



NEFSC Plans for Future Atlantic Sea Scallop Surveys

New England Fishery Management Council

Mystic CT

April 24, 2012

Northeast Fisheries Science Center

Woods Hole MA



Council Request:

Motion 7: Pierce/Preble

- Recommend that the Council request NEFSC:
 - 1) explain how it intends to integrate Habcam results into overall biomass estimates;
 - 2) detail scientific/technical obstacles for successful integration of Habcam results;
 - 3) provide a timeline for expected integration of those results; and
 - 4) describe its intentions for continued use of other surveys for biomass estimates.

Major Points: Scallop Surveys

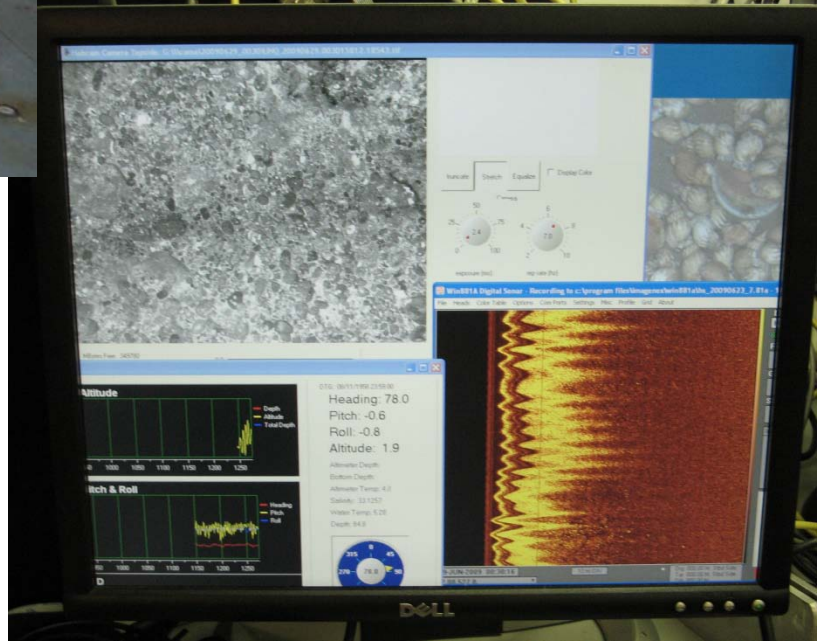
- Fully committed to providing information for stock assessments of this valuable resource
- Will build on previous history for dredge survey and transition to a new image based survey that will serve scallops and other needs.
- Support information from multiple data sources including longstanding cooperative research efforts
- Recognize the importance of biological samples and will continue to use combined dredge and advanced sensor packages.
- Prepared for contingencies including sensor package failures.
- Will build a bridge with past survey methodology

HabCam towed camera system

Developed by collaboration between fishermen and scientists at the Woods Hole Oceanographic Institution

