

Science, Service, Stewardship



Sperm Whale Prey Studies in the Gulf of Mexico

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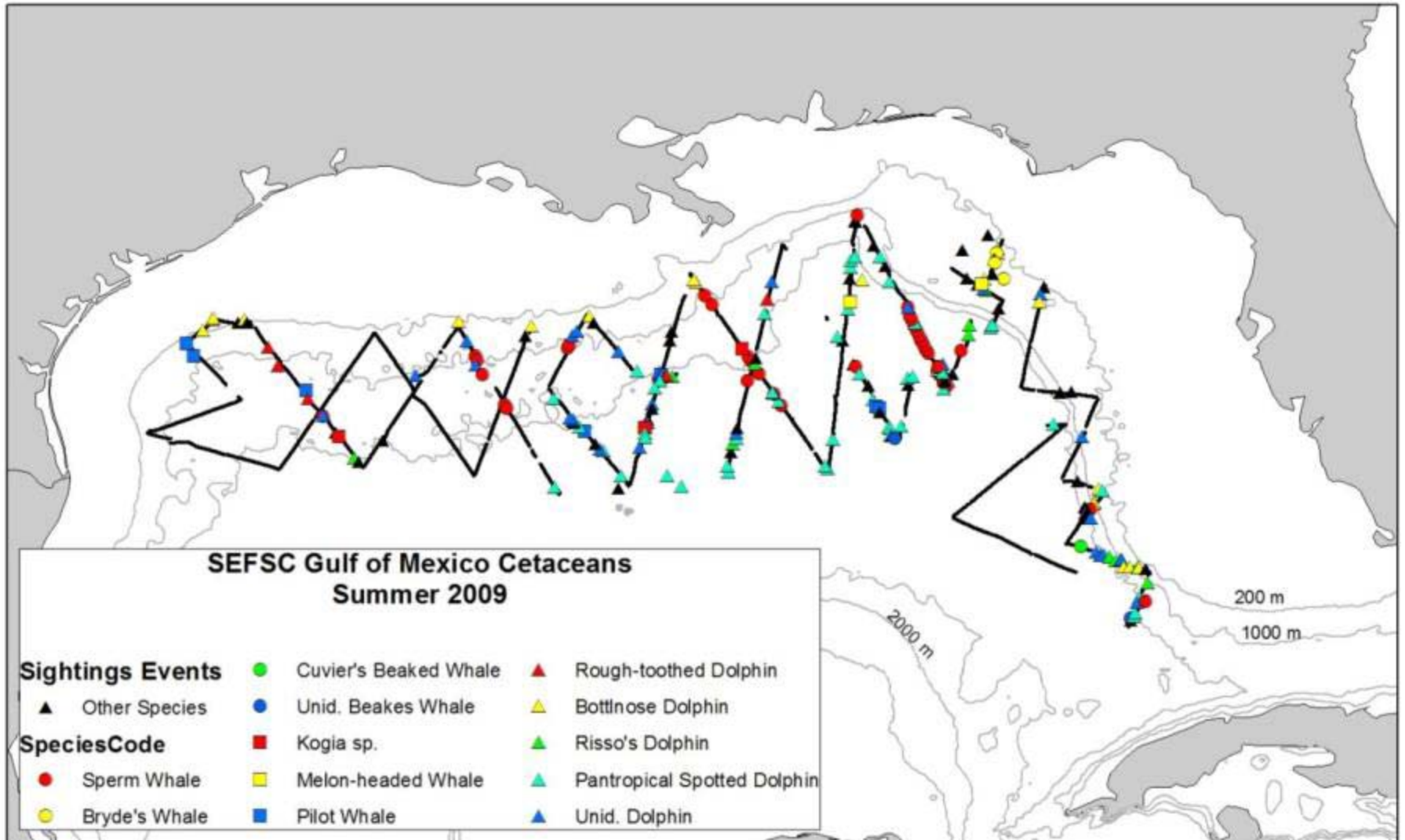
Southeast Fisheries Science Center

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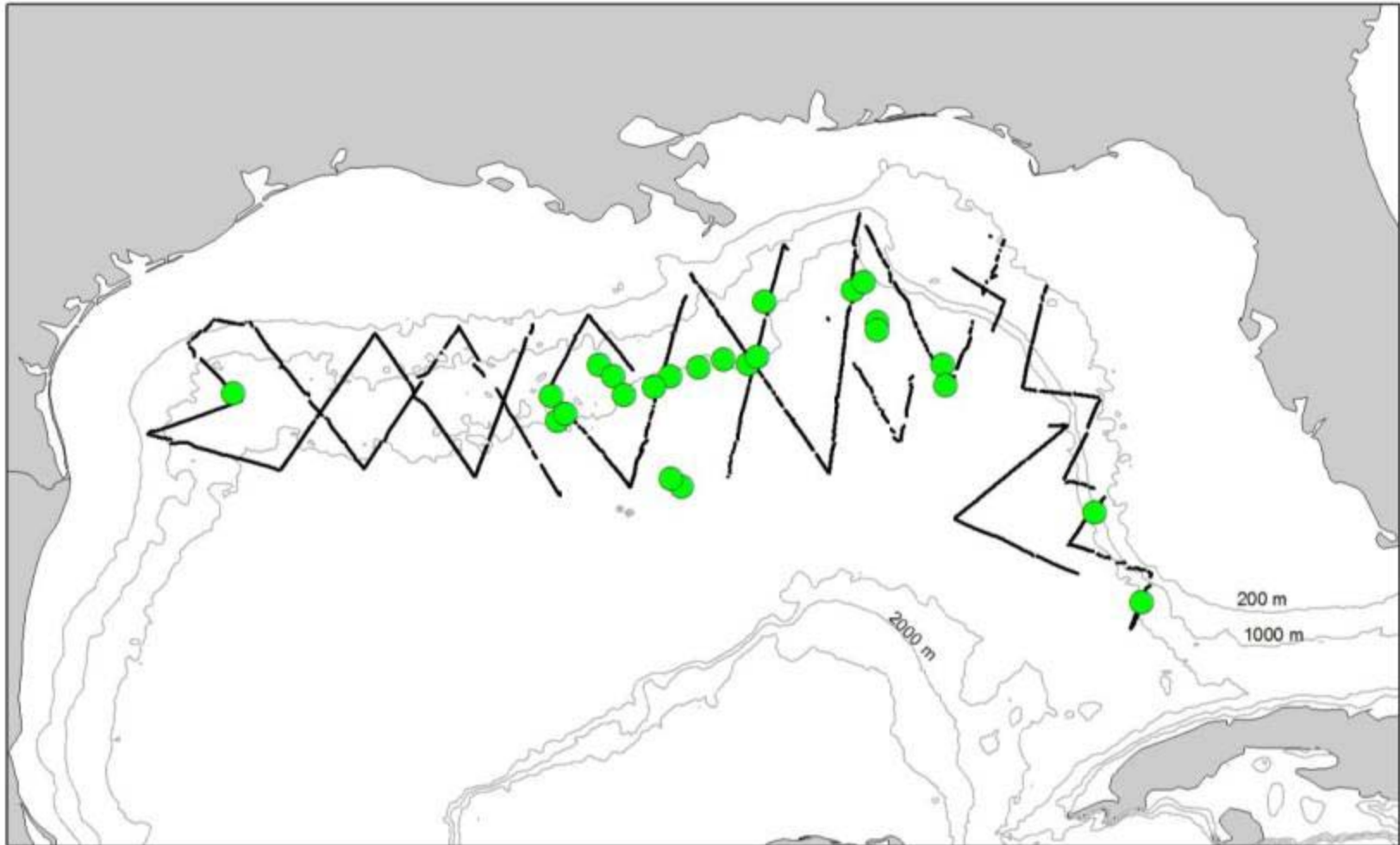
Study Objectives

