August 2015

Sustainable Fisheries GIT
Science Updates

Chesapeake Bay Program
Science Restoration Partnership

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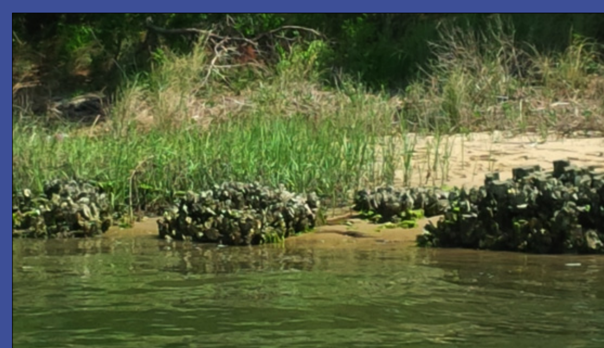
What is the Fisheries GIT?

The Chesapeake Bay Program's Sustainable Fisheries Goal Implementation Team (Fisheries GIT) facilitates fisheries management that encourages sustainable Chesapeake Bay fish populations, supports viable recreational and commercial fisheries and promotes natural ecosystem function. The Fisheries GIT provides the forum to discuss fishery management issues that cross state and other jurisdictional boundaries. The Fisheries GIT also works to connect science to management decisions and create a framework for implementing ecosystem-based approaches to fisheries management. This fact sheet highlights the science and research discussed at the team's June 2015 semiannual meeting.

OYSTERS

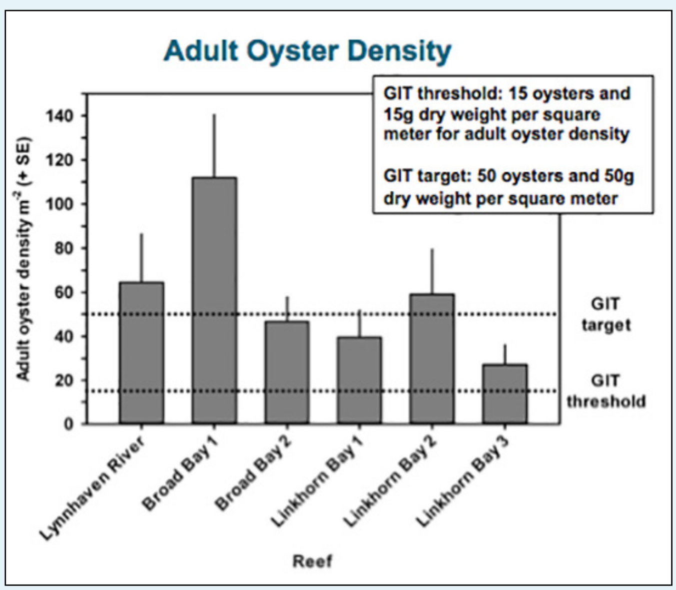
The Lynnhaven River is one of the six currently selected tributaries for large-scale oyster restoration under the Watershed Agreement oyster outcome of restoring 10 tributaries by 2025. The U.S. Army Corps of Engineers (USACE) has been monitoring past restoration projects to determine if they meet the restored reef criteria outlined in the Oyster Metrics. Restoration partners include the National Oceanic and Atmospheric Administration, Virginia Marine Resources Commission, Lynnhaven River NOW and other local groups. For a tributary to be fully restored, it must meet or exceed the multiple criteria developed by the Oyster Metrics Team.



Intertidal oyster castles photographed in May 2015 in the Lynnhaven River. These castles not only provide habitat for oyster settlement and growth but also prevent shoreline erosion. *Photo credit: Lynnhaven River NOW.*

It has not yet been determined if the Lynnhaven meets all of the Oyster Metrics criteria. So far, monitoring of past Lynnhaven restoration projects has seen high recruitment and large numbers of oysters. Monitoring data has also shown significantly better performance of high-relief reefs compared to low-relief reefs.

For more, please see Dave Schulte (USACE)'s presentation.