Funded by RSA, NOAA, Northeast Consortium





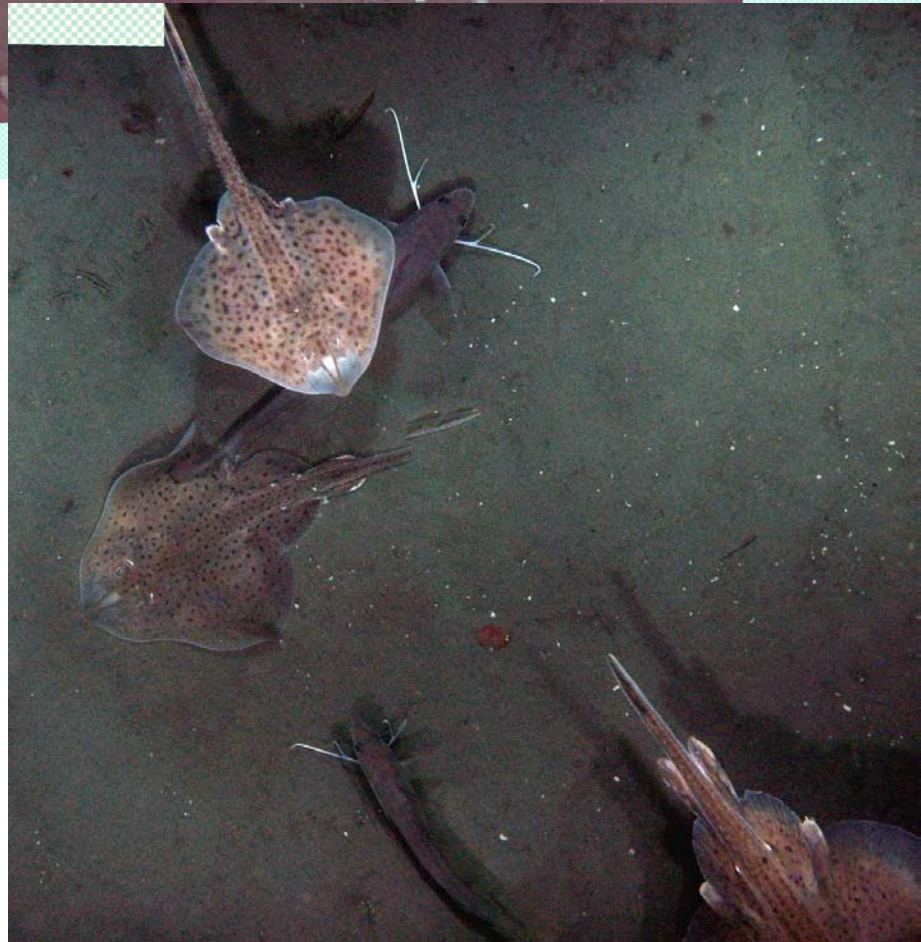
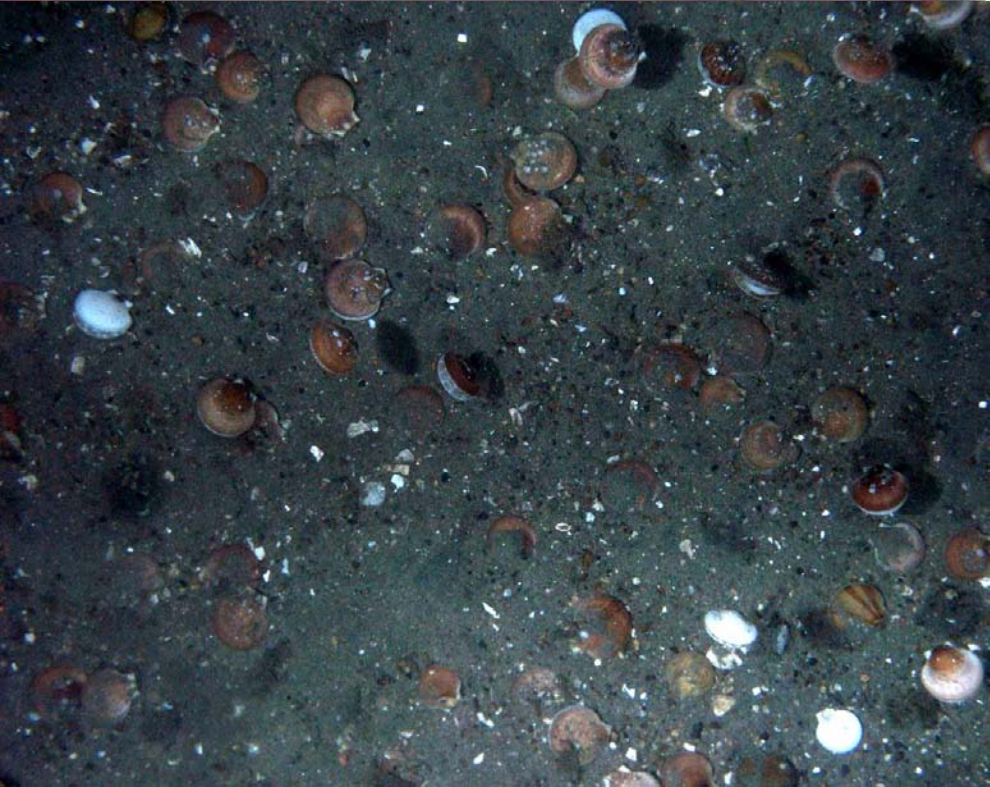