- 1) Determine the prey species of sperm whales in the Gulf of Mexico
- 2) Study the deepwater food web that supports sperm whales
- 3) Examine the importance of gyres, eddies, and other oceanographic features for concentrating sperm whale prey in specific locations

Pilot Study – Summer 2009



Pilot Study – Summer 2009



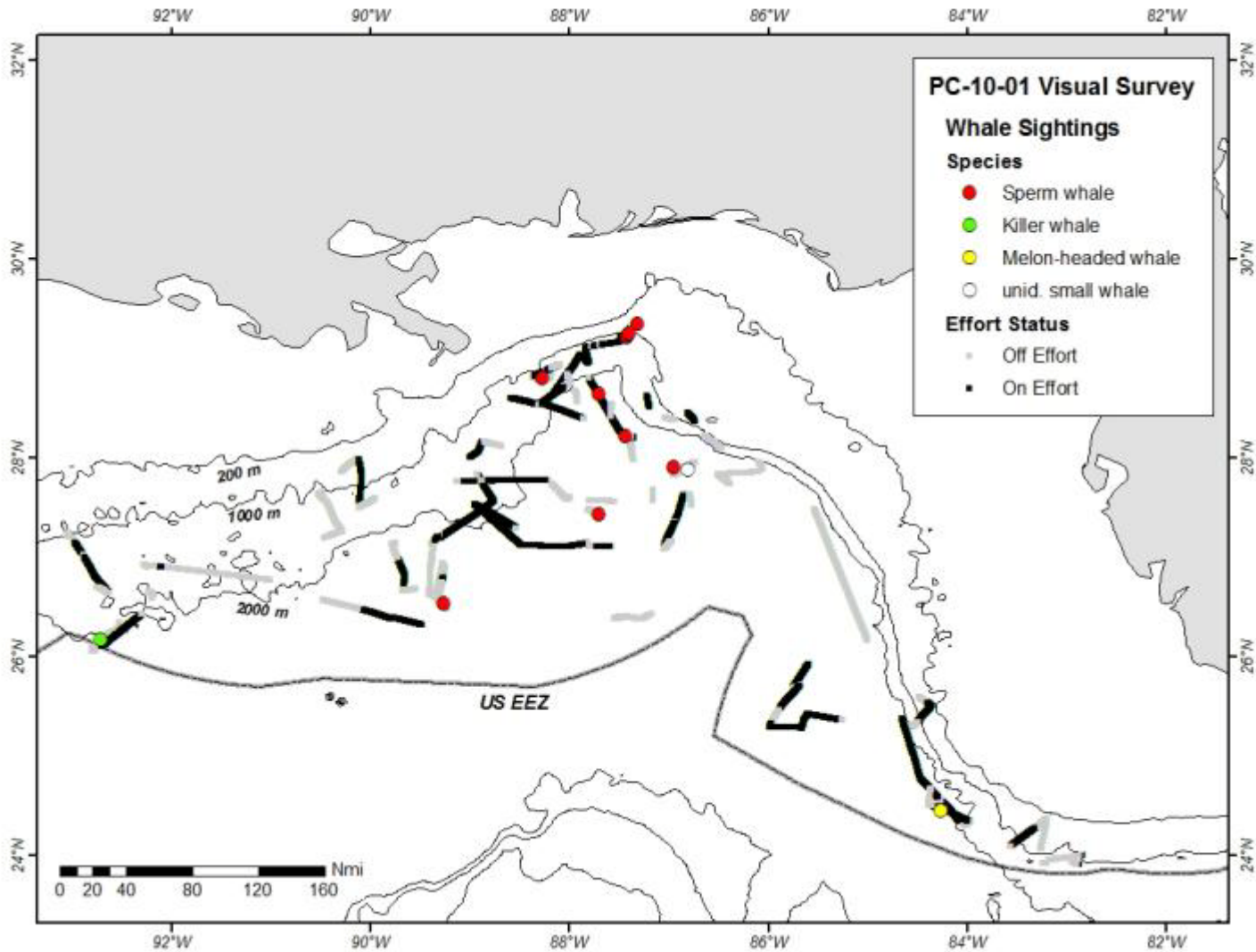
Architeuthis!



