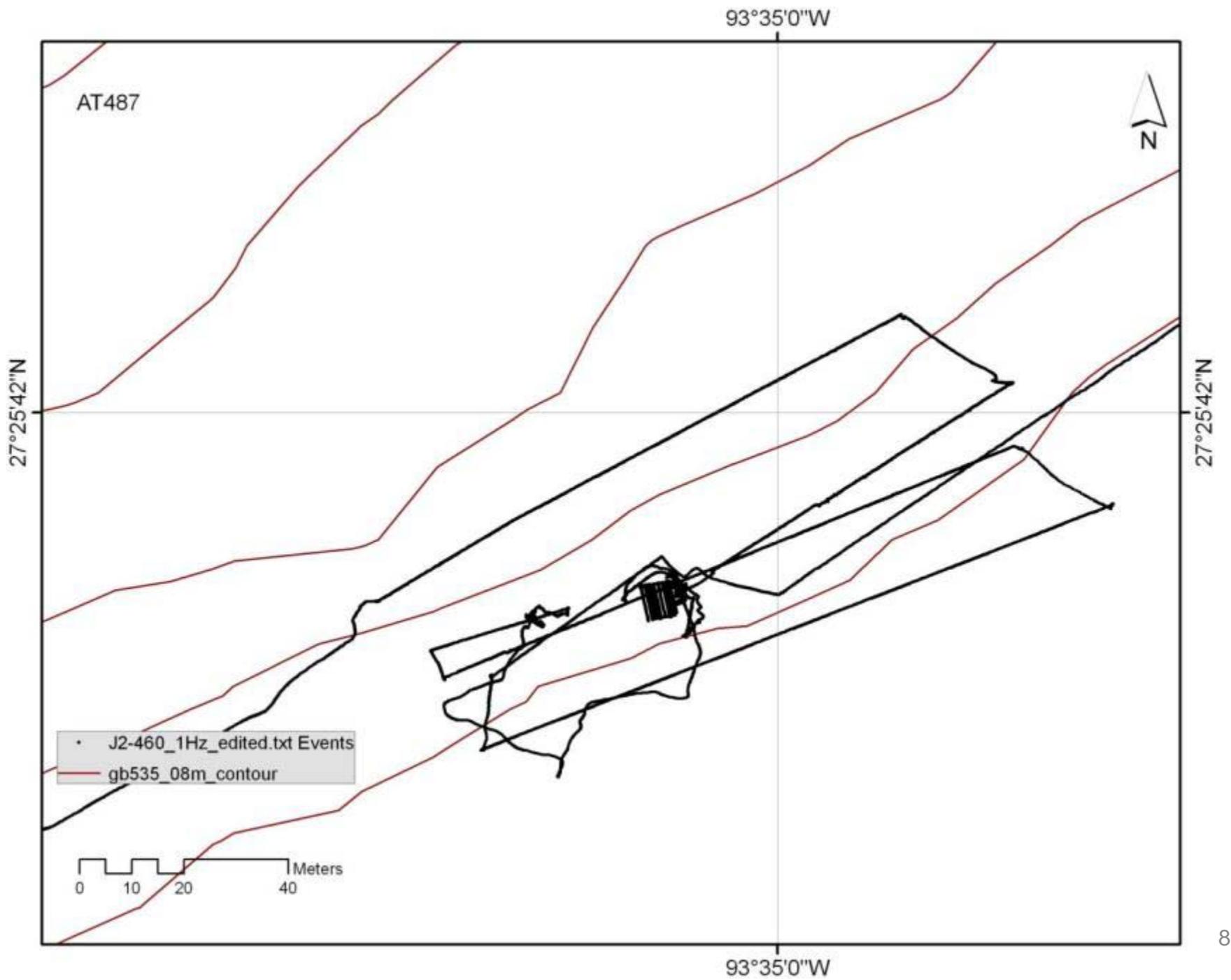
VK826

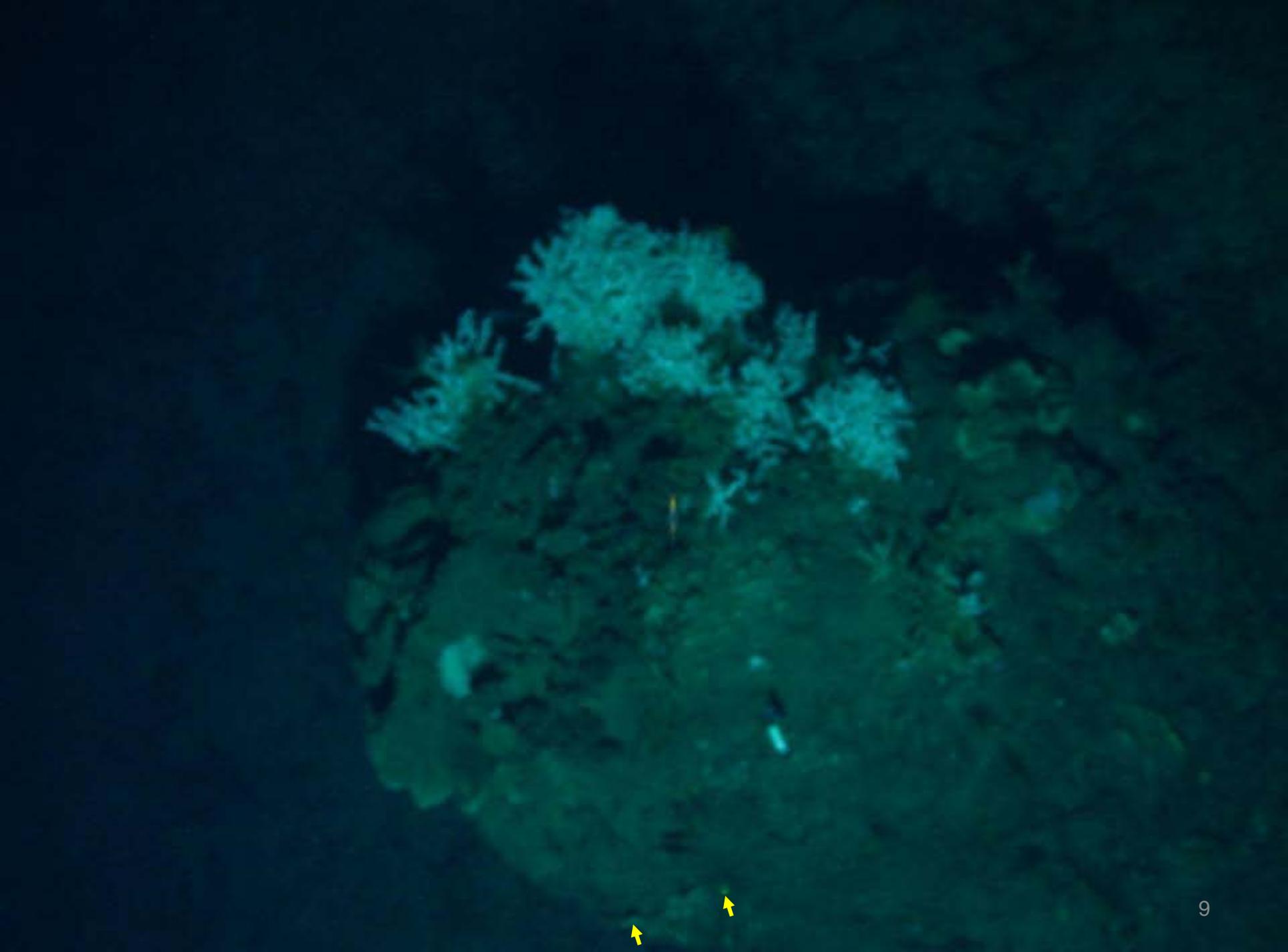




Field Methods

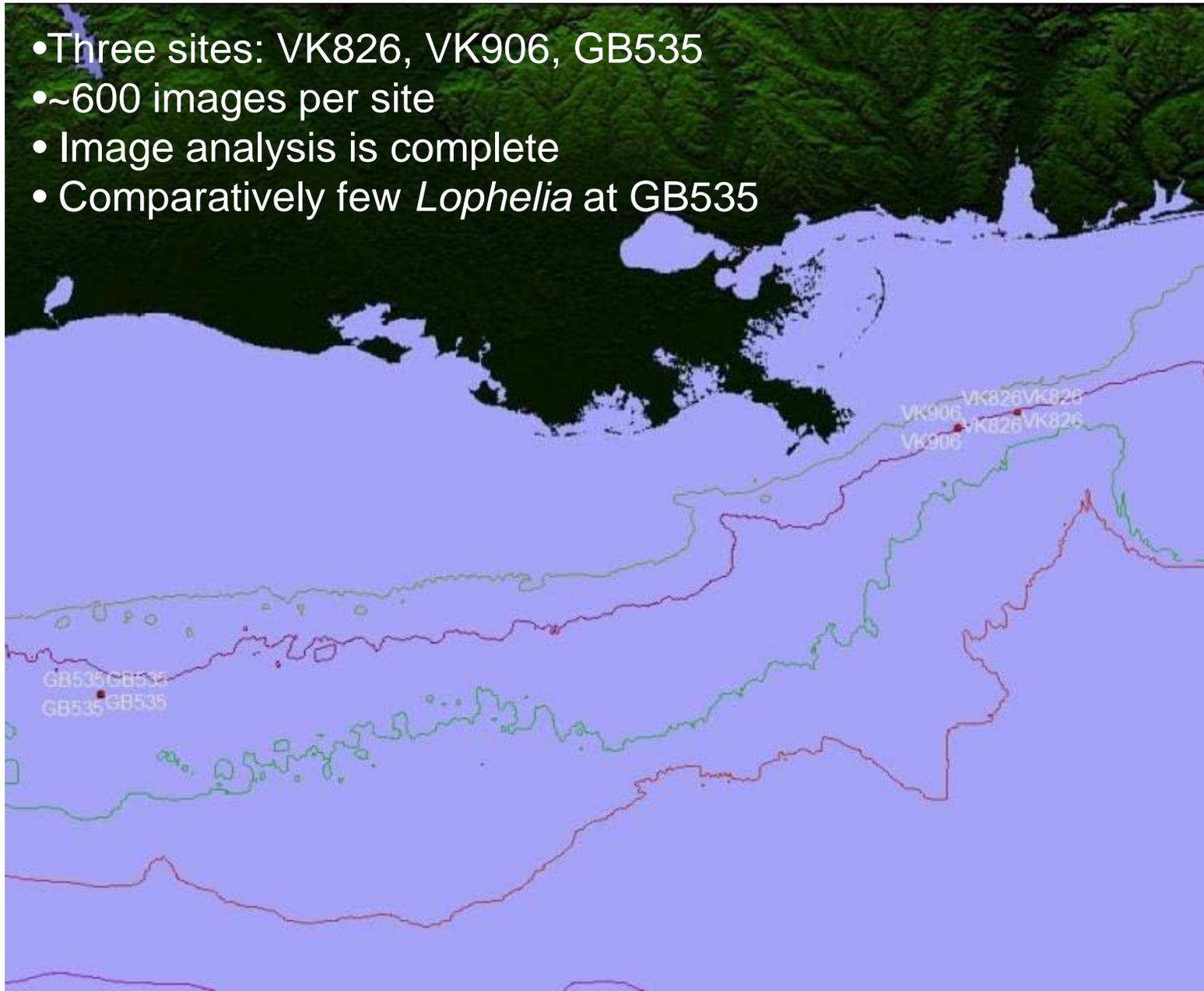




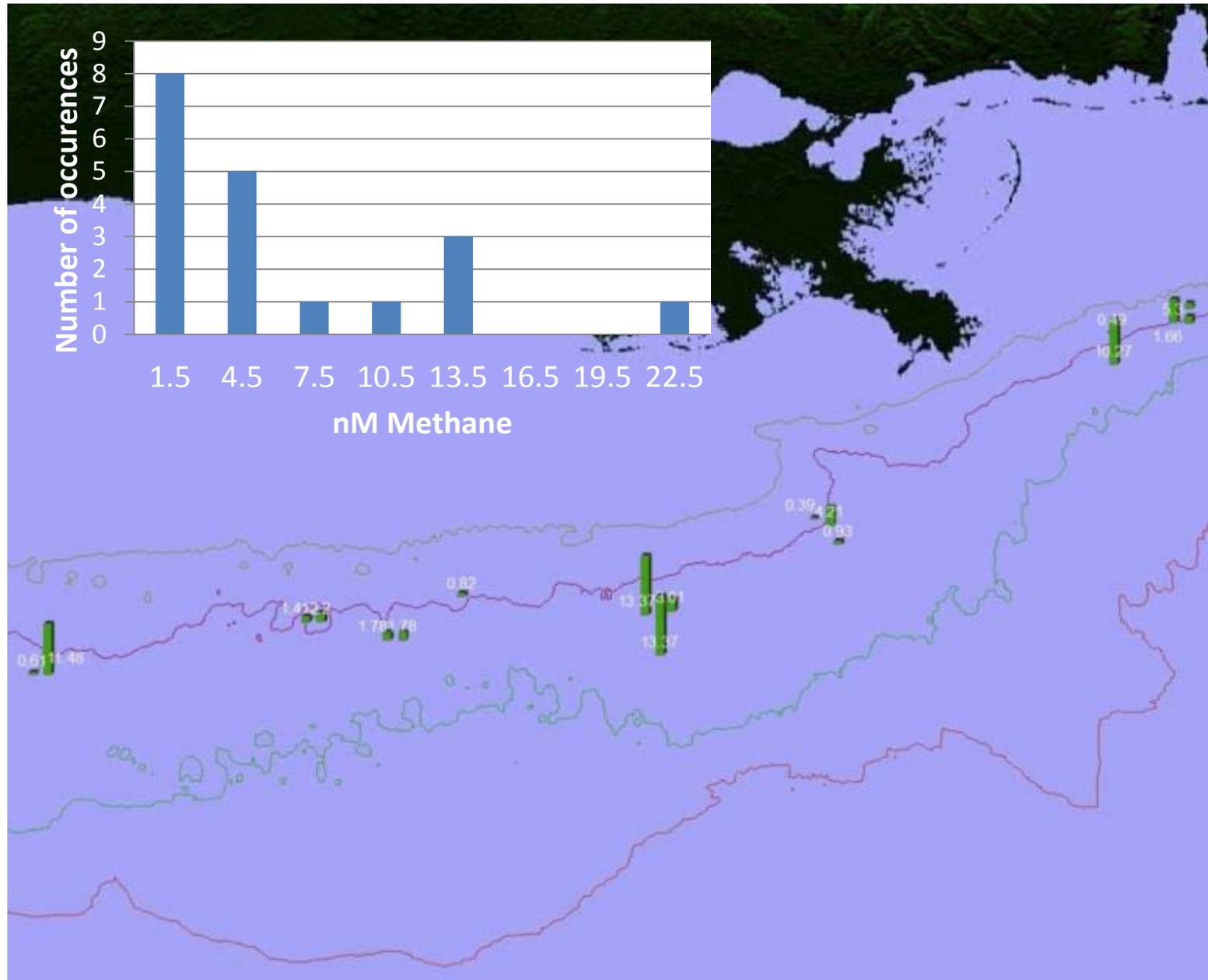


JASON/BROWN Coral Transects 2010

- Three sites: VK826, VK906, GB535
- ~600 images per site
- Image analysis is complete
- Comparatively few *Lophelia* at GB535