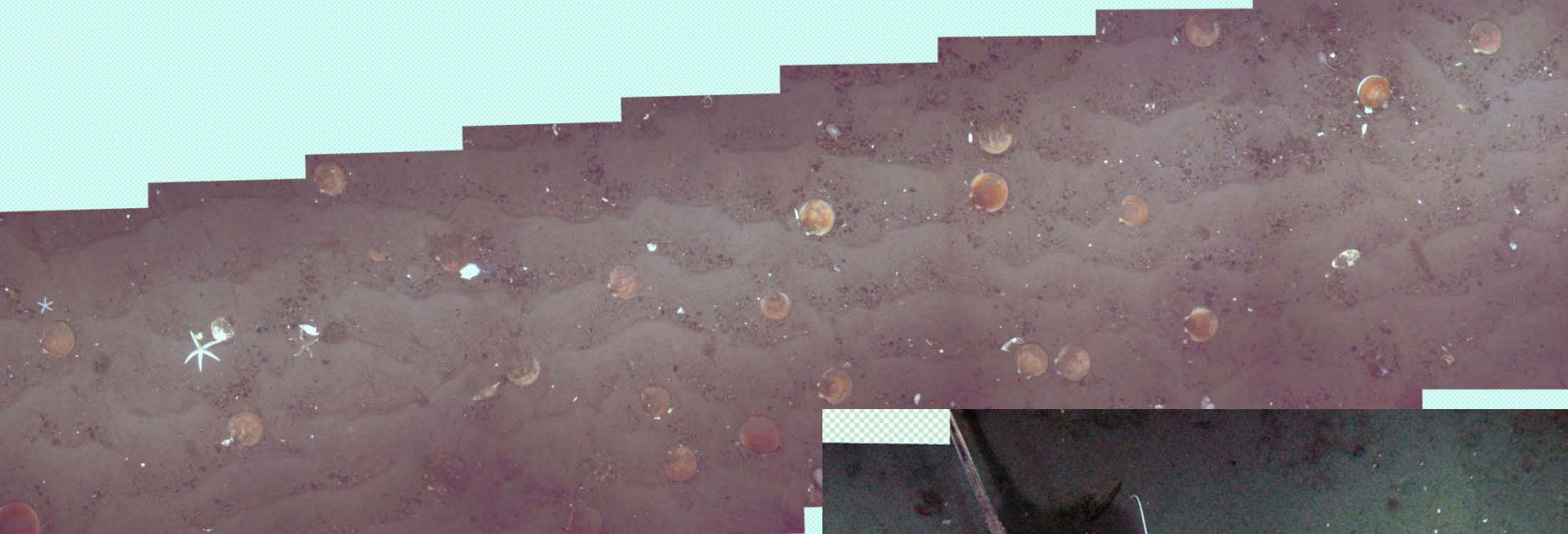
- ❑ Camera, strobes, other instruments inside a steel frame
- ❑ Vehicle towed about 2 m off the bottom

