APPROVED BY:
COMMITTEE CHAIRMAN

MOLLUSCAN SHELLFISH SUBCOMMITTEE MEETING
MINUTES
Tuesday October 12, 2021
Webinar

On Tuesday, October 12, 2021, the Subcommittee Chair, **Carolina Bourque,** called the meeting to order at approximately 8:35 a.m. The following were in attendance by GoToMeeting:

Members
Carolina Bourque, LDWF, Lafayette, LA
Jason Rider, MDMR, Biloxi, MS
Erik Broussard, MDMR, Biloxi, MS
Portia Sapp, FDACS, Tallahassee, FL
Robert Caballero, LDWF, New Orleans, LA
Jason Herrmann, ADCNR/AMRD, Dauphin Island, AL
Evan Pettis, TPWD, Rockport, TX
Ryan Gandy, FWC, St. Petersburg, FL
Byron Webb, ADPH, Mobile, AL
Charlie Culpepper, FDACS, Tallahassee, FL
Denise Kinsey, LDWF, Baton Rouge, LA

Staff
Charlie Robertson, GSMFC, Ocean Springs, MS
James Ballard, GSMFC, Ocean Springs, MS
Ali Wilhelm, GSMFC, Ocean Springs, MS
Dave Donaldson, GSMFC, Ocean Springs, MS

Others
Laura Picariello, TX Sea Grant, Corpus Christi, TX
Scott Bannon, ADCNR/MRD, Dauphin Island, AL
Chad Hanson, The Pew Charitable Trusts
Tom Soniat, University of New Orleans, New Orleans, LA
Eric Weissberger, NOAA Fisheries
Traci Floyd, MDMR, Biloxi, MS
Mario Marquez, Texas Sea Grant, Corpus Christi, TX
Sharon McBreen, The Pew Charitable Trusts
Darin Topping, TPWD, Rockport, TX
Sara Pace, USM/GCRL, Ocean Springs, MS
Laura Solinger, USM/GCRL, Ocean Springs, MS
Read Hendon, USM/GCRL, Ocean Springs, MS
Ryan Bradley, Mississippi Commercial Fisheries United, Long Beach, MS
Anne Birch, The Nature Conservancy
Kathleen Hemeon, USM/GCRL, Ocean Springs, MS

Adoption of Agenda

Jason Hermann moved and it was seconded by Robert Caballero to amend the agenda to remove agenda items 4 and 6, and to add an update regarding Deepwater Horizon Region-wide

TIG Restoration Plan as agenda item 4.A. Motion carried unanimously.

Approval of Minutes

Robert Caballero moved and it was seconded by Portia Sapp to approve the minutes as written for the March 4, 2021 meeting. Motion carried unanimously.

DWH Region-wide TIG Restoration Plan

Eric Weissberger, NOAA Fisheries, provided an update on the recently published "Final Restoration Plan/Environmental Assessment 1. Birds, Marine Mammals, Oysters, and Sea Turtles". Natural Resources Damage Assessment's (NRDA) preferred alternative is improving resilience for oysters by linking brood reefs and sink reefs. Resilience would be fostered by building a network of reefs over a range of habitat types, depths, and salinity. Larval transport would be incorporated into the design, and the damaged nearshore-offshore connection restored. The estimated cost is $35,820,000.

Placement of reef sites was designed to promote transport of oyster larvae from brood reefs to sink reefs. Locations for the project will be in east Galveston Bay in Texas; Mississippi Sound and northern Biloxi Marsh in Louisiana; Heron Bay in Mississippi; the western shore of mid-lower Mobile Bay in Alabama; Cedar Key to Horseshoe Point in Florida.

Exact locations for oyster restoration will be determined based on bottom type, water quality, habitat suitability indices, bottom scanning, and larval transport modeling. The specific design will vary by state management goals. Depth/habitat/salinity gradients will be followed as possible for resilience. Management may be with shell budget to promote sustainability.

Monitoring is budgeted for three years and is still to be determined, but may include oyster habitat created; oyster reef salinity and depth gradients; oyster reef interconnectivity and recruitment; oyster habitat productivity; explanatory variables.