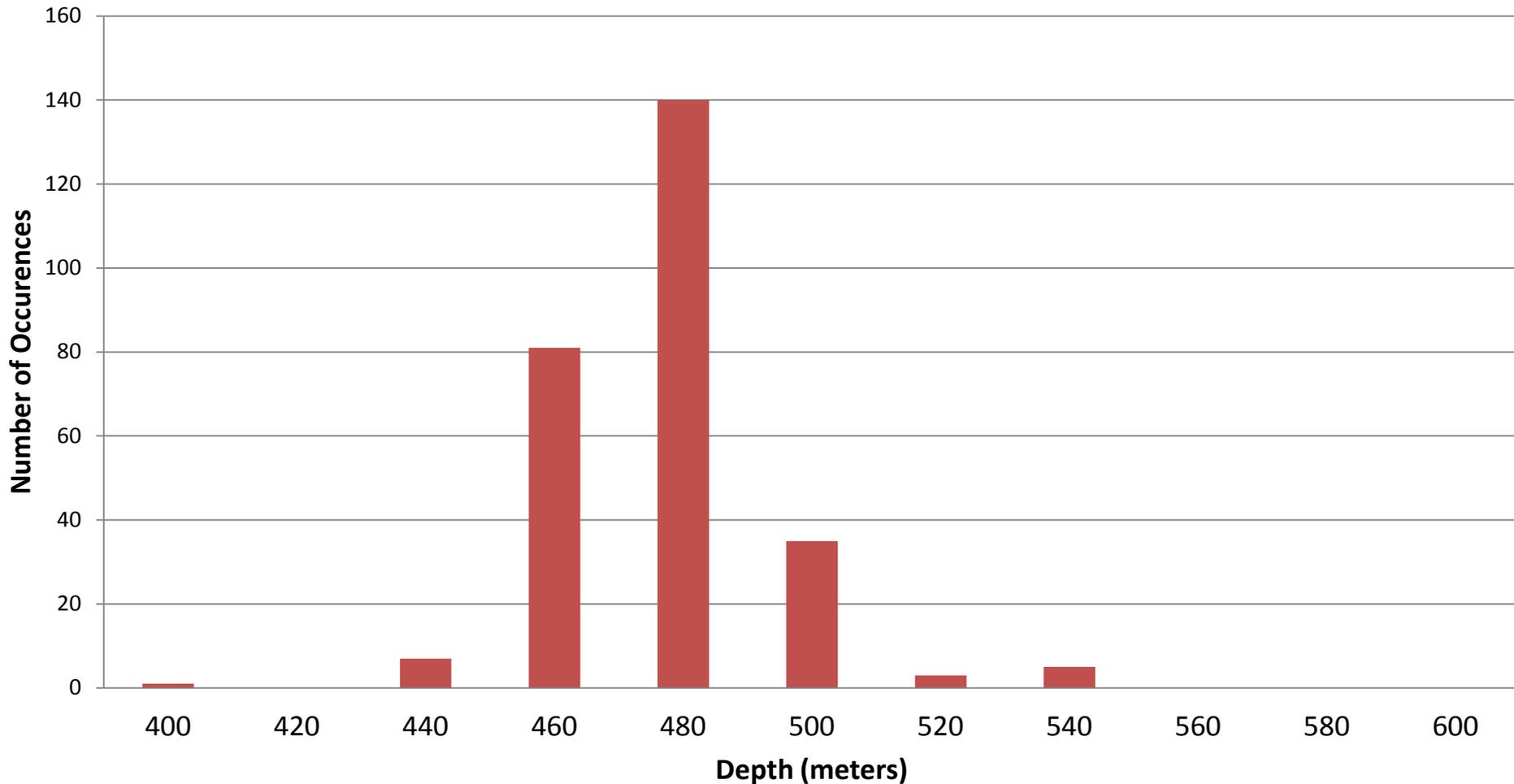
Methane Samples



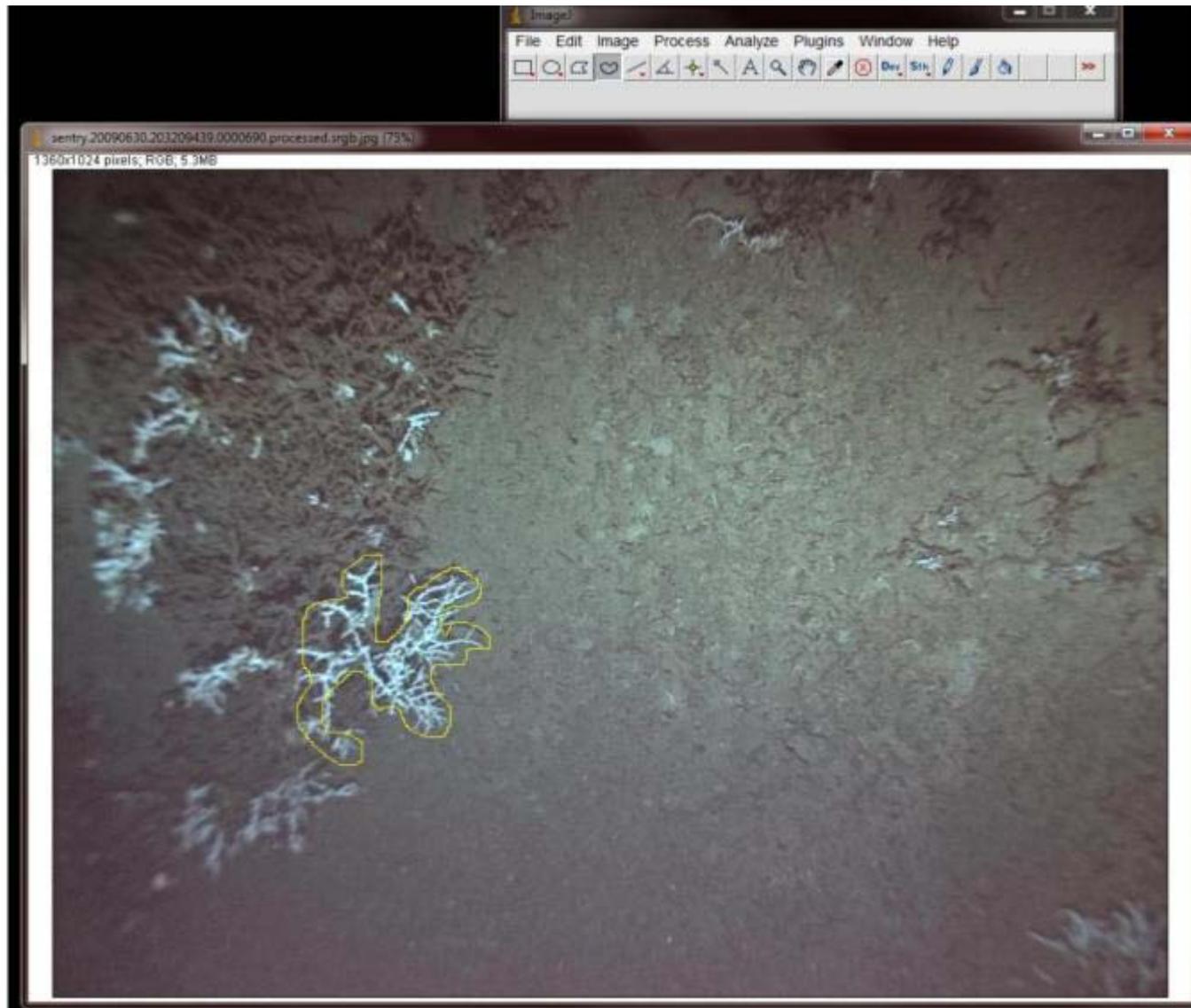
Depth (Sentry Dive)