HabCam towed camera system

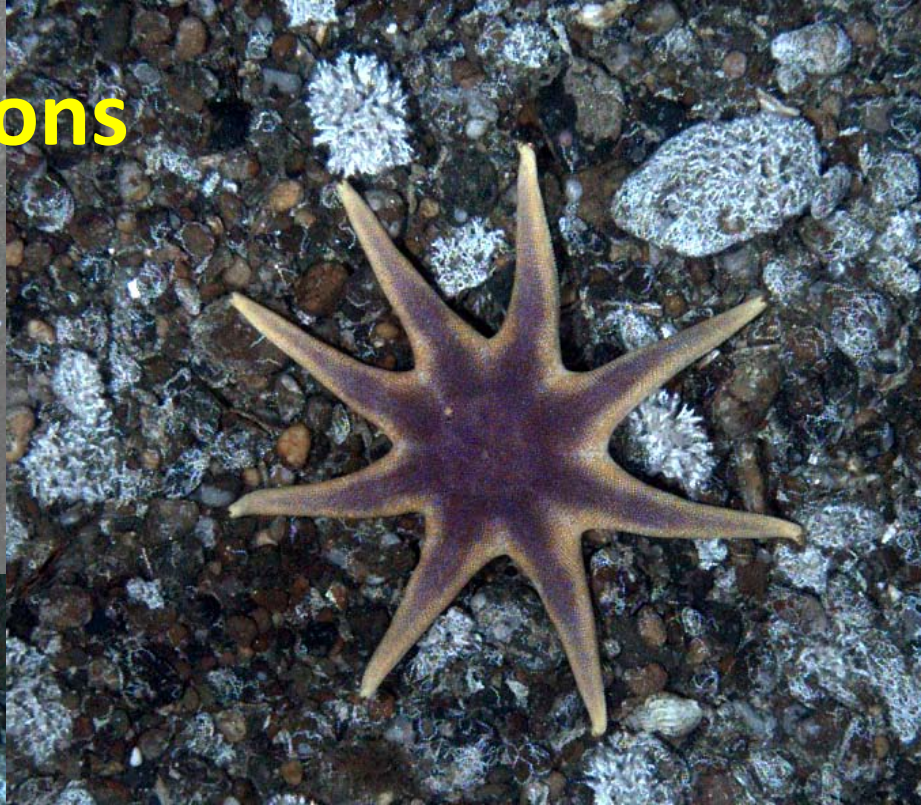
- Towed at ~5 knots about 2 m above sea bottom
- Collects overlapping digital still images (>3/sec)
- Images cover more area per unit time than the dredge survey
- Information collected on multiple spatial scales
- Collects in situ information on fish and habitat
- Detection efficiency approaches 100%