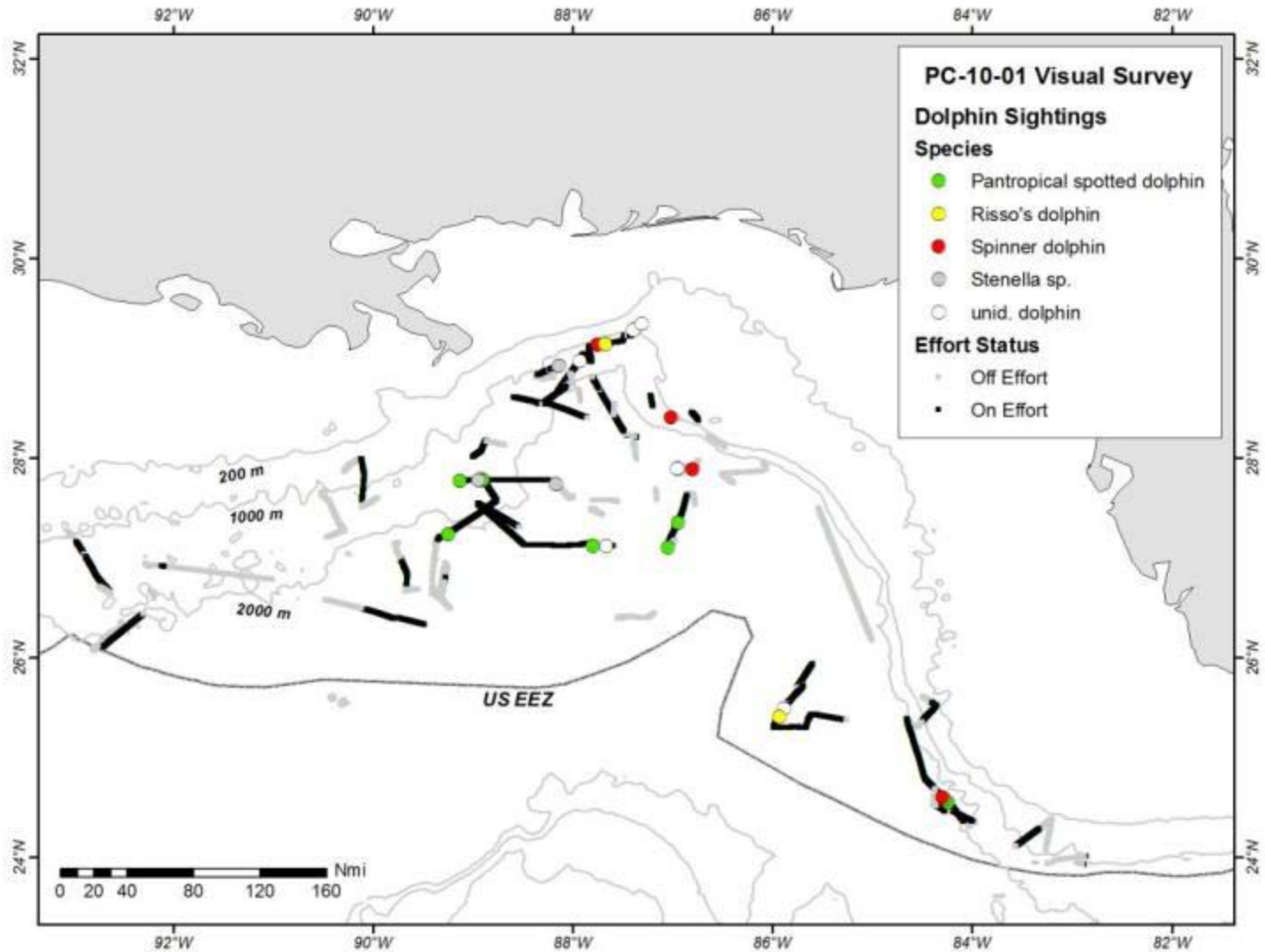
SWAPS Data Collection

- 1) Visual and passive acoustic survey to detect marine mammals
- 2) Collect biopsy samples from marine mammals and scat samples from sperm whales
- 3) Midwater trawling to quantify mesopelagic fish and squid biomass
- 4) Collect squids for genetic barcoding for use in identifying prey in sperm whale scat
- 5) Collect tissue samples from trawl species for stable isotope analysis and potential contaminant analysis
- 6) Collect scientific echosounder data (EK60) to evaluate broad-scale patterns in biomass
- 7) Conduct hydrographic profiles to examine oceanographic structure