Average depth was 465 m

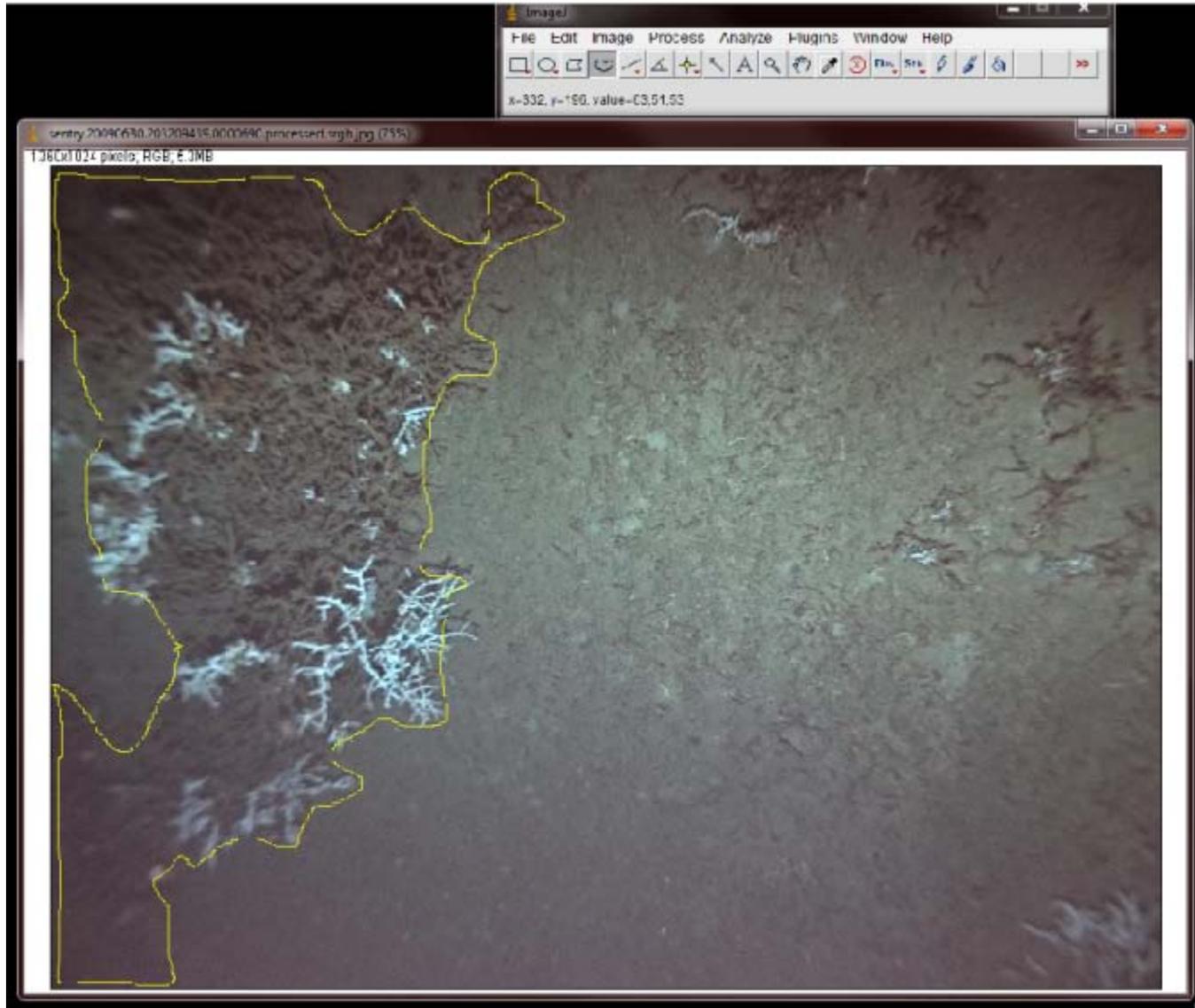
VK826: Occurrence of *Lophelia* at depth



