



Assessment of Geomorphological Characteristics and Reef Fish Utilization of Reported Reef Fish Aggregation Sites in the Florida Keys, USA

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Background and Introduction

Fish Spawning aggregations (FSAs) are a vital part of the life cycle of many reef fish species. In many cases, a lack of knowledge of the location of FSA sites prohibits their effective management. We are using acoustic technologies at reported FSA sites in the Florida Keys to: (1) assess whether reported FSA sites are characterized by similar habitat characteristics and (2) determine levels of fish utilization of these sites.

Materials and Methods

Ongoing research is occurring in the upper and lower Florida Keys focusing on reported FSA sites obtained from commercial fishers.

We use a combination of split-beam acoustic and diver surveys to assess reef fish utilization of reported FSAs and surrounding areas during predicted spawning moons for focal species such as black groupers (*Mycteroperca bonaci*), mutton, cubera and yellowtail snappers (*Lutjanus analis*, *L. cyanopterus* and *Ocyurus chrysurus*, respectively). Diver surveys provide for groundtruthing of acoustic images as well as determining if previously reported FSAs are recovering or have been "fished out".

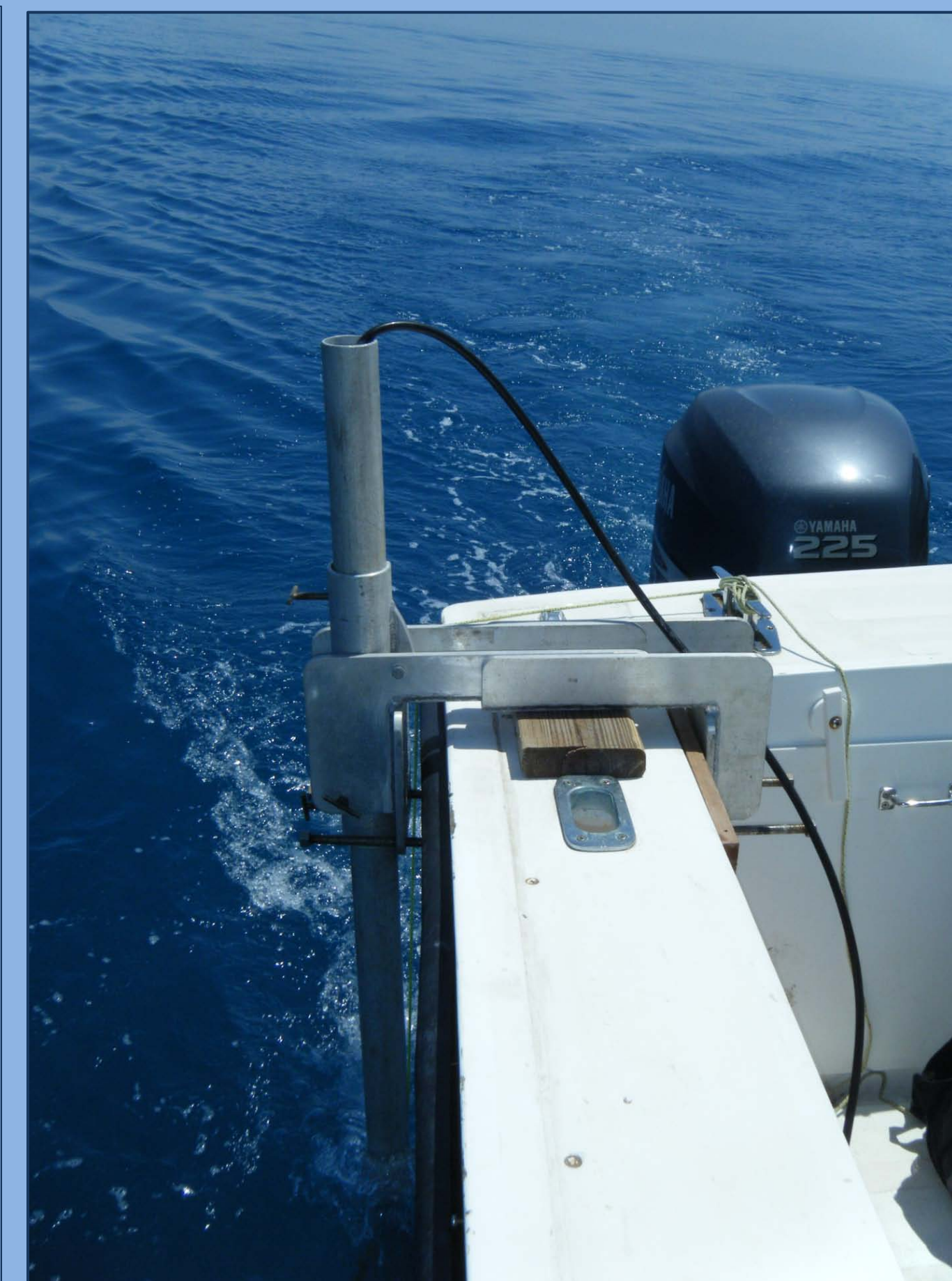


Photo 1: The acoustic equipment used to identify potential aggregations.