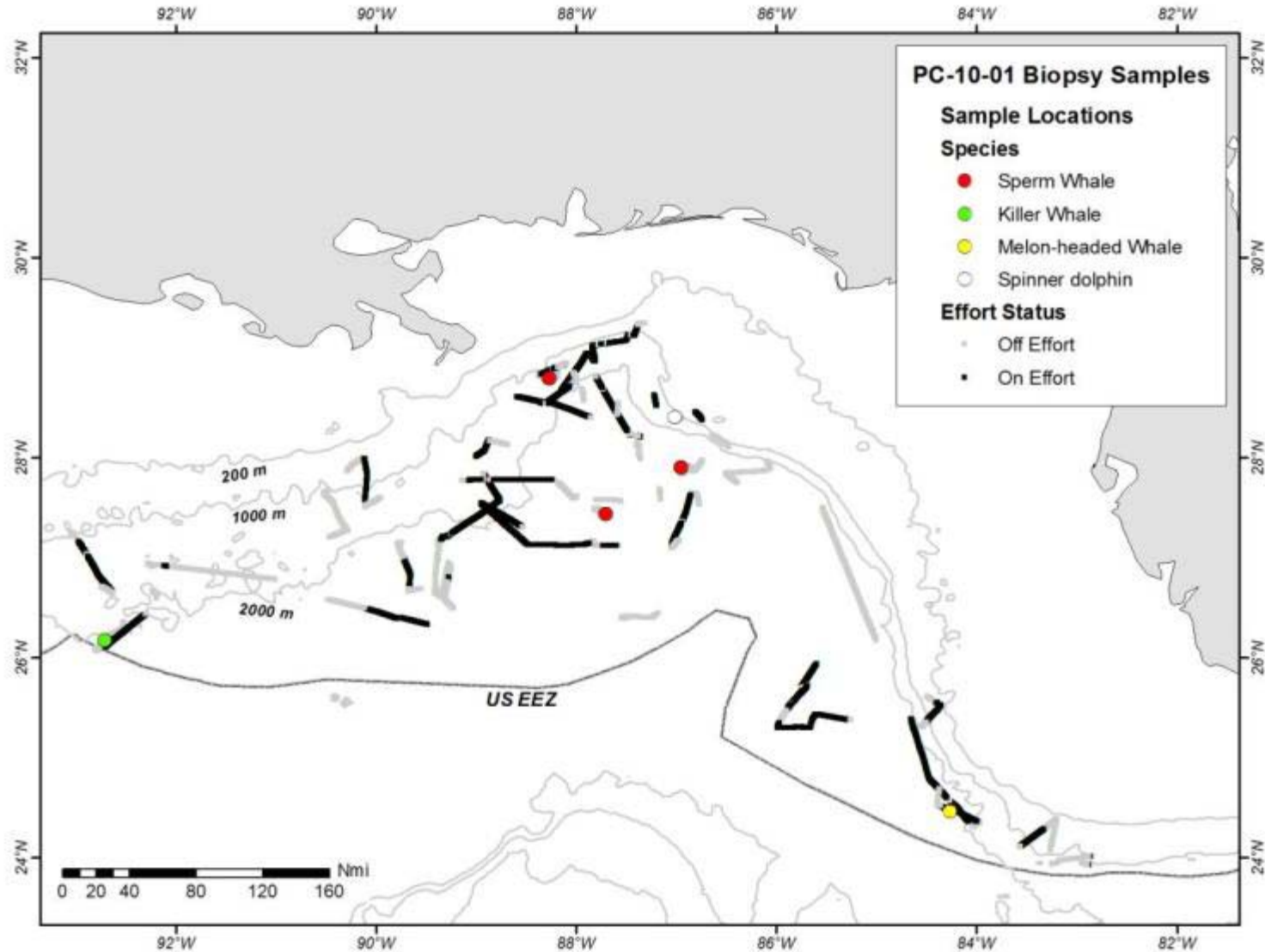
Marine Mammal Survey



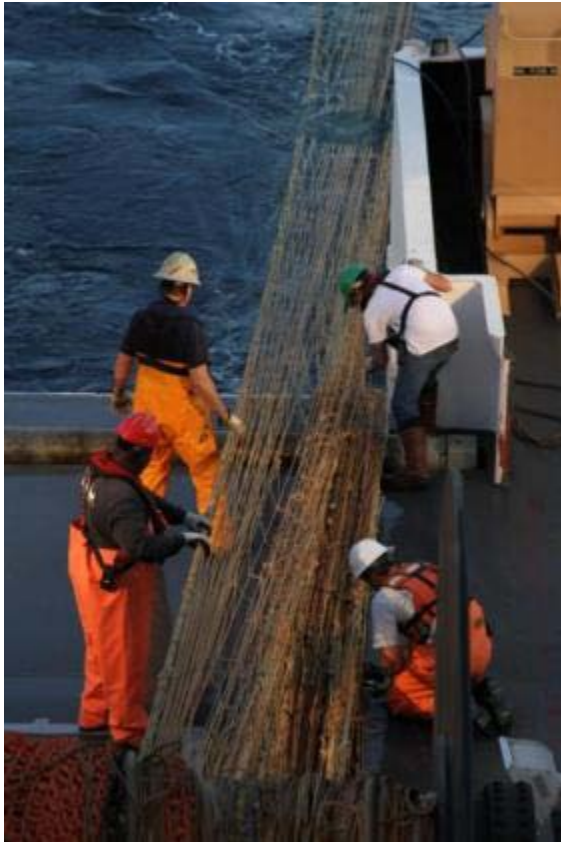
Marine Mammal Survey



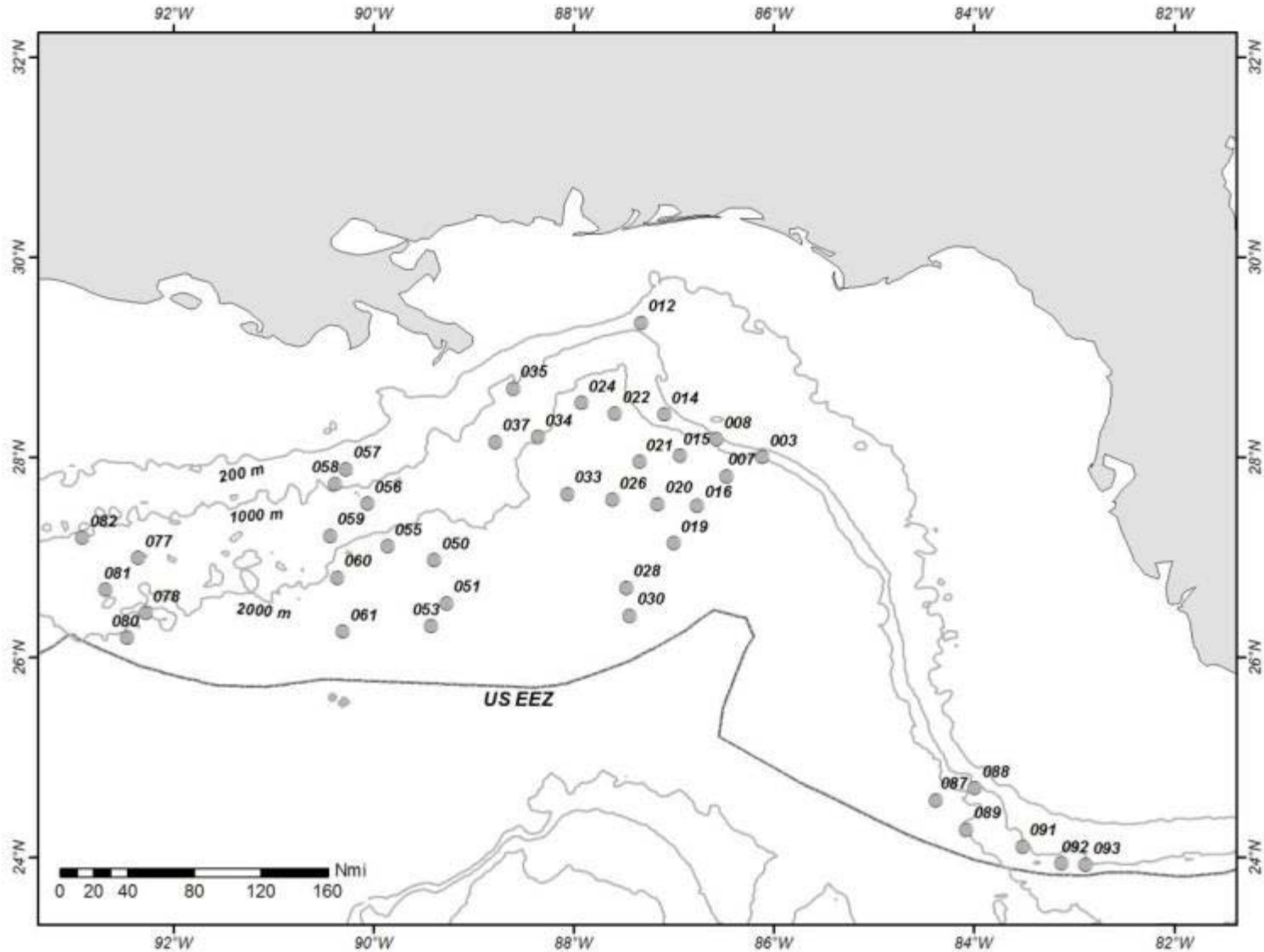