Coral Area Measurements



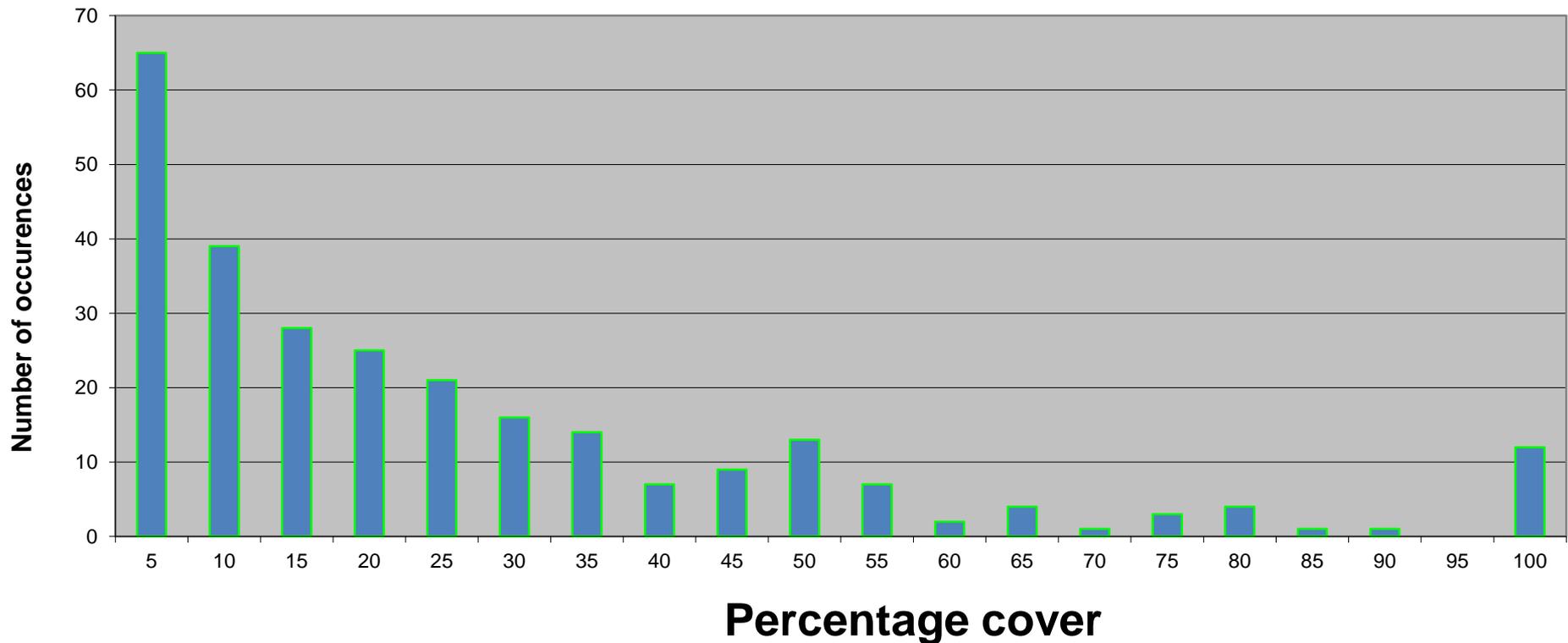
Coral Area Measurements



Occurrences of Live Corals (Sentry Dive)

- 14.7% of corals photos included living coral
- Most sampled reefs have a low percentage of live coral

Percentage of live coral (of areas that contain coral)