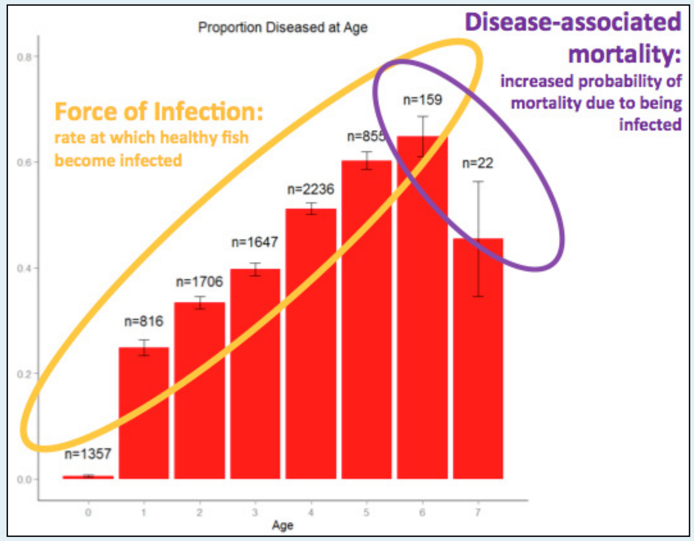
Right: Adult oyster density monitored on all measurable, constructed reefs have surpassed the GIT Oyster Metrics threshold, with three reefs exceeding the GIT target. The graph included samples from both high and low relief reefs; when just high relief reefs are considered, the target is consistently exceeded. Oyster density is just one of the multiple criteria being used to evaluate past projects.

STRIPED BASS

HEALTH INDICATOR:

Researchers are using statistical modeling techniques to explore the connection between mycobacteriosis disease in striped bass and environmental variables like water temperature, hypoxia and forage availability. Preliminary results show the apparent prevalence (proportion of animals that test positive for mycobacteriosis) is correlated with several factors including body condition, seasonal water temperatures and hypoxic volume. A resulting striped bass health indicator could provide information about how the Bay's health could be influencing disease in the striped bass population.

The striped bass show visible signs of mycobacteriosis in the form of skin lesions. *Photo credit: MD Dept. of Natural Resources.*



Above: Healthy fish from the 1998-2013 Maryland DNR striped bass health survey became infected at a fast rate as they got older from ages 1-6. The drop in infected fish seen from age 6 to 7 is most likely the result of many of the infected age 6 dying from the disease.

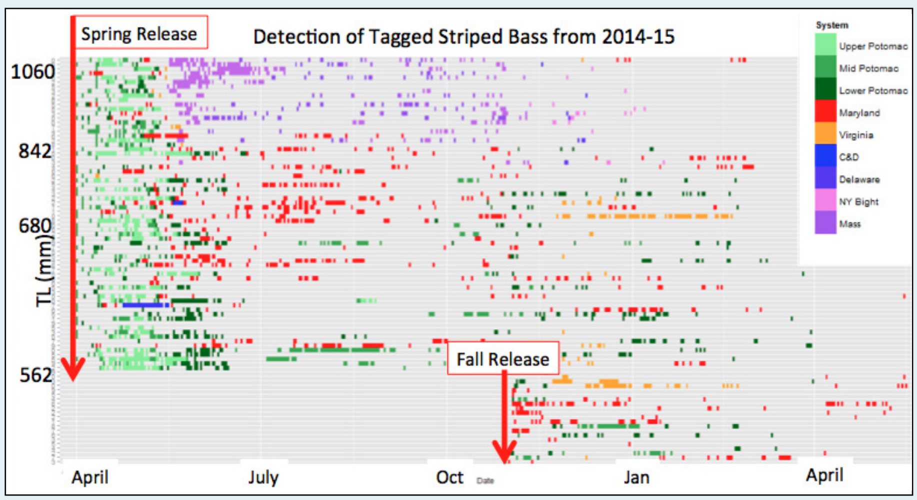
For more, please see Rebecca Scott (EcoAnalytics LLC)'s [presentation]*.*

TELEMETRY:

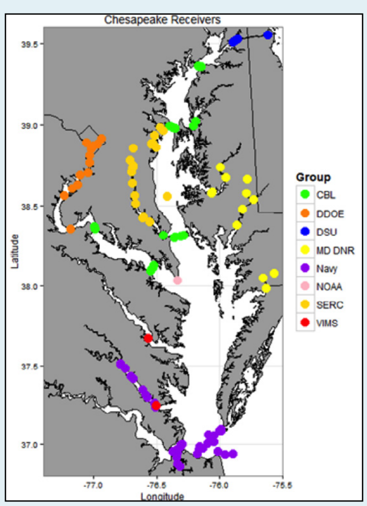
The Potomac and Atlantic Striped Bass Telemetry study is tagging and tracking a representative group of Potomac River striped bass for a 2.5 year period in the Potomac, other Chesapeake Bay tributaries and along the Atlantic Coast to follow the movements of striped bass produced in the Bay. Location data transmitted from the tag in each striped bass show whether the individual has stayed in the Potomac, left the Potomac but stayed in the Bay or left the Bay.