Marine Mammal Survey



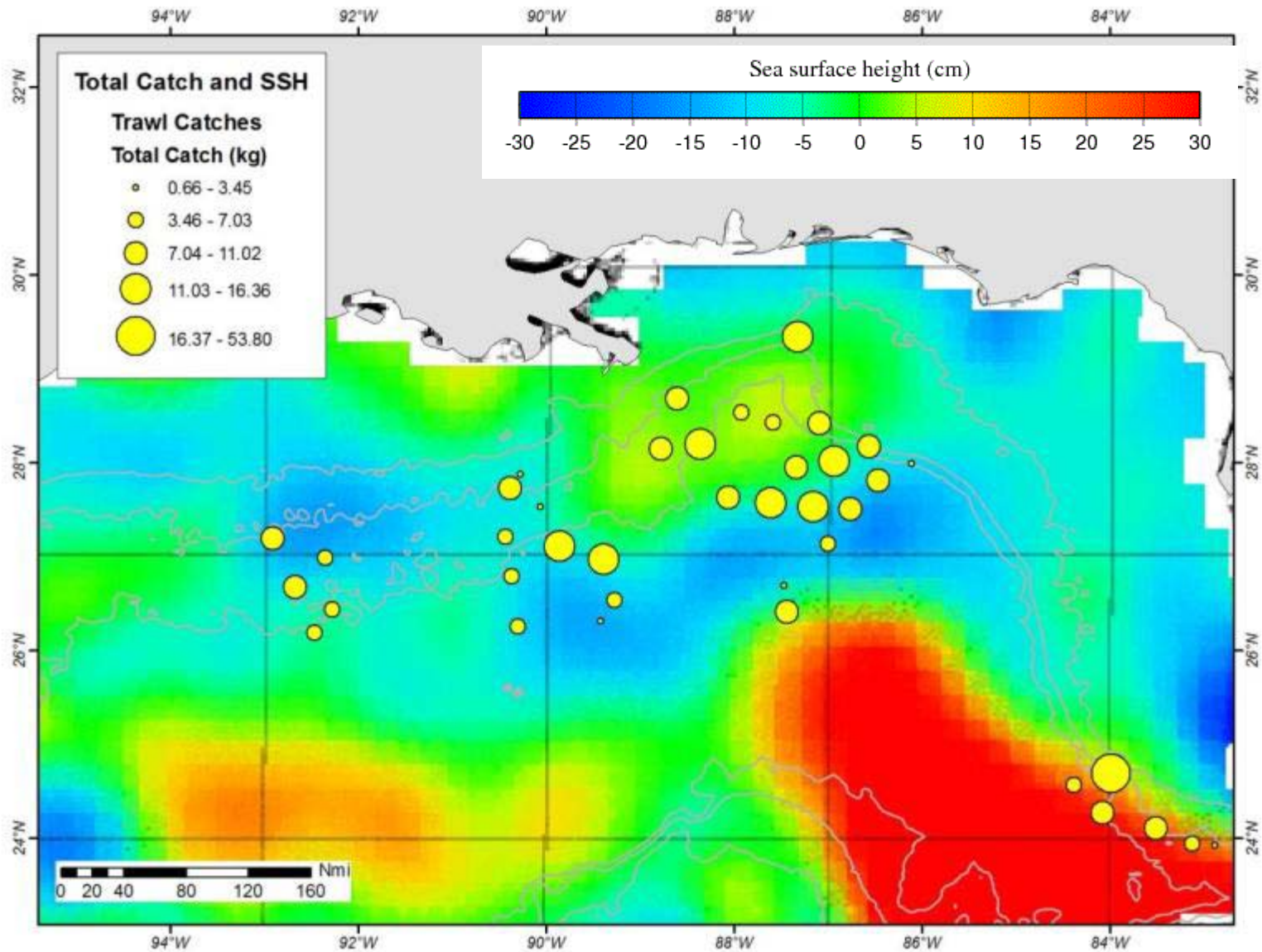
Midwater Trawling



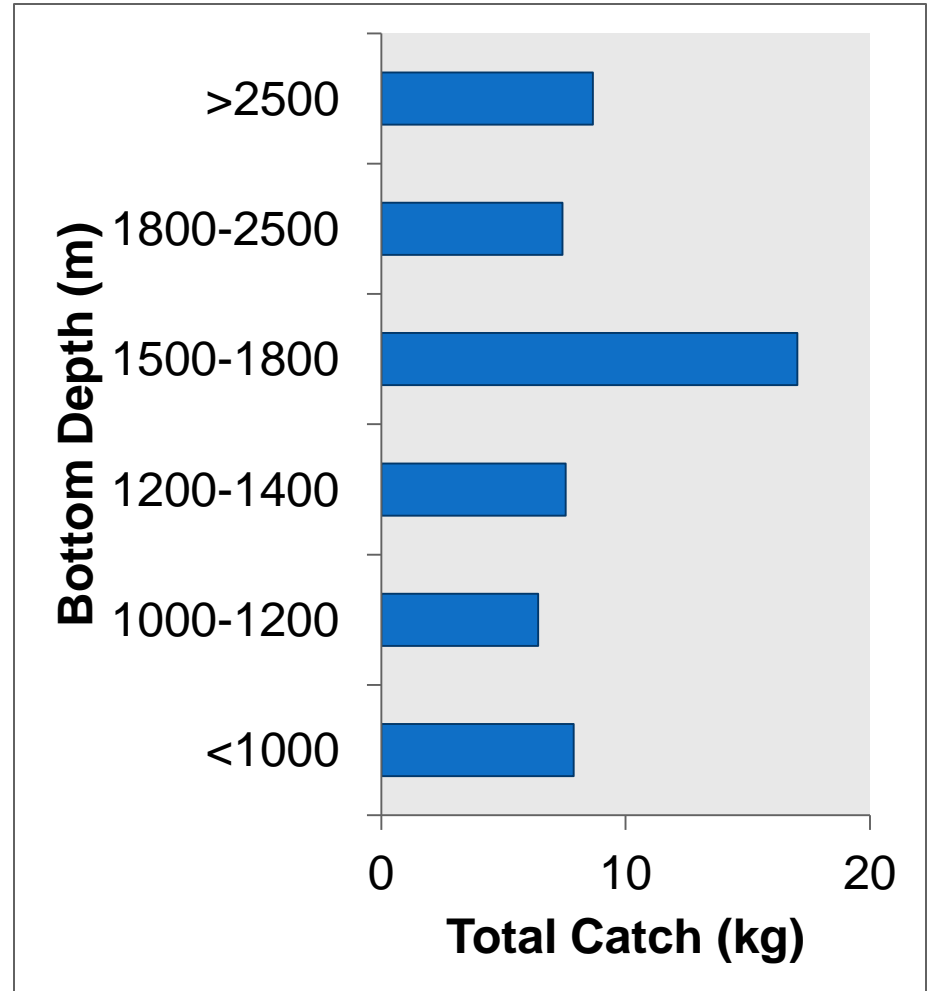
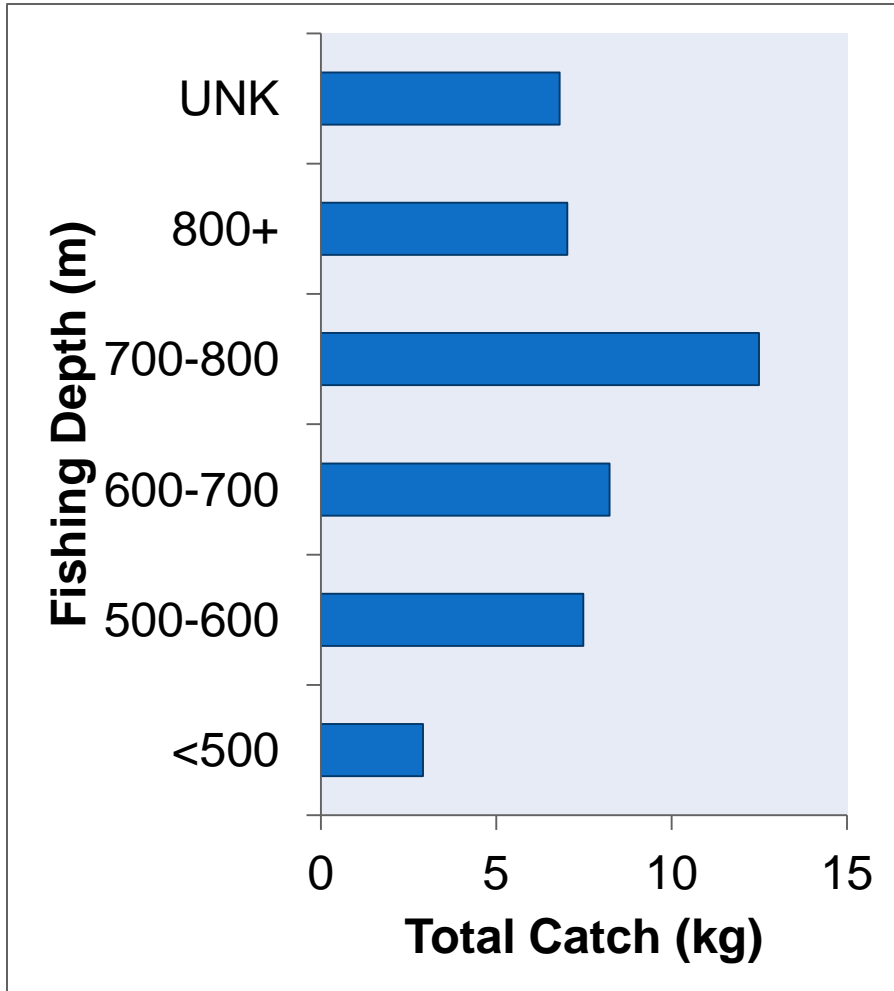
Midwater Trawl Stations