Gulf-wide Oyster Shell Budget

Tom Soniat, University of New Orleans, presented information on a Gulf-wide oyster shell budget project to help determine standards for cultch and oyster density to support sustainable harvest and fishing at maximum sustained yield.

The model was initially developed for the Louisiana oyster fishery. Annual stock assessment provides oyster density; oyster numbers by size; cultch density and reef area. These are inputs to the model which simulates growth, natural and fishing mortality, and cultch loss or gain. Shells of dead oysters are added to the reef, and shells of fished oysters are debited from the reef. Growth and mortality are size and time dependent. Fishing can occur for seed and/or sack oysters. Fishing rate is time dependent. Initial sustainability goal is no-net cultch loss.

The new sustainability goal is: oyster density/cultch density standard (OCS) for fishing at Maximum Sustained Yield (msy). The OCS was derived from Solinger et al., submitted to the *Canadian Journal of Fisheries and Aquatic Sciences.*

How many oysters can be harvested is determined by several factors: Oyster population at equilibrium is assumed; Dermo mortality (10% chosen as common); maximum catch occurs between 20 and 25% fishing mortality (F), yielding 2.9 million oysters. Thus, at a level of 10% Dermo mortality (D), an F of about 20% is recommended. Total mortality (Natural + Dermo + Fishing) is then 40% per year.

The required oyster density consists of about 33 market-sized oysters to support an oyster population with D=10% and F= 20%.

As is expected, increasing F reduces volume of cultch per square meter. Cultch is relatively consistent with Dermo mortality, because Dermo contributes cultch to the shell bed unlike fishing mortality, which removes cultch. At D = 0.10 and F = 0.20, about 2.2 kg of cultch is needed to sustain the population at equilibrium.

Based on the previous information, the OCS for the Gulf of Mexico was decided to be: 30 oysters/m^2 (> 75mm); 2000 g/m^2 cultch (surficial).

A total of 16 samples were taken at different locations across all states, except Mississippi, from Aransas Bay in the west to Apalachicola Bay to the east and applied to a stock assessment model. The model considers different environmental conditions (i.e. temperature and salinity) and fishing scenarios to produce harvest simulations for each state according to two standards, OCS and No Net Loss (NNL) standards. According to the sustainable harvest standards set forth by the OCS, the model predicted very little harvest could be achieved across all Gulf states. However, when applying NNL standards, the model predicts quite a bit of resource available to harvest, which is especially true in Texas with approximately 1.13 million sacks available under a low salinity scenario.

Soniat explained shell is a temporary resource and cultch additions can help overcome cultch loss. Shell half-lives measured *in situ* confirm that shell half-lives are about 5 years in the Gulf of Mexico. Clean shell diminishes very quickly. The decay rate of the "clean shell" is on the order of about 0.81years, which implies shell planting would need to be applied continuously on a yearly basis under NNL. OCS would be presumably self-sustaining.

Differential recruitment among substrate types and regions in Delaware Bay were used to estimate Effective Surface Area (ESA) (clean cultch). Larvae preferentially set on live oysters and boxes versus other cultch, which exemplifies the relationship between ESA and recruits. Total ESA defines recruitment potential. Excessive ESA/cultch does not always lead to increased recruitment. There is an optimum level of ESA/cultch beyond which recruitment may not increase much. Additionally, analysis of ESA indicates reefs can become effectively extinct when cultch is still present.

Model results converge with the Haskin Rule, which states fishing would end with a minimum ratio of 40% live animals to cultch ratio. This could be used to quickly assess whether overfishing is occurring.

OCS and NNL serve as restoration targets and have different implications. The NNL approach doesn't include oyster density/cultch density standards, allows greater harvests versus OCS, is not self-sustaining, and provides no benchmarks for restoration. OCS includes oyster density/cultch standard, restricts harvest versus NNL, is self-sustaining, and does provide benchmarks for restoration. Management could also consider a hybrid approach using certain aspects of each approach. The goal would be to achieve the OCS and fish sustainably at maximum sustained yield.

Future activities include transferring the modeling capabilities and code to state agencies, and holding an R modeling session for agency personnel in Jan./Feb. 2022.