2011 Habcam survey of Georges Bank

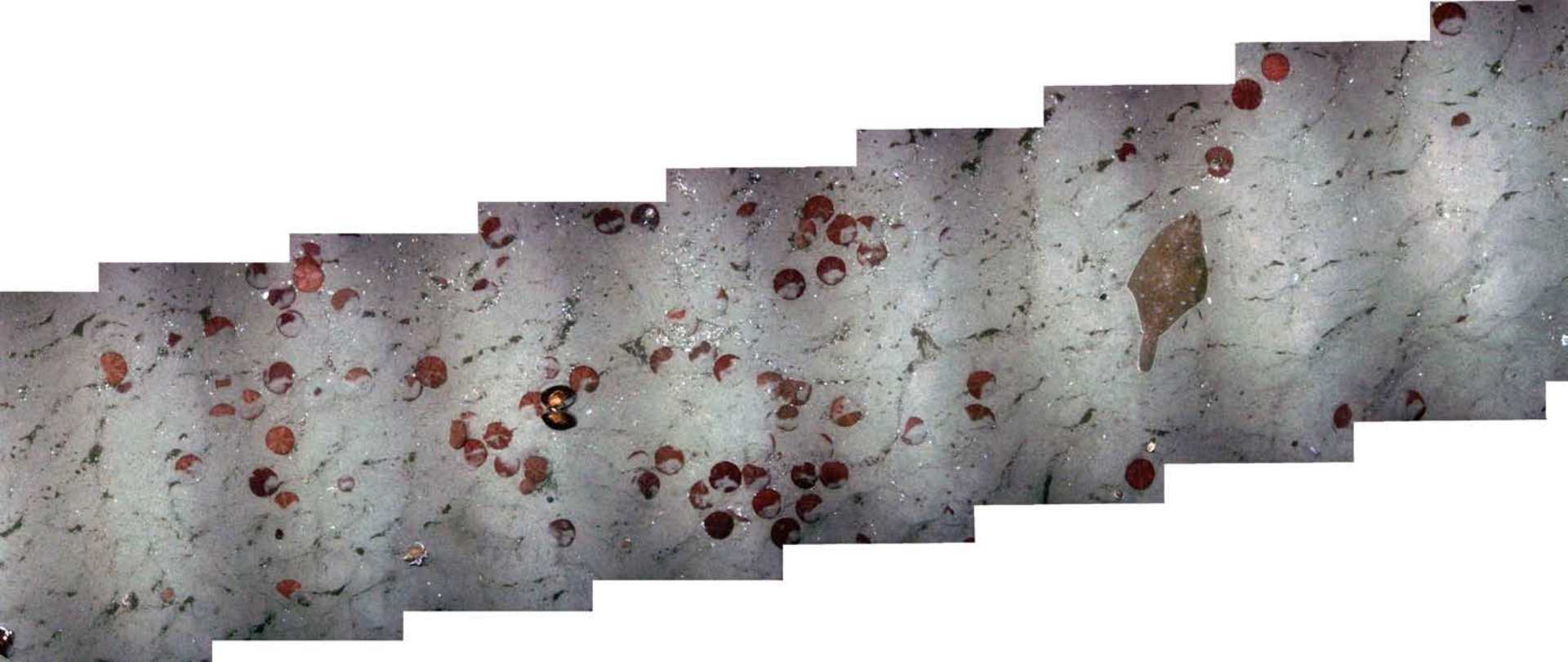
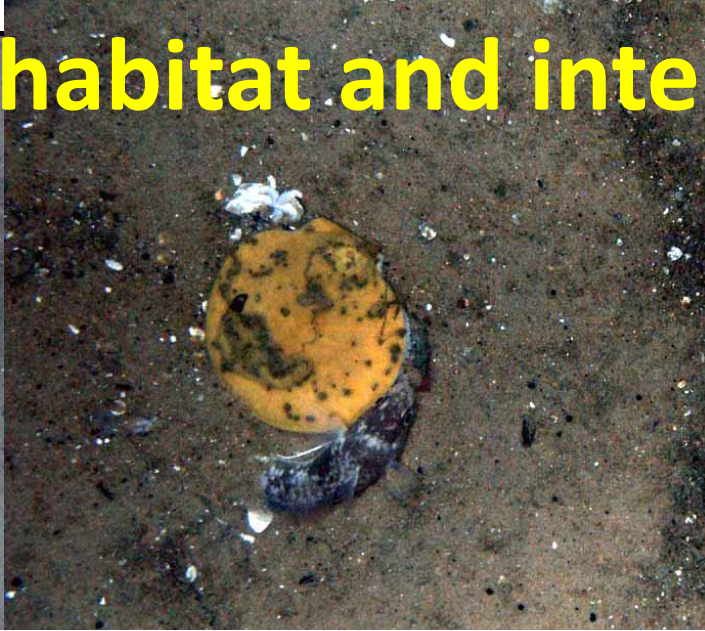
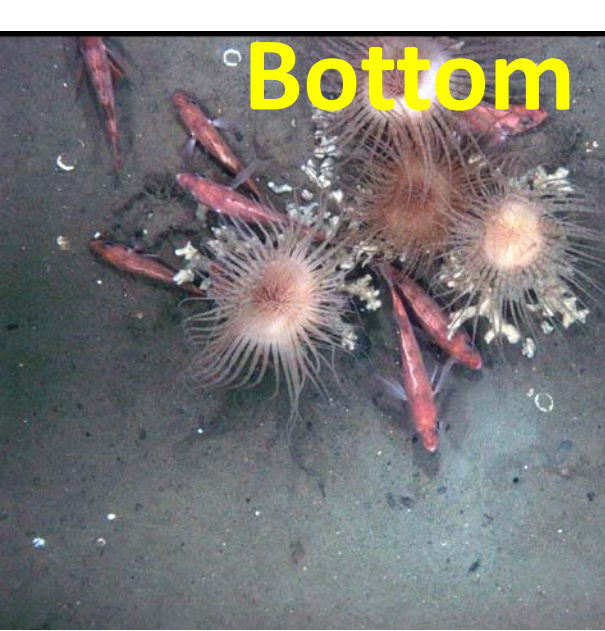
- First large-scale HabCam survey
- Intended as a prototype of future surveys
- Used current HabCam system
- Collected about 2.5 million images in 10 sea days