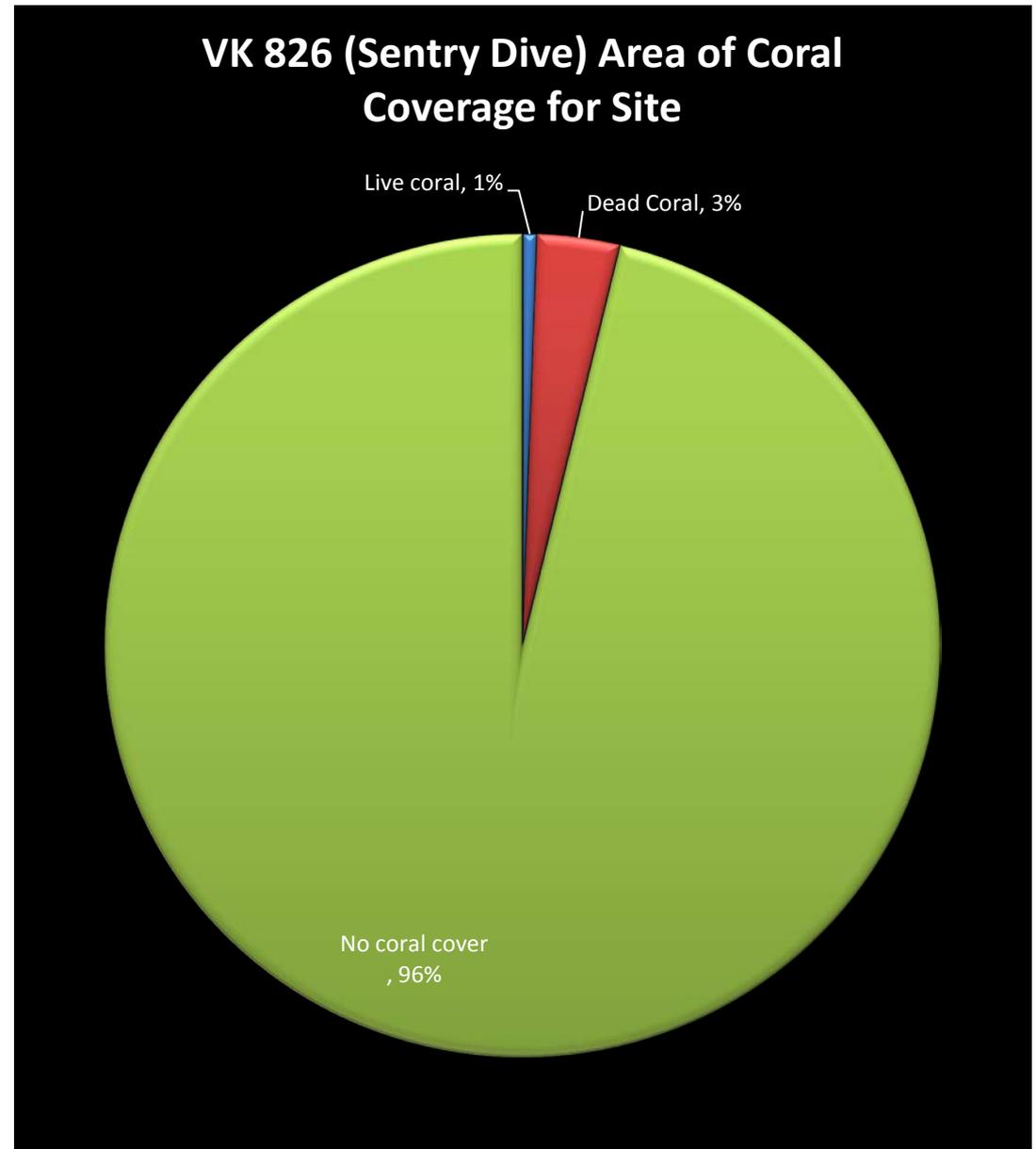


Area of Corals (Sentry Dive)

3.9 % area of corals

0.57 % area of live corals

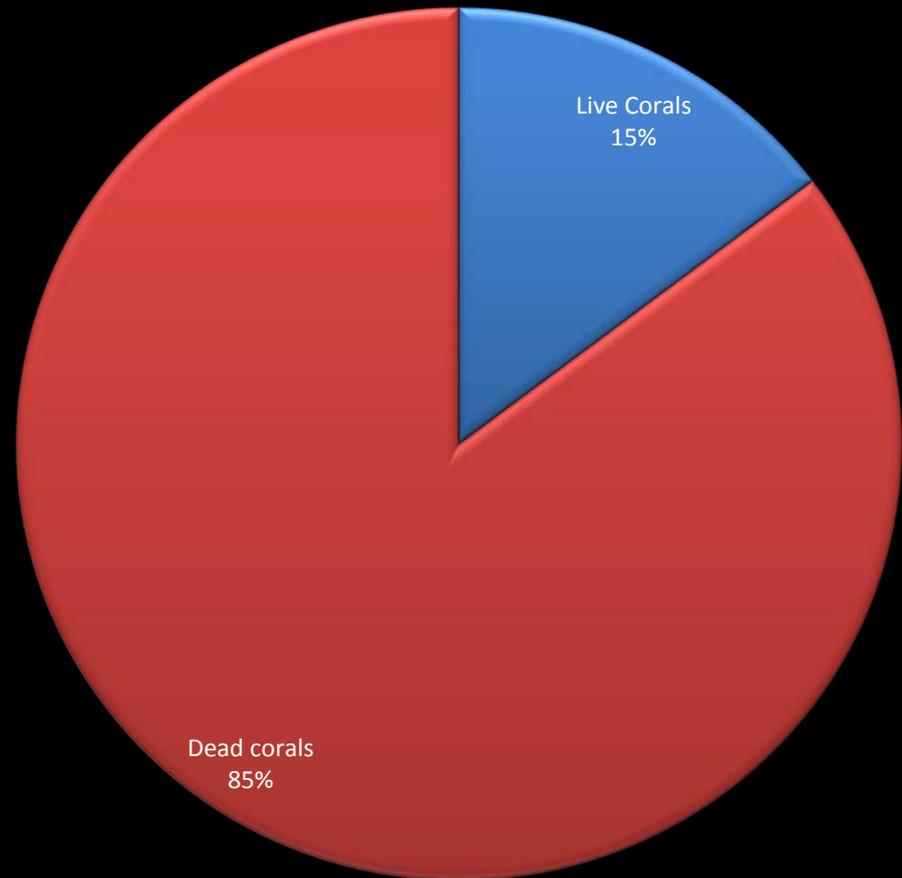
3.3 % area of dead corals



Area of Corals (Sentry Dive)

Area of live and dead corals

VK 826 Coral Coverage (Area found with Coral)