Oyster Reef Connectivity Literature Review

Chad Hanson, The Pew Charitable Trusts, provided a literature review that looked at what the latest research shows on reef connectivity with oysters, and the effects of restoration; successful management strategies; whether to quantify or address broader application of restoration; what methods best establish/quantify connectivity; any observations or recommendations for future restoration.

The search query focused on oysters in the Gulf, Atlantic, Pacific, and outside the US for the years 2000 to present. The query was concluded in August 2021, and resulted in approximately 30 papers and reports. These were reduced to 18 of the most applicable. Study types consisted of modeling, field sampling, genetics, geochemical (i.e. trace elements), and combined. Regions included Pamlico Sound, NC; Chesapeake Bay, MD/VA; Southern California; and Mobile Bay, AL.

Studies from the Mobile Bay, AL region used modeling to predict oyster larvae dispersal within sub-regions of Mobile Bay and eastern MS Sound. The results of one study found that about 63% of oyster larvae from the Cedar Point region traveled towards the MS Sound, that areas like Bonne Secour Bay are mostly self-recruited, and restoring east Mobile Bay may help replenish larvae within the bay (Kim et al 2013). A second study used trace elements and hydrodynamics to determine east MS Sound is an important source area for oyster reefs in the Cedar Point region of AL waters (Gancel et al 2021).

Along U.S. Atlantic Coast studies using similar larval transport models indicated oyster reef connectivity ranging from 25-68 miles with a connectivity rate of between 18-24% within those distances (Haase et al 2012, Puckett et al 2014 and 2016, Theuerkauf et al 2021, Lipcius et al 2008, Sisson and Shen 2012). Geochemical and genetic tracing was determined to be useful in distinguishing natal reefs (Kroll et al 2016, Turley et al 2019, Munroe et al 2014, Jaris et al 2019).

Other research on oyster reef connectivity from southern California (Carson 2010 / Lopez-Duarte et al 2012, Peteiro and Shanks 2015) were considered.

Oyster connectivity research is challenging; however, primary observations were that environmental conditions have a profound effect on connectivity and networks of spawning reefs can contribute to metapopulation. Small healthy reefs have more larvae and connectivity. Big reefs have more settlement. The maximum connectivity was approximately 50 miles. Close, to mid-range less than 20 miles was the best connectivity.

Some recommendations for research and restoration include multi-year research and modeling; couple modeling with field validation; protected reefs strategically placed to replenish larvae; know each system and modeling platform. Things to include in restoration strategies are: to factor in connectivity into objectives; to study directly, demonstrate; to appropriate spacing; have small, dense, abundant, high relief and source reefs; diversify the approach by using small/big, high/low reefs.

State Oyster Highlights for On and Off-Bottom

Florida

Ryan Gandy stated that their west coast wild harvest landings are down by 90% from 2012 - 2019, largely due to decline in Apalachicola Bay and the 2020 closure of Apalachicola Bay, which is closed through 2025. Sampling in Apalachicola Bay over the past 12 months has shown environmental conditions are favorable for oyster recovery, but recovery is going to be pretty slow.

Substrate for oyster recruitment is limited but they are starting to see good spat recruitment on collectors, which is a good sign for rebuilding the system.

They have been finishing up NFWF Phase I in Apalachicola Bay and are preparing the monitoring report, which will include performance of four different cultch densities. Lessons learned have already been applied to some restoration efforts to provide higher relief and increased density of cultch for substrate longevity. A second NFWF project in Apalachicola is going to include about 1,000 acres and focus on monitoring, mapping, and restoration for both the Appalachia and Suwannee Sound. The shell budget model is being used as a guide for restoration and staff have the capabilities to build the code themselves.

Planning has begun to develop a framework for a statewide management plan that would provide the guidance for regional management of fisheries. Florida envisions utilizing this regional-based management system for oysters in the future.

The Florida Trustee Implementation Group will soon begin identifying data gaps, plan new monitoring, and map habitat, which lead to a restoration project focusing on source and sink oyster reefs in Suwanee Sound. Part of the planning is to identify and leverage larger-scale projects in that area that have been completed or are planned for the future.

Alabama

Herrmann reported that commercial Alabama oyster landings in meat pounds and values from 2011-2020 totaled 195,743 pounds, and $2,424,728 value.