Predator-prey interactions



Bottom habitat and interactions

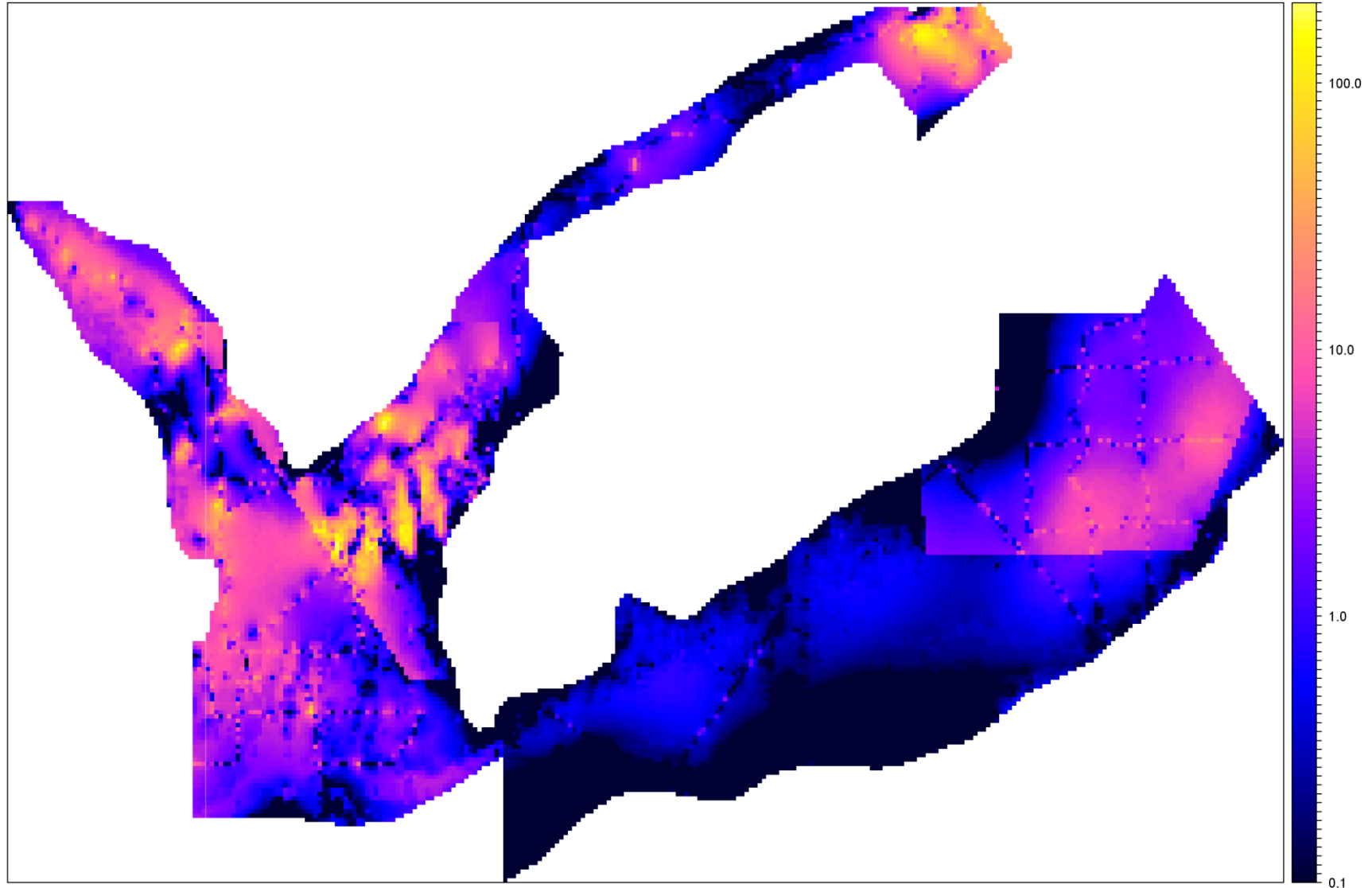


Observations of the invasive tunicate *Didemnum*



2011 HabCam Estimates of Scallop Density on Georges Bank

Predicted spatial distribution of sea scallops (metric tons of meat per square kilometer)