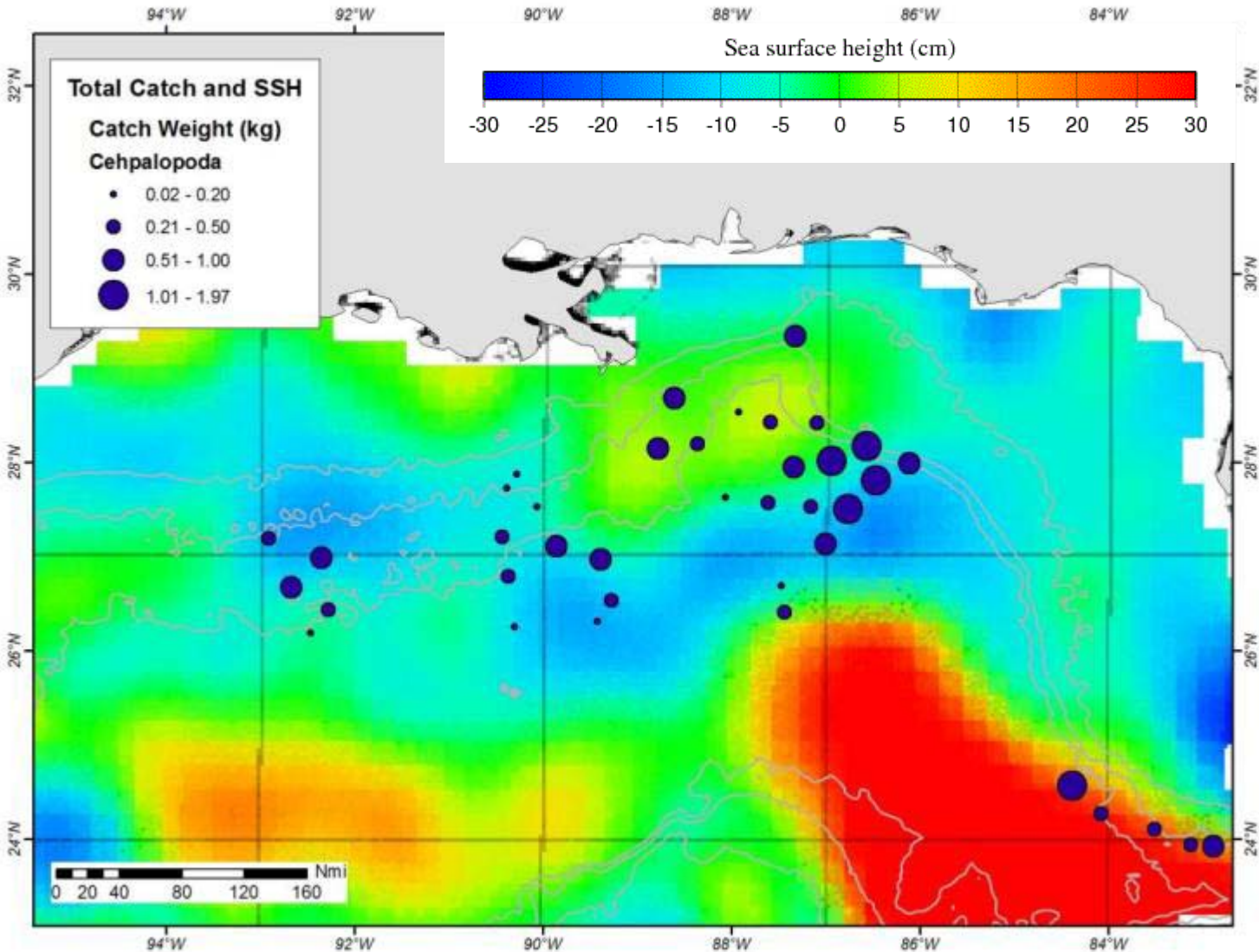
Midwater Trawl Catch



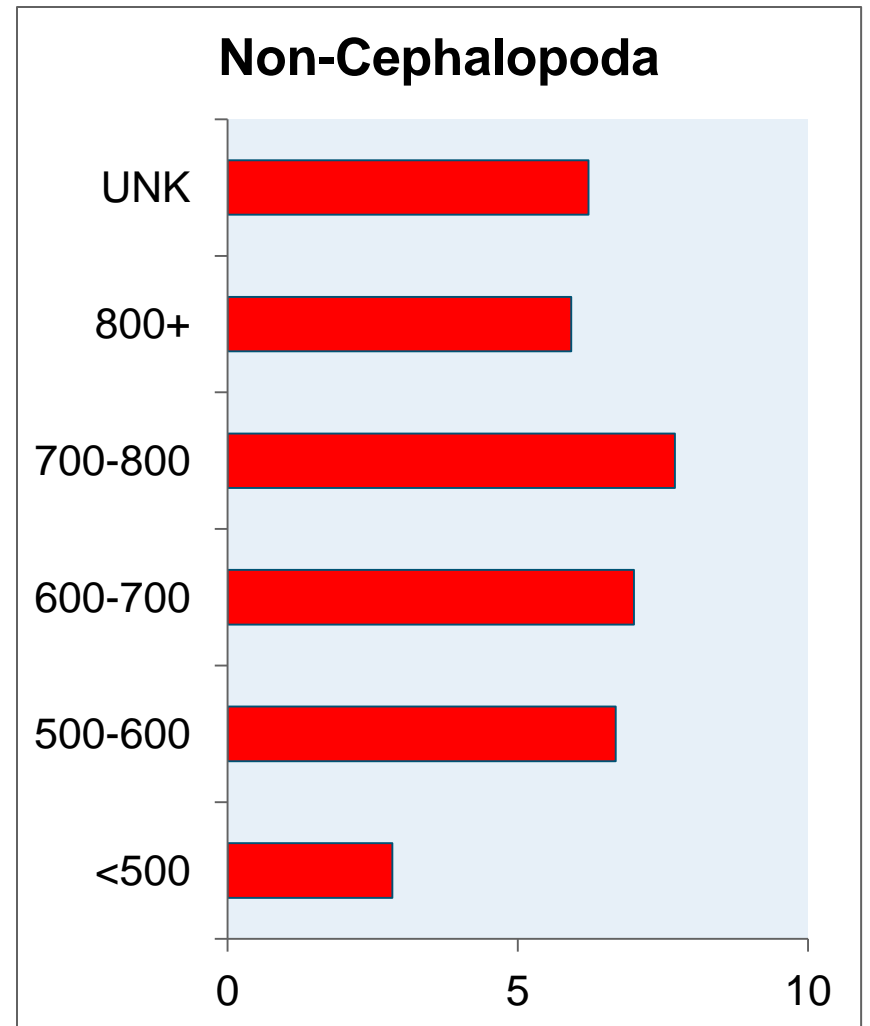
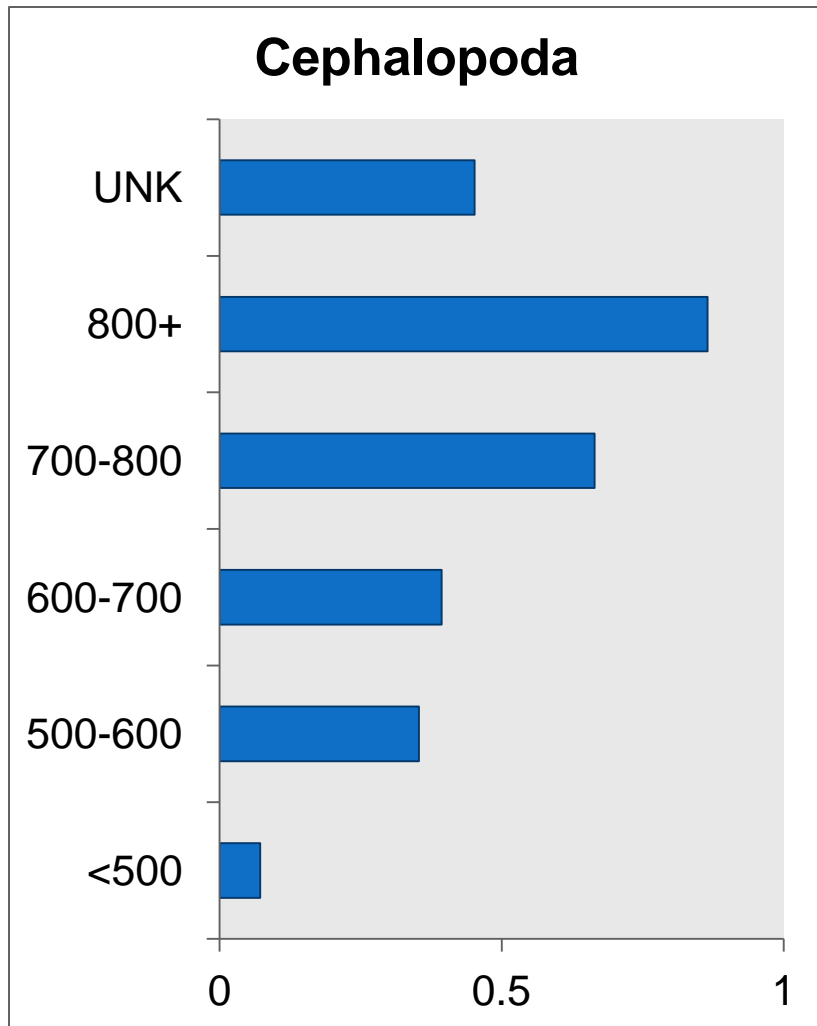
Midwater Trawl Catch