This research will help regional fisheries managers better understand the migration rates of striped bass residents (fish who stay in the Chesapeake) vs. striped bass migrants (fish who leave the Bay and swim along the Atlantic Coast).

For more, see Dave Secor (UMCES-CBL)'s [presentation]*.*



Above: Each small color block represents a daily detection of a tagged striped bass from this study. Each individual is represented by a row of detections, sorted by length (largest fish towards top of the graph). Date of detection is shown on the x-axis. The color of the detection represents different general regions where fish were detected.



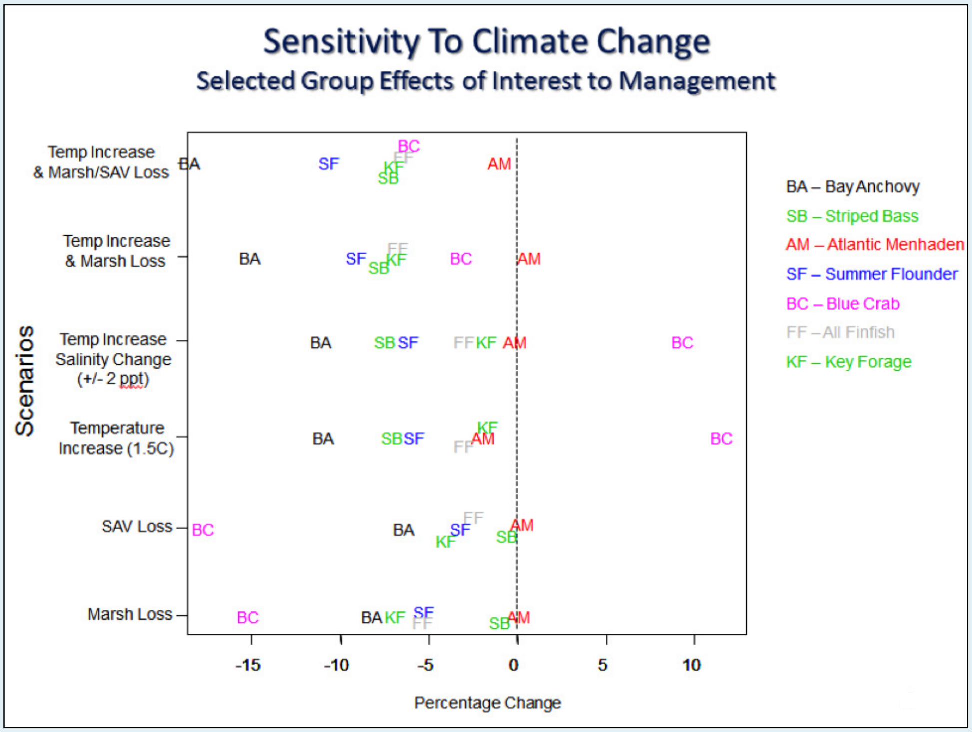
Left: About 100 telemetry receivers operated and maintained by various agencies and institutions are located throughout the Bay. When a tagged striped bass passes a receiver, the tag transmits a signal to the receiver that is recorded and logged. Researchers periodically download this data, which allows the research team to track when and where each striped bass swims.

CLIMATE CHANGE

Researchers are using the Chesapeake Atlantis Model (CAM) to predict fishery production changes due to temperature increases, salinity change and/or habitat loss (SAV/marsh) due to climate change. Overall production under climate change scenarios, when compared to present conditions, decreased for most species.

The combined scenario that includes both the habitat loss and temperature increase expected in the Chesapeake over the next 50 years showed the greatest loss in production to be from Bay anchovy (the most important forage fish species in the Bay). The research team will continue to explore additional climate change scenarios, incorporate biological information and work with fisheries managers to develop specific products based on the model outputs.

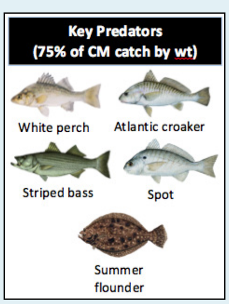
For more, see Tom Ihde (ERT/NOAA)'s presentation.