Comparison of Survey Estimates for Georges Bank (MT meats) in 2011

Area	NEFSC Dredge	SMAST	HabCam	VIMS
CL Area 1-Access	14,833	12,582	15,024	
CL Area 1-No access	6,083	6,290	12,379	
CL Area 2-North	10,244	16,307	14,289	
CL Area 2-South	15,245	12,846	10,767	20,512
Nan Lightship –Access	3,939	3,315	5,528	
Nan Lightship –No Acc	92	2,806	NS	
Northern Edge	8,028	4,715	3,024	
South Channel	17,054	26,491	26,048	
Southeast Part	3,817	2,212	2,244	
Total	79,335	87,564	89,303	

1. Explain how it intends to integrate Habcam results into overall biomass estimates

- Habcam provides an independent measure of stock biomass, but like all surveys, has uncertainty
- Therefore important to incorporate multiple sources of uncertainty in an assessment model.
- Assessment models rely on data from multiple sources.
- Use of HabCam was extensively reviewed at SARC 50 in June 2010

How are survey data used?

ASSESSMENT MODEL

CASA model – used to estimate biomass and fishing mortality from previous years (like VPA or ASAP models used for finfish)

CASA is an integrative model that combines survey, commercial, observer and growth data to obtain estimates of biomass and fishing mortality

Both NEFSC dredge and SMAST video survey data are included in CASA – Habcam will be a third source of survey data. VIMS RSA data will likely be integrated into the dredge index in the future

How are survey data used?

PROJECTION MODEL—Area Management

SAMS model (Scallop Area Management Simulator) – area management model to forecast future biomass and landings. More detailed spatially than CASA, with 16 separate areas

Survey data from broadscale surveys (NEFSC, SMAST) and RSA surveys of specific areas are used to initialize scallop abundance in each area. Detailed RSA surveys give better information than the broadscale surveys.

2. Detail scientific/technical obstacles for successful integration of Habcam results

- Continual refinement of survey design and estimation with combination of image and dredge samples
- Maintain capability to conduct dredge survey and blend with HabCam results.
- Purchase of fiber optic winch
- Post-Cruise Image processing
- Loss or Equipment Failure

Habcam ongoing work

Automated processing of imaging progressing
(work with WHOI and RPI)

Bayesian geostatistical methods – use previous surveys as informative prior

Co-kriging approaches to combining multiple surveys

150 HabCam vs Survey Dredge comparative tows

3. Provide a timeline for expected integration of those results

- 2011—demonstrated ability to integrate dredge and HabCam survey for Georges Bank (100 fewer tows but only slight increase in CV)
- 2012 Dredge survey will continue but at about half the station density (about 200 stations). VIMS dredge survey data can be used to supplement NEFSC dredge survey, so that precision of time series will not suffer. {Hudson Canyon, CA II, NLSA}
- 2012 next generation dual camera HabCam system (3D images) to be deployed starting in 2012. Enhanced oceanographic and acoustic sensor array
- Audited 2012 Survey data will be available by August 2012
- HabCam will also be used for Closed Area II trip (RSA Sponsored)
- **2012 and 2013 are transition years. Will evaluate progress and revise plan accordingly.**

4. Describe its intentions for continued use of other surveys for biomass estimates

- Stock assessments benefit from multiple data sources. Complementary surveys.
 - NEFSC Dredge Survey
 - SMAST Video Drop Camera Survey
 - VIMS dredge surveys
 - Other surveys and experiments as needs arise.
- The Atlantic Sea Scallop Fishery is productive, well managed and strongly supported by science from NMFS, SMAST, VIMS, Industry and Academic Partners. It is in everyone's interest to continue this process.

QUESTIONS?