Midwater Trawl Catch



Cephalopod Catch by Fishing Depth

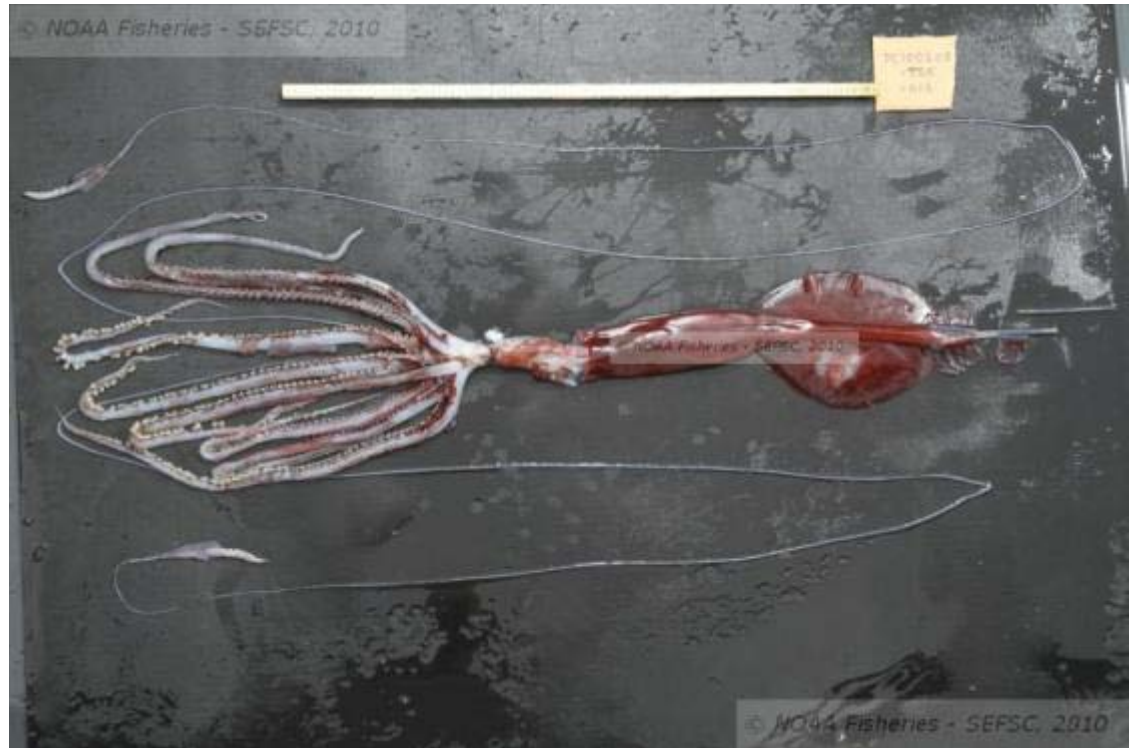




Larger Specimens



Ommastrephes bartramii



Asperoteuthis acanthoderm

Squid Identification

At least 57 identified species of squids were collected during the survey

Voucher specimens and samples with uncertain identification were taken to the Smithsonian Institution National Systematics Lab to validate species identifications

Genetic work is underway to develop genetic “barcodes” for voucher specimens

Sampling for Stable Isotope Analysis

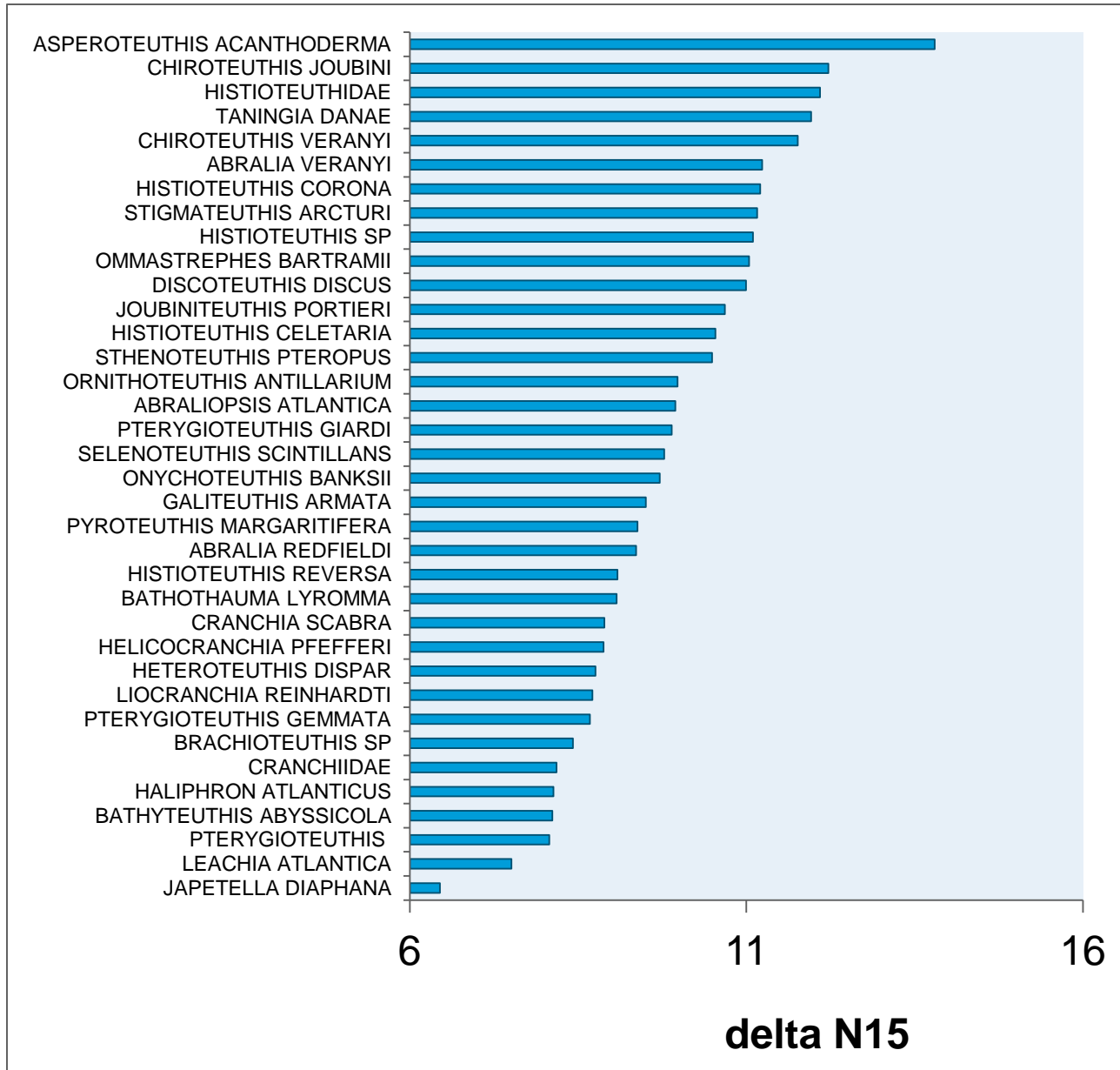
1,241 samples were collected for stable isotope analysis