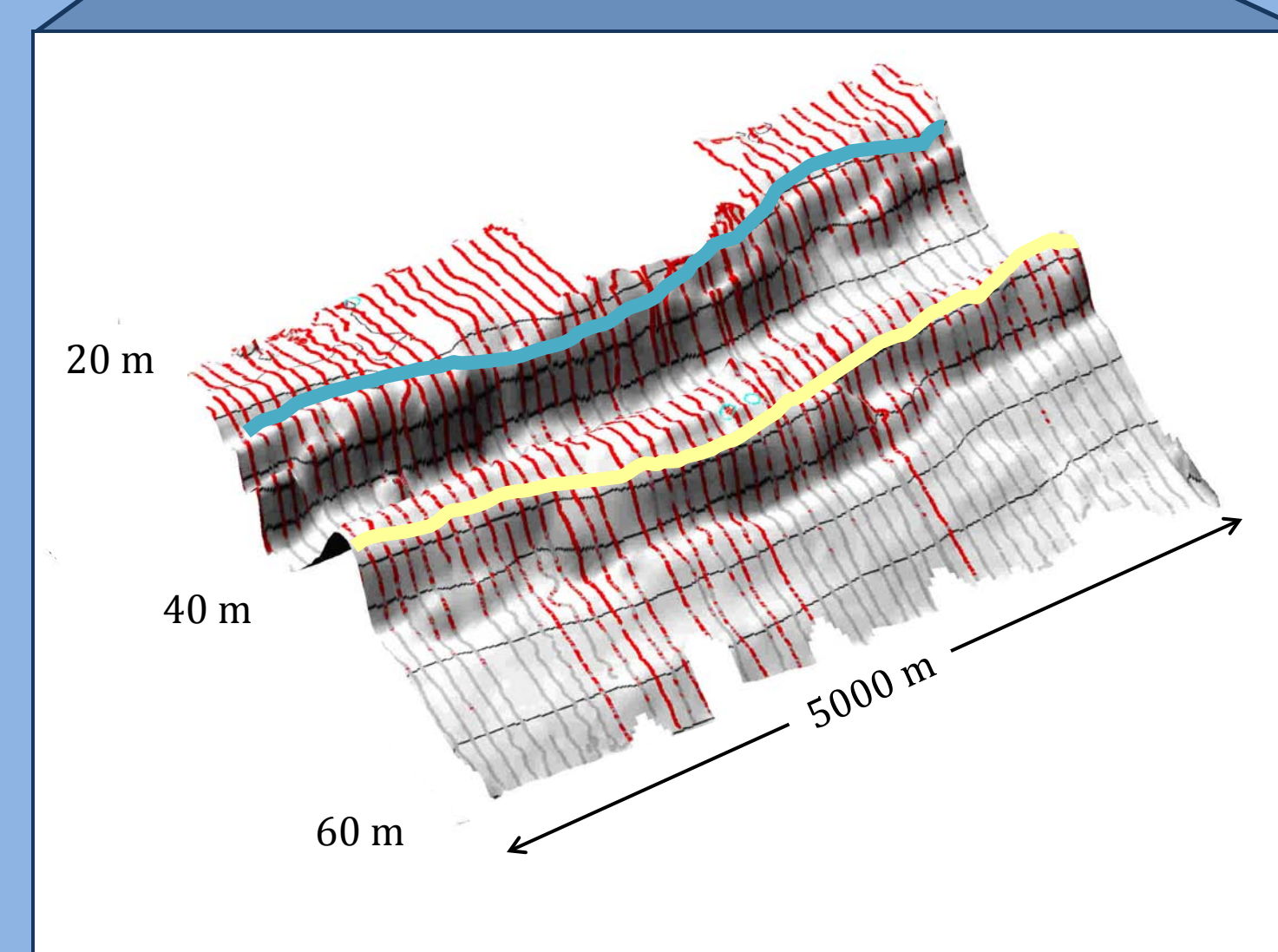