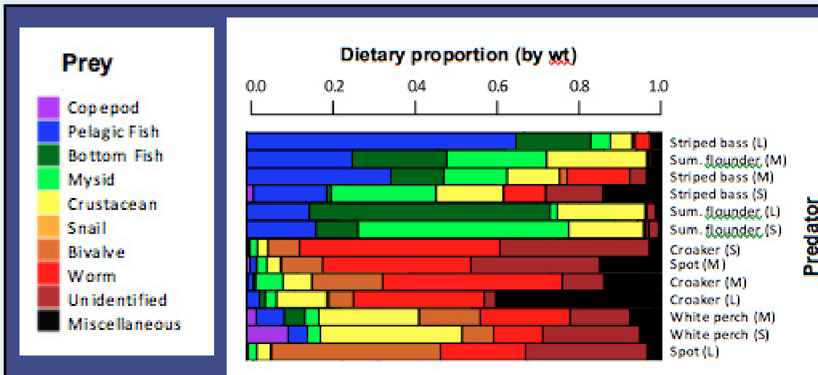


Model output showing change in fishery production (x-axis) for select species groups for various climate change scenarios (y-axis). The percentage change of fishery production can be positive (right side of dashed line), negative (left side of dashed line) or no change (on the dashed line).

FORAGE

The forage outcome in the Chesapeake Bay Watershed Agreement calls for assessing the available forage to support predatory fish species, and it is a step toward ecosystem-based fisheries management in the Bay. This project directly supports that outcome and stems from results of the 2014 STAC Forage Workshop. Researchers are developing a suite of forage indicators to quantify the status of several key prey groups over time, to integrate information from multiple surveys, and to potentially serve as the basis for developing targets and thresholds for management use in the future. The project is also developing nutritional profiles for five key predators (shown in the left image) to quantify their consumption of key prey items.





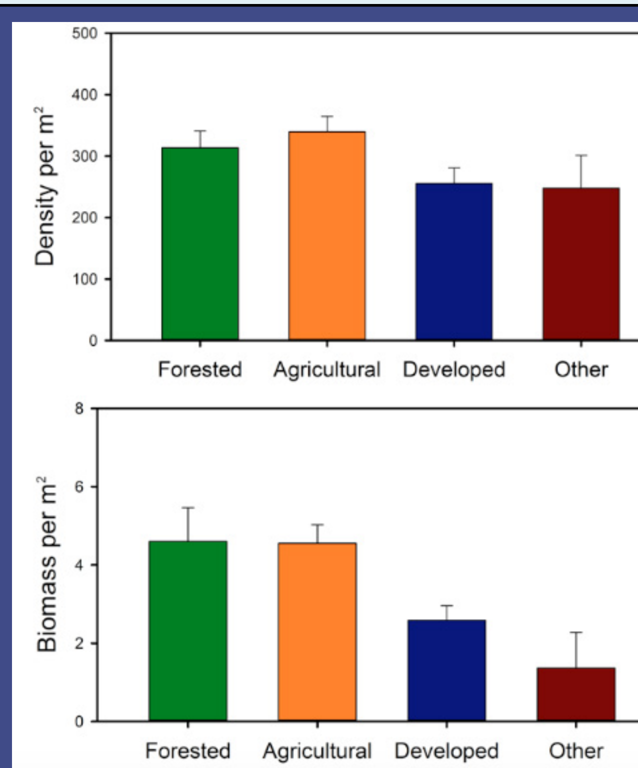
Based on analysis of ChesMMAP gut content data, the diets for white perch, Atlantic croaker, striped bass, spot and summer flounder are shown here. Each profile (row) shows the dietary proportion by weight of each prey type (colors). These diet data will be combined with predator population estimates to derive nutritional profiles of how much each predator group eats of these key prey groups across the mainstem of the Chesapeake Bay.

For more information, see Andre Buchheister (UMCES-CBL)'s presentation.

LAND-WATER INTERFACE

Habitat plays a crucial role supporting fishery production, providing critical spawning, nursery and foraging habitat for fish species. As part of a larger research effort studying the impacts of stressors at the land-water interface, researchers are studying the effects of land use and shoreline hardening on fish and benthic communities. Results show that land use types (such as developed and forested) and shoreline hardening in the watershed influence the abundance of different species. Results have shown negative correlations between bottom-oriented fish species abundance and cumulative shoreline hardening (i.e., % of a system's shoreline that is hardened) as well as cropland cover in the watershed. Results have also shown reduced benthic density, biomass and richness in developed and mixed-developed watersheds.

For more, see Denise Breitburg (SERC)'s presentation.



The average benthic density and biomass (y-axis) showed higher levels in forested and agricultural areas compared to developed and mixed-use areas (x-axis). Higher density and biomass indicate healthier benthic communities. Data source: Rochelle Seitz (VIMS). Funding provided by NOAA Center for Sponsored Coastal Ocean Research.

Below: The average abundance of key species (y-axis) decreases as the percentage of hardened shoreline (left) and cropland (right) in subestuaries increases (x-axes). Data source: Kornis et al. in review. Funding provided by NOAA Center for Sponsored Coastal Ocean Research.