Includes at least 117 species/taxa including 47 squid taxa

Small tissue samples were collected from dorsal muscle of fish and from fin/mantle muscle for squids

Sample analysis being conducted by Dr. Peggy Ostrom at Michigan State University for stable isotopes of carbon and nitrogen

Preliminary SI Results (468 samples)

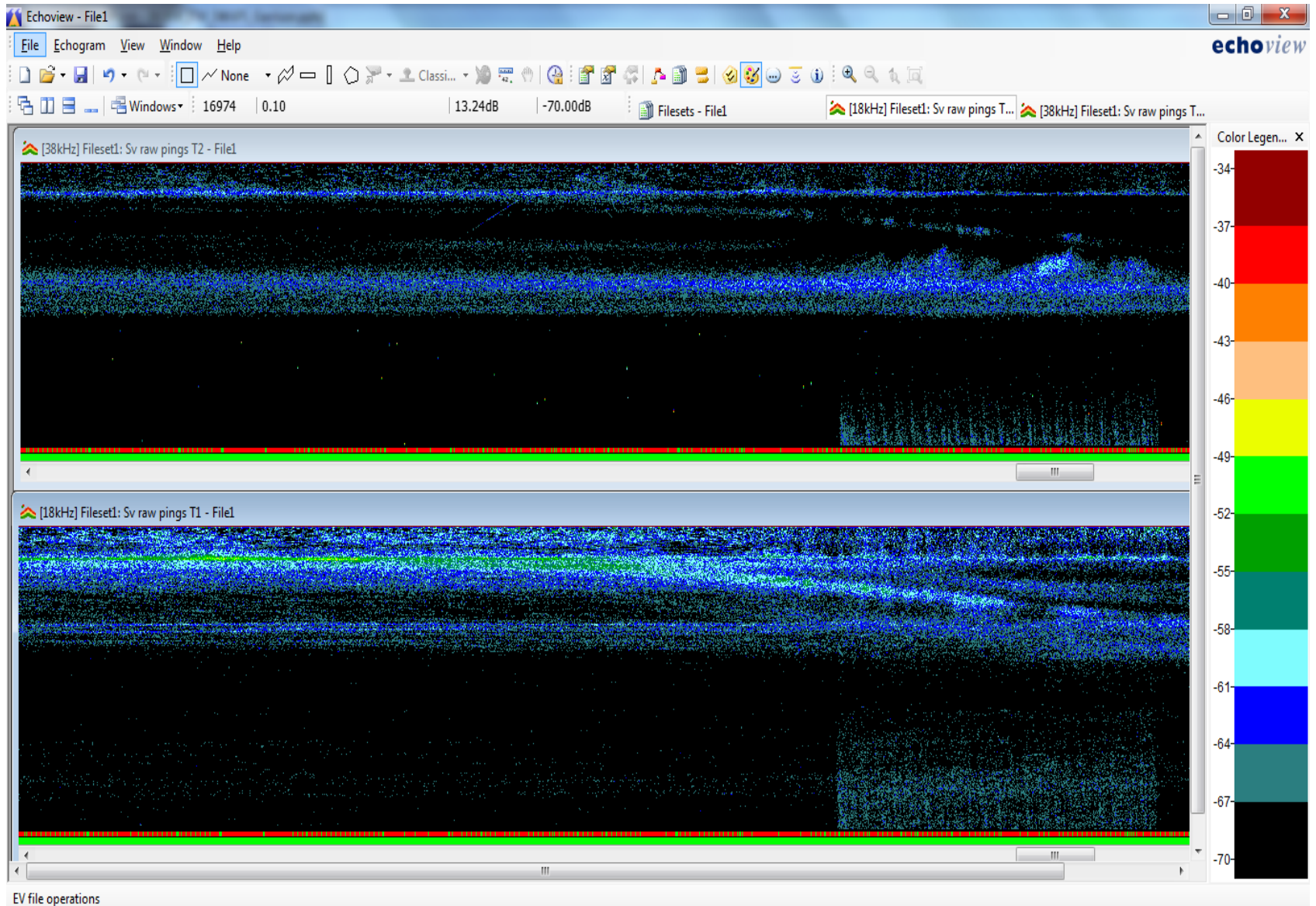


Sperm whale dN
In the Gulf of
Mexico ranges
from ~11–13

The expected
trophic enrichment
is ~3.3 per trophic
level

Suggesting that
species with dN
values ranging
from 8–10 are at
the same trophic
level of SW prey.

Scientific Echosounder Data



Scientific Echosounder Data

Data collected continuously throughout the survey at four frequencies: the 18 and 38 kHz are useful

Echointegration is being used to characterize acoustic backscatter in discrete vertical layers at each frequency and using frequency differencing

Conduct direct comparisons between backscatter and trawl catches in fished layers

Provide data on distribution of biomass and correlation (if any) between squid catches and EK60 returns

Project Status and Timelines

Stable isotope samples are continuing to be analyzed; expect completion of sample analysis by the end of May

Voucher specimen identifications are complete, and genetic sequencing is starting and will be completed over the next 3–6 months.

Processing EK60 data and conducting echointegration analyses

Gathering and integrating physical oceanographic data (including remote sensing sources)

Next Step: Eastern Gulf/Dry Tortugas

The eastern Gulf, north of the Dry Tortugas is an area where sperm whales are routinely observed during summer months

But no understanding of their seasonal movements, relationships with other Gulf of Mexico sperm whales, demographics, etc.

Currently developing a project focusing on sperm whales in this region: incorporate passive acoustic monitoring, biopsy sampling, prey sampling, and tag telemetry studies