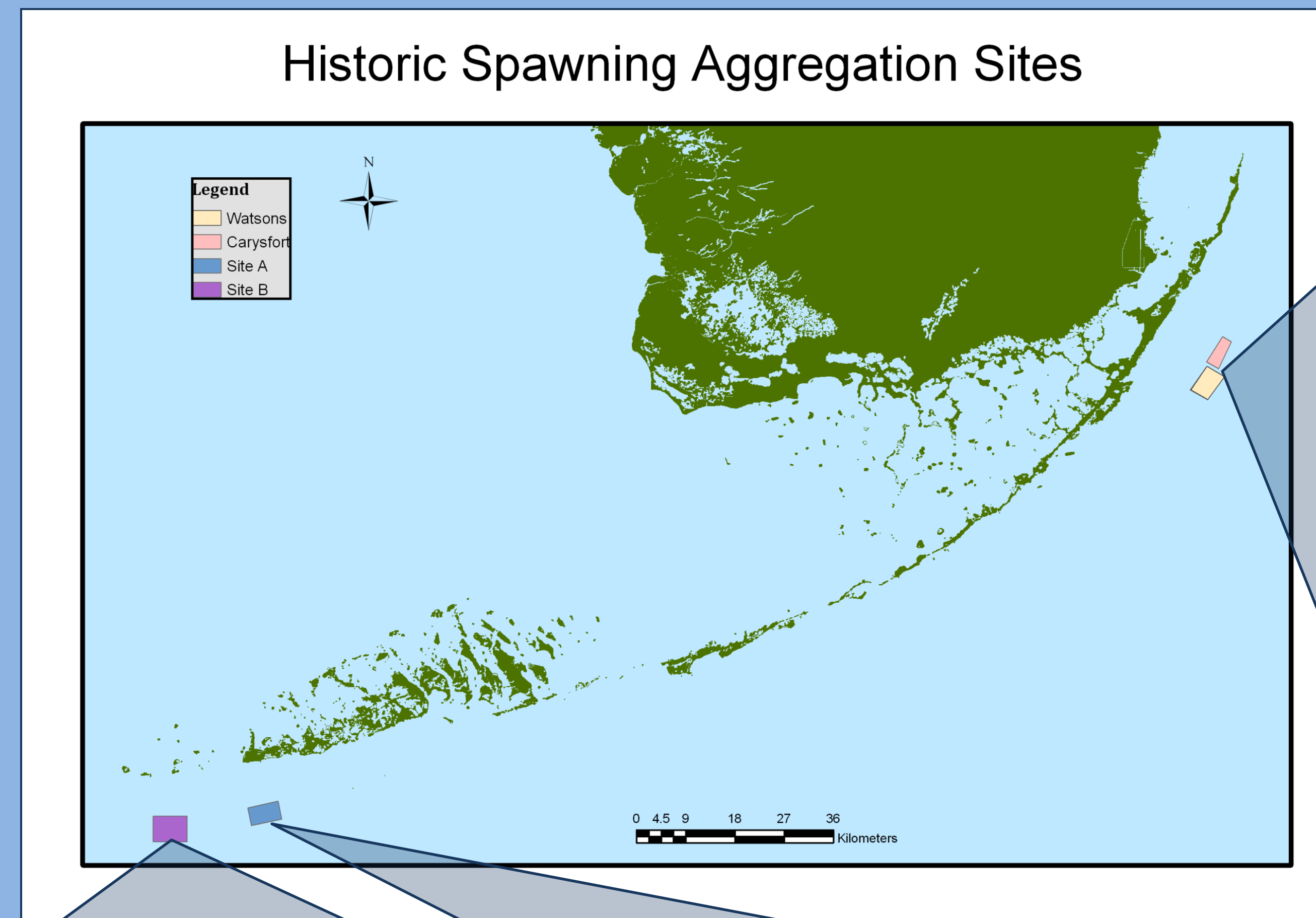