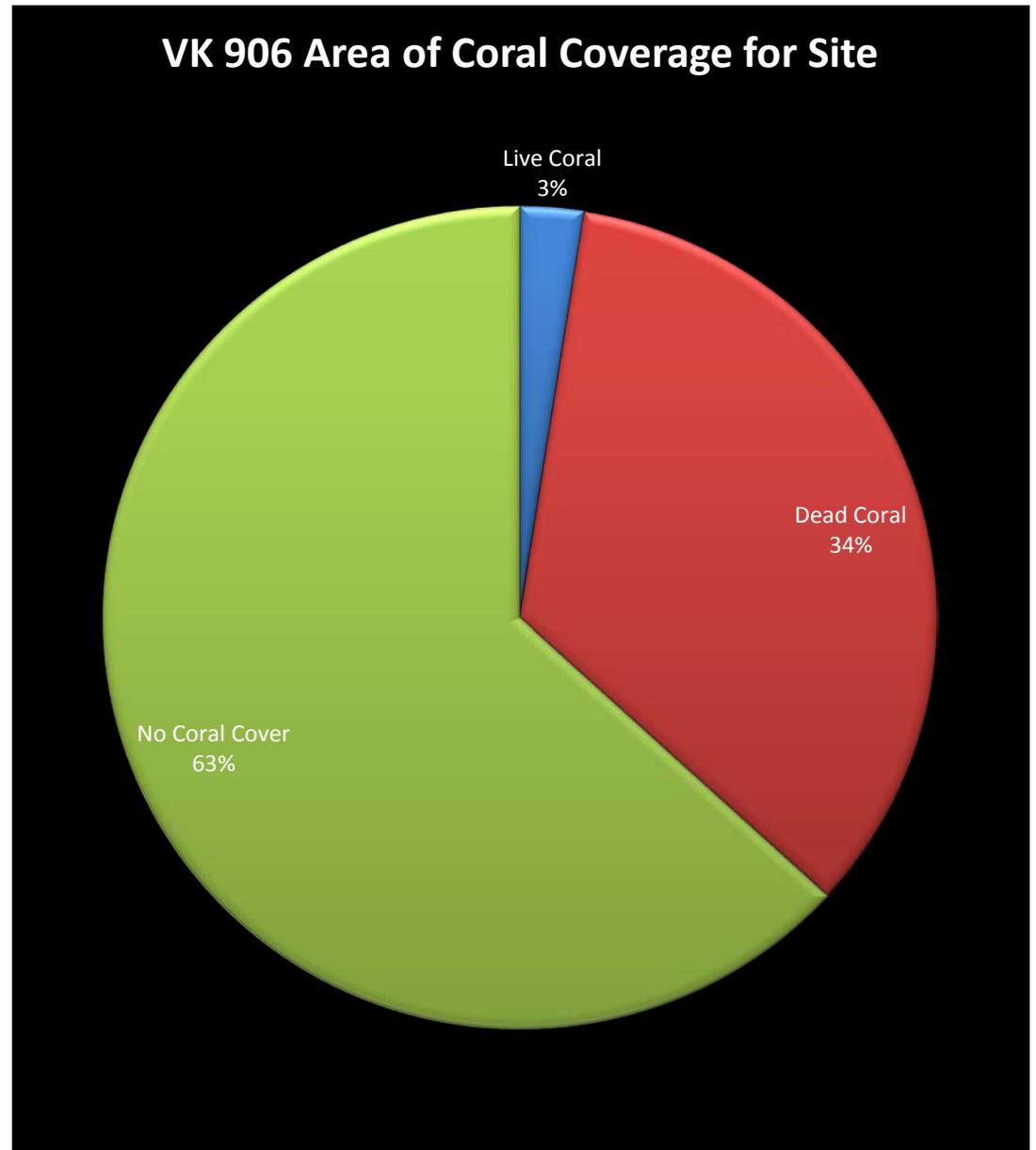


Areas of Corals (JASON)

36.81% area of corals

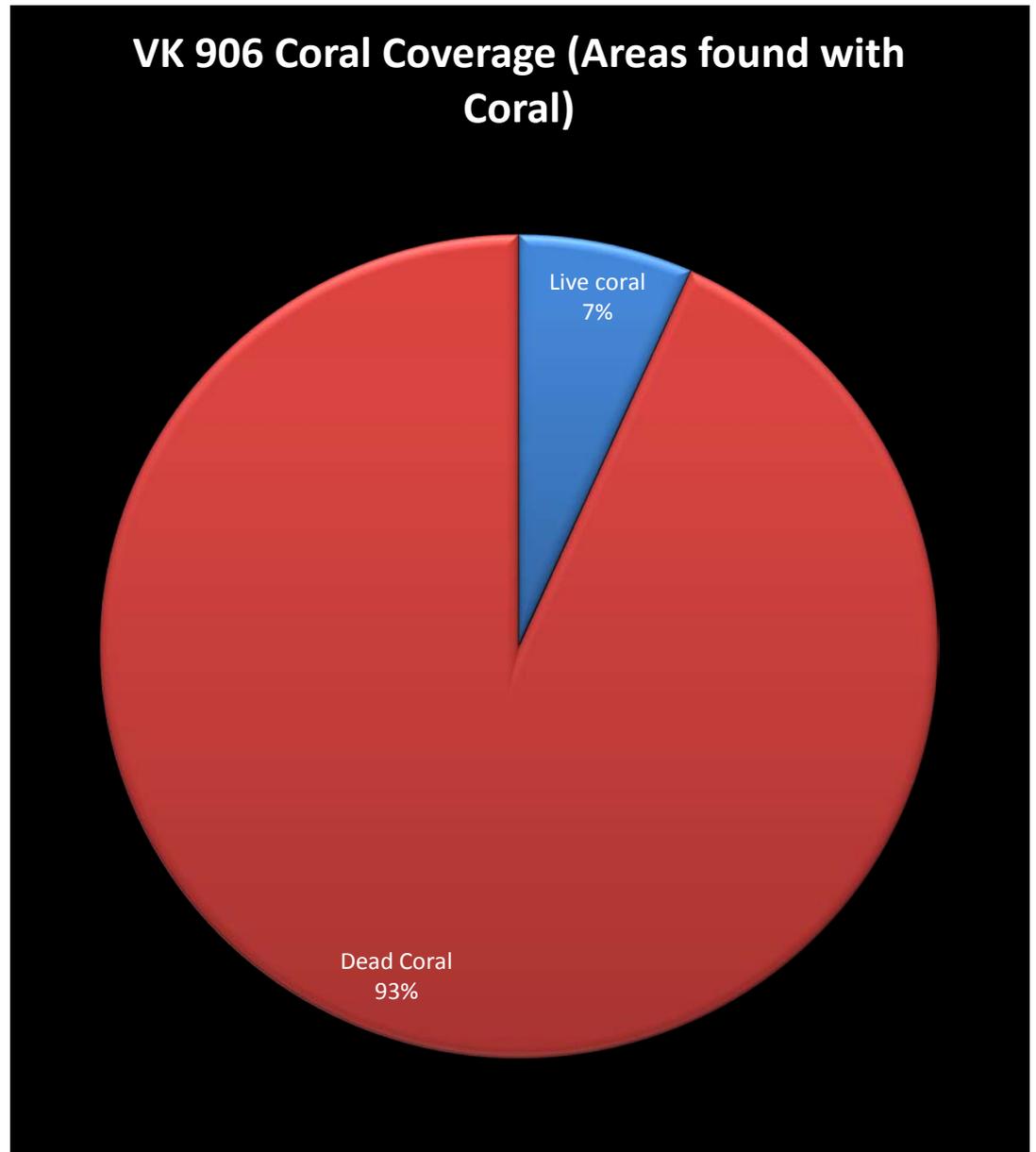
2.5% area of live corals

34% area of dead corals



Area of Corals (JASON)