AMRD biologists continue to monitor oyster densities on public oyster reefs. From June 2021 – August 2021, there were 178 SCUBA quadrat samples collected and processed. The densities of oyster spat and sublegal oysters were lower in 2021 than in 2020 quadrat survey results, due to extended periods of low salinity caused by fresh water from high rainfall and river flows in 2021.

AMRD decided to open the public oyster reefs to harvest on October 4, 2021. They are requiring recreational harvesters to purchase a new recreational harvest tag to account for recreational harvest while monitoring total harvest on Alabama's oyster reefs. The average amount of sacks harvested per day, including recreational sacks, is currently 749. They are also opening the reefs on the first four Saturdays of the season to provide an opportunity for young people to harvest oysters.

The AMRD continues to use a 500x500-meter grid system to track and manage harvest on individual reef areas to help ensure that there is a more even distribution of harvest across productive reefs. Harvesters are able to see which grids are open, and monitor their position within the grid system by accessing a web link on their smart phones.

Funded through NOAA Restore, the Side Scan Mapping of Oyster Reefs project will determine locations of live oyster reefs and other potentially suitable bottoms for oyster reef restoration. AMRD has completed mapping high and medium priority historical oyster reef locations in Mobile Bay using side-scan sonar. Data is being processed, and will be used to determine if additional water bottoms can be used for oyster restoration activities, as well as for baseline and post-restoration project

construction monitoring. The Oyster Cultch Relief and Reef configuration studies are being conducted to evaluate different methods of cultch deployment. Deployments of cultch material for experimental sites were completed in September 2020. Cultch relief studies include the deployment of mounds of oyster shell and #4 limestone. The oyster recruitment, survival, and growth on these mounds will be compared to controls, which will be cultch deployed by typical broadcast methods. Additional studies are being conducted to determine if oyster recruitment, survival, and growth can be enhanced by planting cultch in elongate mounds to help reduce sedimentation.

Natural Resources Disaster Assessment (NRDA) funding was obtained for the construction of an Eastern oyster hatchery and remote larval setting facilities. Construction will begin in spring 2022, with oyster spat production anticipated by fall 2022.

Mississippi

Jason Rider reported that they have cultivated approximately 160 acres of the western Mississippi Sound. Reef assessments included 175 square-meter dive samples collected and 124 one-minute dredge tows. Cultch planting was done in the spring on 100 acres of oyster reef and an additional 100 acres were done in fall.

In 2021, there were 17 active off-bottom harvester with fifty-one acres leased in the MDMR Commercial Aquaculture Park. There are 2.8 million oyster seed being cultured. In 2020, commercial operations harvested approximately 423,895 oysters. Off-bottom Oyster Aquaculture training classes began in June.

Currently, MDMR is in Phase I of the Remote Oyster Setting Facility Project to assess the feasibility of the facility, determine infrastructure layout, operational and maintenance costs, setting efficiencies, and production milestones. The future setting facility is expected to receive 2.5 billion eyed oyster larvae per year, with a 15% setting efficiency.

In 2021, MDMR acquired 79.3 million oyster larvae from the University of Southern Mississippi Oyster Hatchery and Auburn Shellfish Lab to set on oyster cultch material for initial testing and technical trials in order to fine tune setting protocols. The results of these experimental trials have produced 9.6 million oyster spat on 25 cubic yards of oyster shell distributed in the Biloxi Bay Reef complexes over a 5-month period.

Water quality analysis is done through monthly fecal coliform analysis for FDA. Harmful algal bloom analysis is done through monthly sea water sample collections for cell identification at 15 locations. Sanitary surveys are done through annual evaluation of all environmental factors that affect the water quality of shellfish growing waters. A new marine fisheries dry lab was built at MDMR funded by GOMESA. They are currently working on FDA certification. When they receive certification, sample analysis will be completed quicker. Types of analysis that are performed include fecal coliform analysis, Enzyme Link Immunosorbent Assay (ELISA) analysis, and Harmful Algal Bloom (HAB) analysis. Taxonomy collection is also done.

Deployment of 60 million spat-on-shell oysters to public reefs has been scheduled.

The state developed an Oyster Management Plan and public meetings held to allow public input into

the plan. It will be published within 30 days.