Figure 2: Preliminary topography for Site A

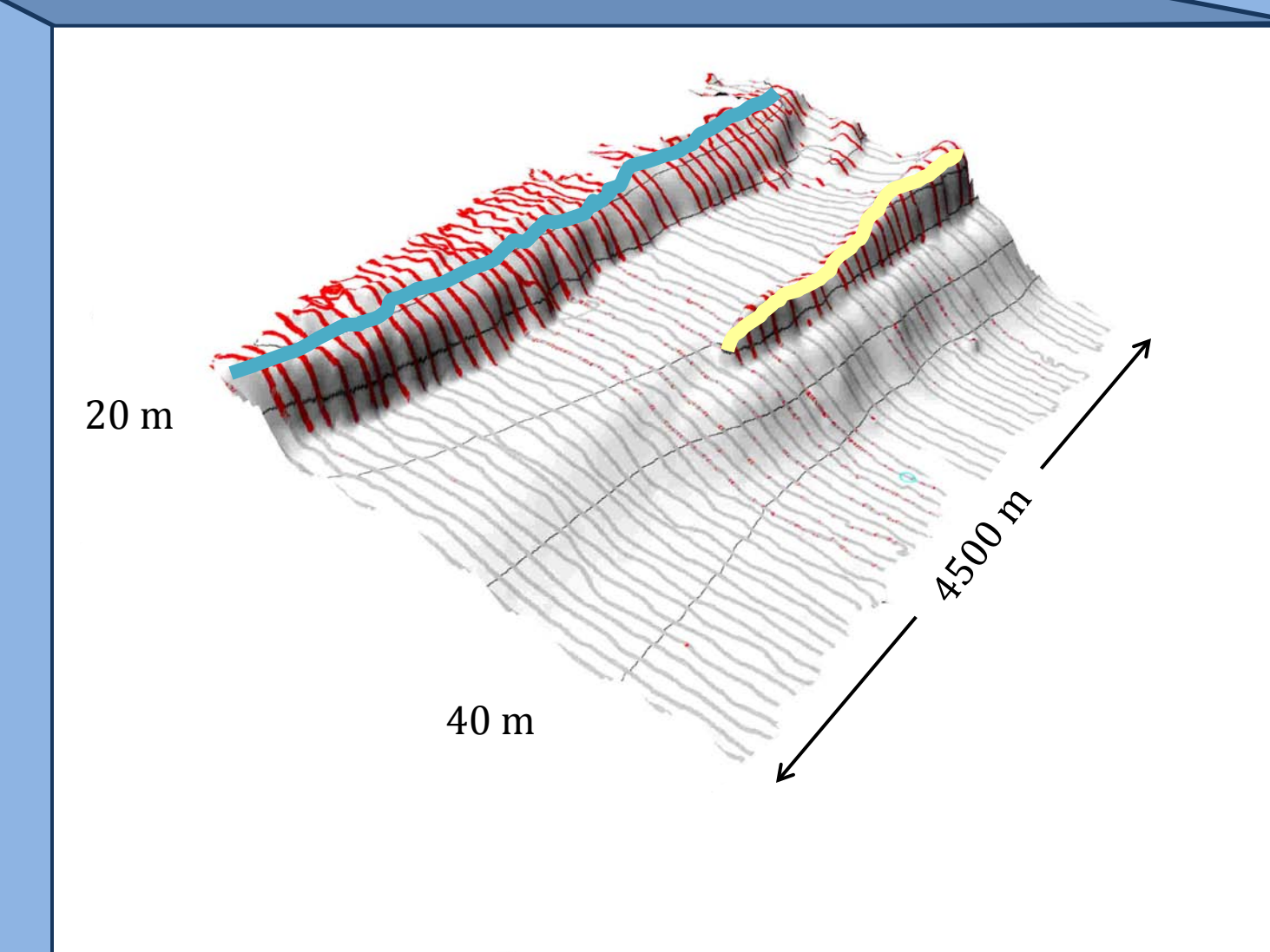


Figure 3: Preliminary topography for Site B

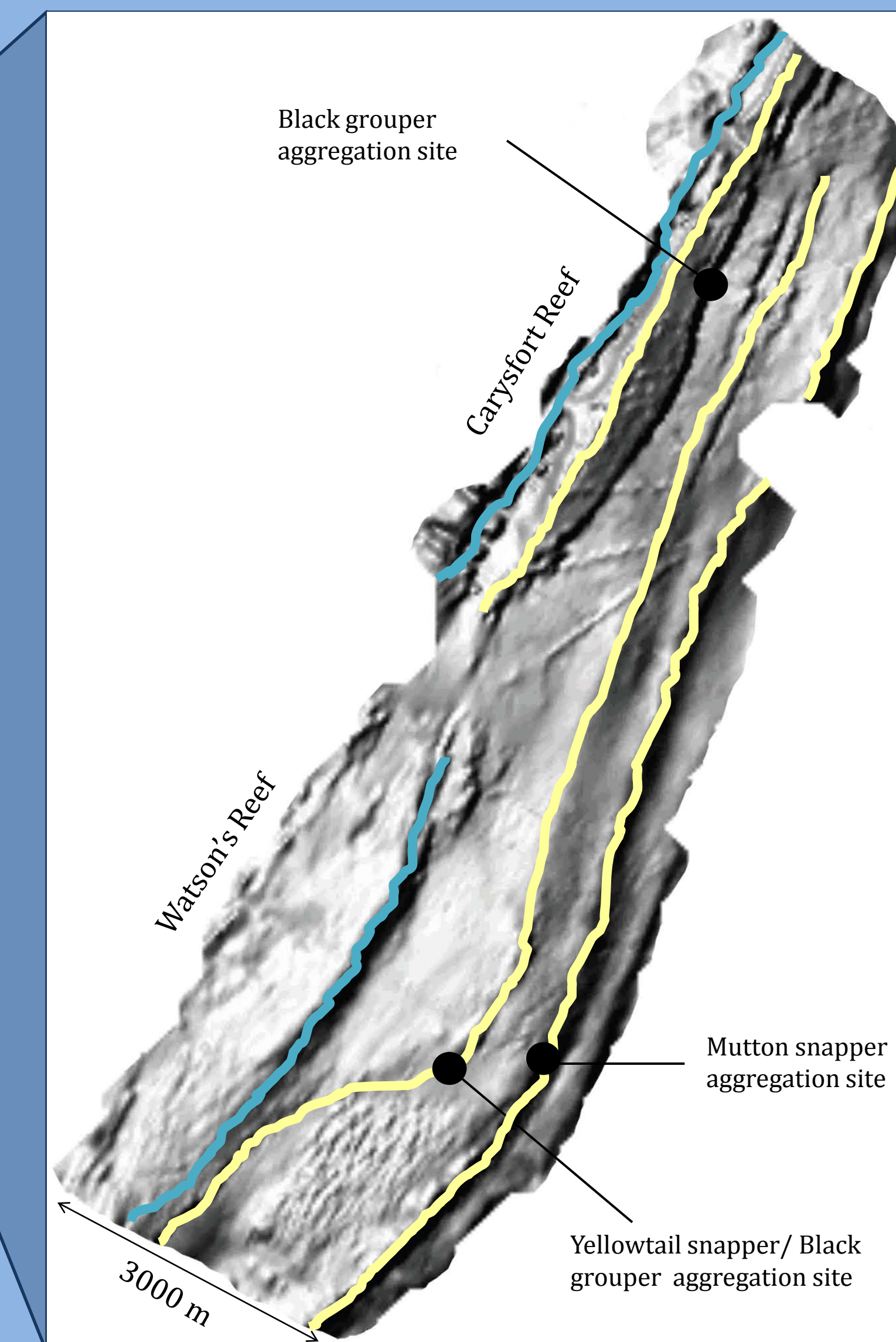


Figure 4: Map of Carysfort and Watson's Reef

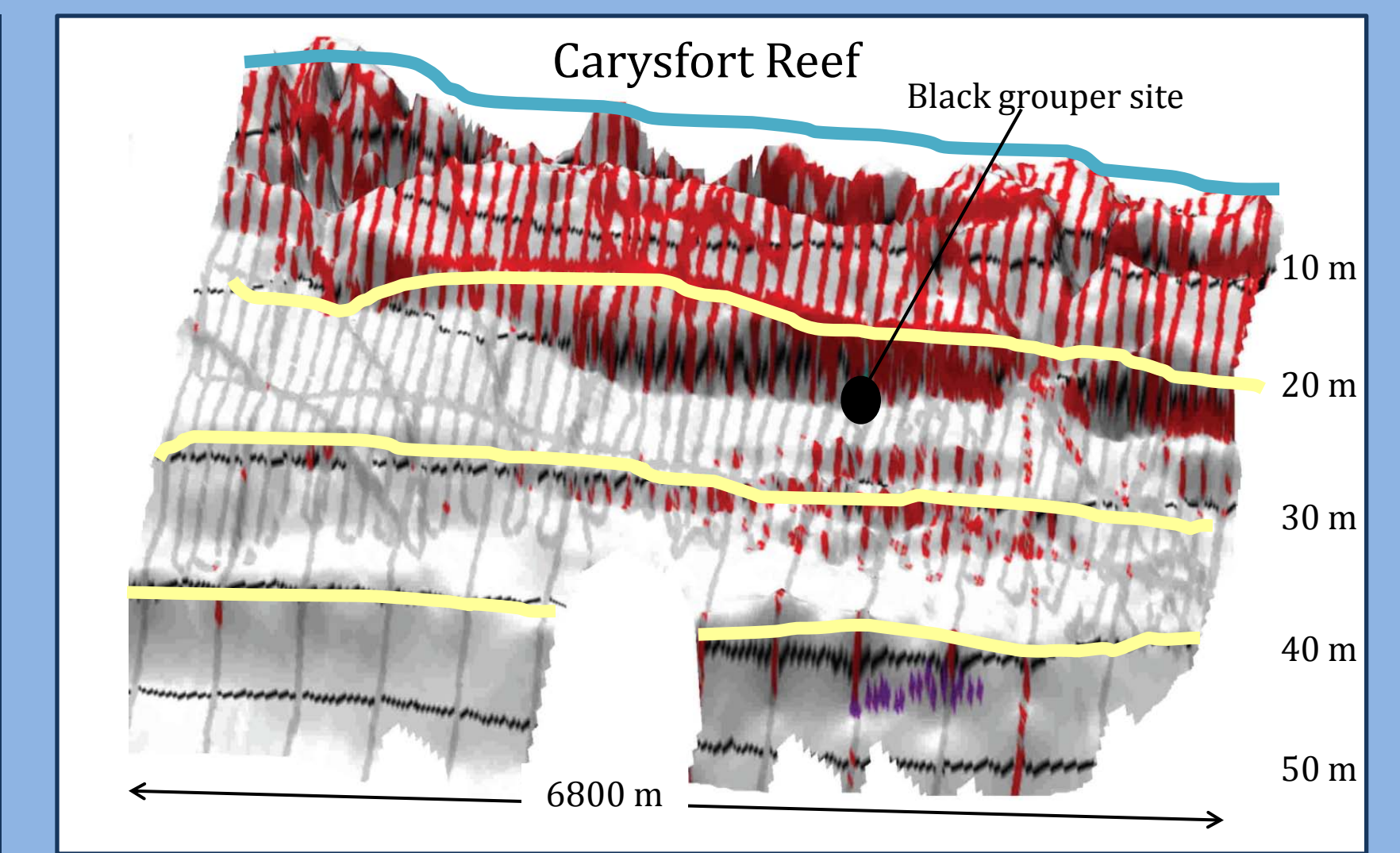


Figure 5: Detailed map of Carysfort Reef

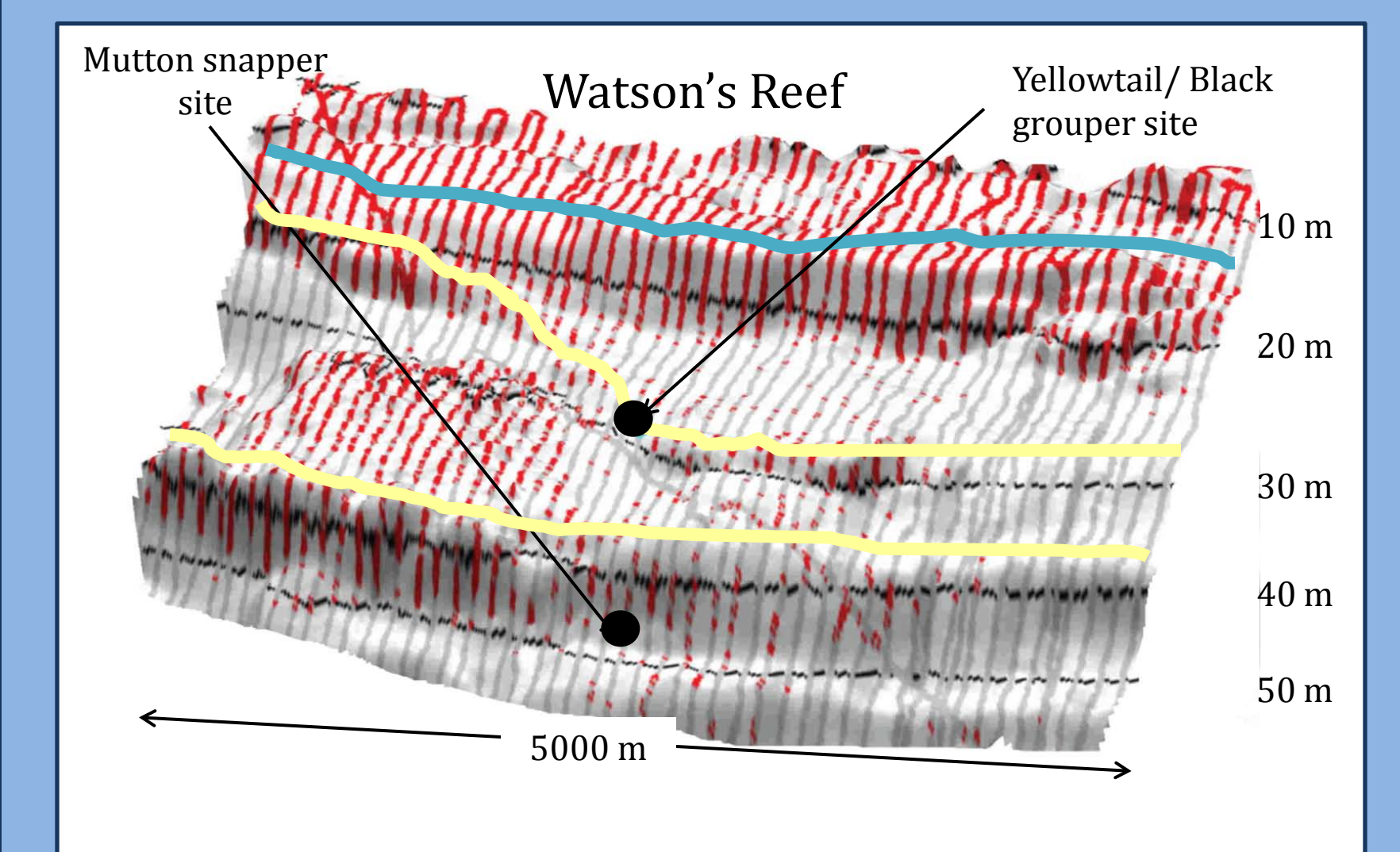


Figure 6: Detailed map of Watson's Reef

Shelf-edge Reef
Outlier Reef

Results and Discussion

Habitat component: Our results indicate that drowned, rocky ridges, known locally as outlier reefs, are features linked to all FSA sites studied. In particular, two geomorphic characteristics were consistently observed:

- a steeply-sloped shelf-edge reef marking the landward boundary of the upper-slope terrace
- an outlier reef forming the seaward boundary of the upper-slope terrace

At several sites at least one other exposed outlier reef on the upper-slope terrace.

Fish utilization component: Surveys were performed at upper and lower Keys sites during predicted snapper and grouper spawning moons. Although no spawning was observed, elevated densities and in some cases spawning-associated coloration or behaviors of multiple species were observed.

Conclusions

This suite of methodological approaches is effective and can be applied to other systems to support FSA research, other fish-habitat utilization assessments and has direct implications for marine spatial management in the FL Keys National Marine Sanctuary.