Area of live and dead corals



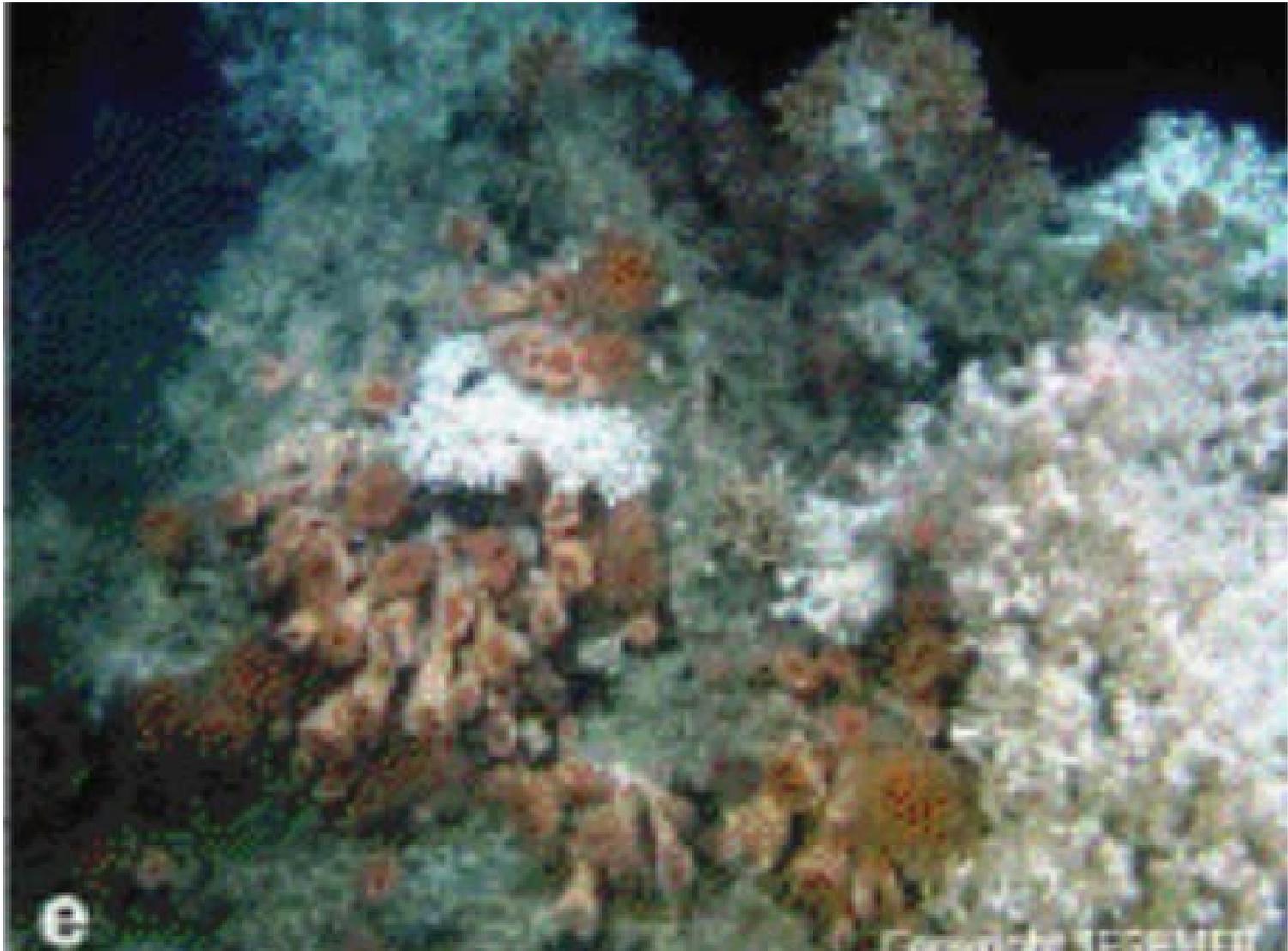
Comparative *Lophelia* communities

- Many *Lophelia* reefs have been documented around the world with the exception of the polar regions (Roberts et al. 2009).
- It appears that the areal proportion of living coral differs sharply among localities.
- The live-to-dead ratios on these reefs, however, have not been documented numerically.

Comparative *Lophelia* communities

Name	Location	Depth	Area
Magellan Mound (Southwest of Ireland)	52° 12'N-12° 22'N and 52° 38'N- 13° 08'W	Depth 450–700 meters	Surface area 120 km ²
Sula Ridge (Norway)	64°N	Depth 250–315 meters	Reef is nearly 13km long
Angola Margin	07° 17'S-12°4'E	Depth ~400 meters	Coral field covers 6x2km ²

Magellan Mound (Southwest of Ireland) (Huvenne et al. 2007)



Sula Reef (Norway) (Freiwald et al. 2002)



Angola Margin

Dense living coral reef (Le Guilloux 2009)



Preliminary Results

- Average depth of corals surveyed is 465 meters (*i*)
- An average of 24.4% of corals are alive at the average depth (*Sentry*)
- 85.3 % of corals found were dead (*Sentry*)
- 14.7 % of corals surveyed were alive (*Sentry*)
- Methane ranged from 0.21 to 21.65 nM (*Jason*)
- 93% of corals found were dead (*Jason*)
- 7% of coral found were alive (*Jason*)

Analytical Methods

- ImageJ was used to determine area of surveyed corals
- $\text{Altitude} * \text{lens} * (\text{ratio of pixels})$
- Gas chromatograph was used to analyze the amount of methane found at each site

References

- Freiwald, A. V. Hühnerbach, B. Lindberg, J.B. Wilson and J. Campbell. 2002. The Sula Reef Complex, Norwegian shelf. *Facies* 47:179–200.
- Huvenne, V.A.I. 2007. The Magellan mound province in the Porcupine Basin. *International Journal of Earth Science Geologische Rundschau* 96:85–101.
- Le Guilloux, E. 2009. First observations of deep-sea coral reefs along the Angola margin. *Deep-Sea Research II* 56:2394–2403.
- Roberts, J.M., A. Wheeler, A. Freiwald, and S. Cairns. 2009. *Cold Water Corals: The Biology and Geology of Deep-Sea Coral Habitats*. Cambridge University Press.