Louisiana

Caballero reported there are currently 166 acres enrolled in alternative oyster culture (AOC) and seven lease holders. Aquaculture parks total 38.7 acres, with 16 lease holders. AOC permits are good for 10 years. The bulk of the permits are concentrated west of the Mississippi River, around Grand Isle, which was impacted significantly by Hurricane Ida. Initial reports show most operations at a total loss.

As per the Louisiana Oyster Management and Rehabilitation Strategic Plan, a grant program has been set up to fulfill Initiative 4 to expand AOC in Louisiana. The program is currently set to last three years and receive $2 million in funding. There are AOC park grants available up to $100K; nursery grants up to $15K; grow-out farm grants up to $45K; and hatchery grants up to $225K. The state is expecting at least three parks, 10 nurseries, 20 grow-out facilities, and two private hatcheries. Expected awards of one AOC park, one hatchery, and six grow-out farms will be given out in 2022.

Bourque explained the Oyster Strategic Plan delineates projects that would cost about $132M to restore oysters and the oyster industry in Louisiana. As they receive funding, they are accommodating and assigning it to different projects.

LDWF is working on a Sea Grant ALC expansion. Side-scan sonar is being done in some areas in Louisiana for possible expansion of the public areas. They also finished a cultch plant construction project that was part of the NRDA TIG oil spill funding and have multiple restoration projects in the works.

Monthly dredge samples continue along the coast and results from annual stock assessment data show landings in Louisiana to be 71% below the historic average, which is the lowest on record.

After Hurricane Ida, there has been a lot of restoration and cleanup efforts, and applying for emergency federal funds to continue with the restoration process.

Texas

Pettis reported on-bottom landings have been steadily increasing since a low point in 2015 and remain relatively high. For the 2021 license year, the combined public reef and private lease landings total 862,000 sacks, which is down slightly from the previous year. The vast majority of the harvest this year was from their two southernmost oyster producing bays due primarily to a number of northern harvest area closures.

Routine oyster dredging monitoring program indicated a small decline in market oyster abundance. They are currently assessing which of those harvest areas will open again this year. There has been some mortality in the mid coast because of freshwater. They are also currently assessing ways to improve the closure criteria by comparing different gears and are using side-scan sonar to collect additional oyster metrics that can inform those closures.

TPWD issued their first two off-bottom mariculture permits this summer, and a third permit is pending approval. There are 10 applicants in the consultation phase that they expect to get an

application from in the next year.

Pettis stated that 2021 was a busy year for restoration for them. Using the combined fees from their Shell Recovery Program and some Hurricane Harvey disaster relief funding, 84 acres were restored, and they are testing a variety of different restoration techniques. They are looking at comparing mounds versus flats approach with different spacing between mounds and flats. They are also looking at placing some rock material on top of shell material to monitor subsidence rates.

Side-scans of San Antonio Bay and parts of Matagorda Bay were just completed, while they continue to side-scan all of the bay in Texas. They have received funding to do Aransas Bay next year.

Discussion of Election of Officers

Charlie Robertson reminded members of the MSSC that election of officers is typically held each Fall meeting and provided several options for them to consider for either re-election of the current Chair or new nominations for Chair and Vice-chair. **Gandy** motioned to re-elect the current Chair; however, **Bourque** and several other MSSC members recommended the group consider a rotating nomination. **Gandy** rescinded his motion and agreed that a rotating nomination may be the best option to consider.

Ryan Gandy moved and it was seconded by Robert Caballero to nominate Evan Pettis as Chair for the Molluscan Shellfish Subcommittee. With no other nominations on the floor nor opposition, Evan Pettis was elected as Chair.

Ryan Gandy moved and it was seconded by Robert Caballero to nominate Portia Sapp as Vice-chair for the Molluscan Shellfish Subcommittee. With no other nominations on the floor nor opposition, Portia Sapp was elected as Vice-chair.

Other Business

The group brought up some topics of interest for future meetings including, hurricane impacts to alternative oyster aquaculture, oyster shell recycling programs updates, state oyster management plans, and state oyster restoration plans.

With no other business to discuss, Robert Caballero moved and it was seconded by Portia Sapp to adjourn the meeting at 11:58 a.m. Motion carried unanimously.