Future Research

Mapping of an additional site will begin November 2010. Future monitoring trips planned around the full and new moons will continue to determine the utilization of each site by commercially important species.

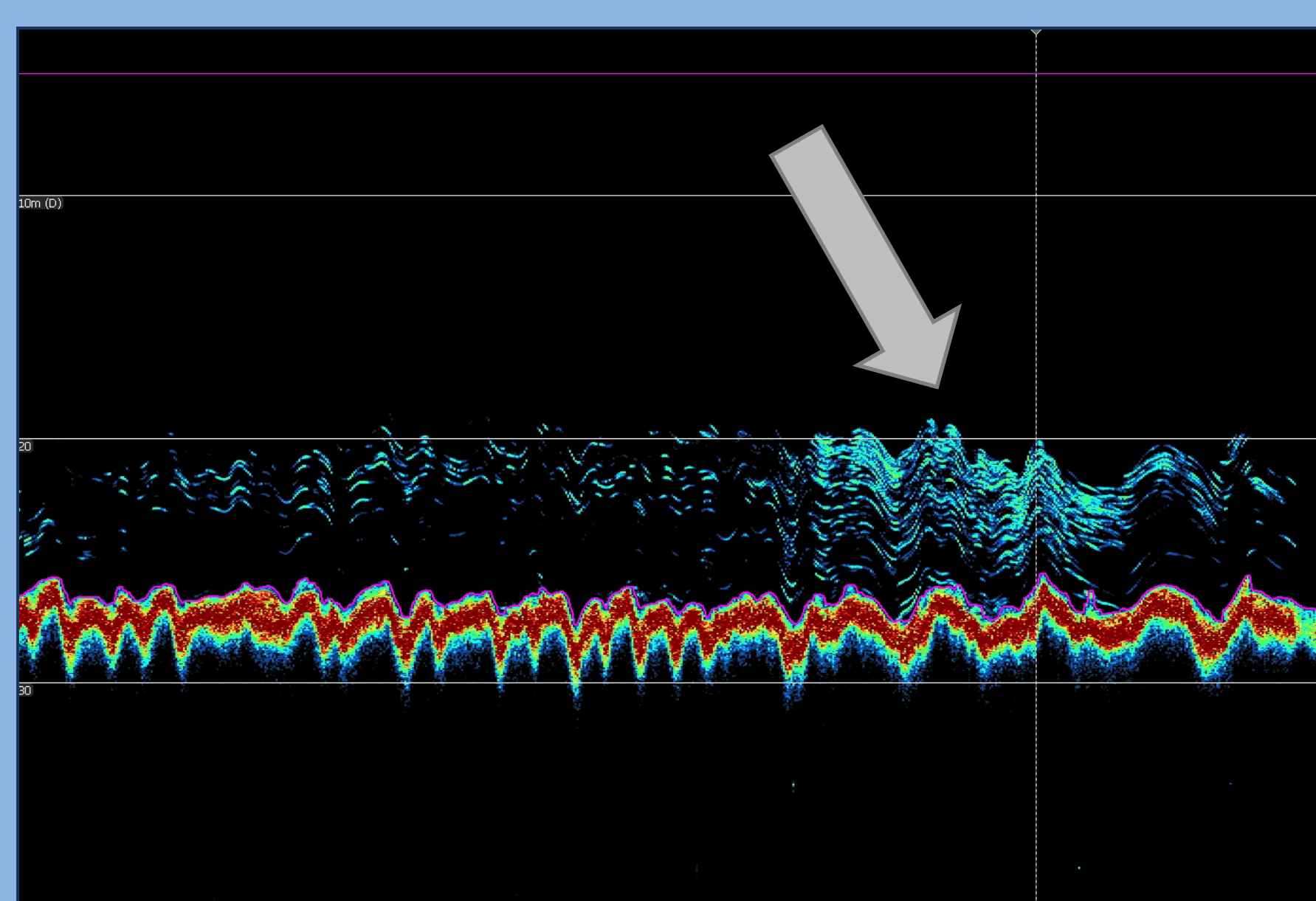


Figure 1: An echogram showing the aggregation of gray snapper at Site B.



Photo 2: The aggregation of gray snapper seen by divers at Site B.



Photo 3: Dedicated scientist patiently waiting for the fish to spawn.

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