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Lagniappe

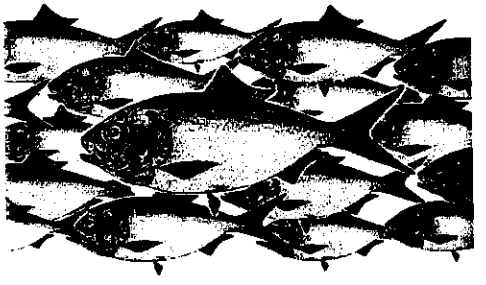
Sea Grant LOUISIANA

June 3, 2002 Volume 26, No. 6

A (near) PERFECT FISHERY

Occasionally, when biologists have a loose moment, they think about what it would be like to design a perfect commercial fishery from scratch. Ideally, in a perfect fishery:

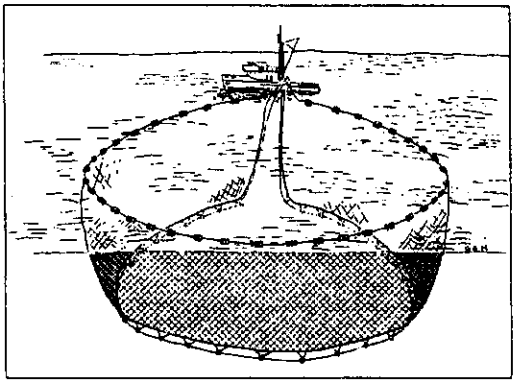
* Bycatch would be low.
* The number of fishermen would be very stable without the big swings in numbers of fishermen that often occur in commercial fisheries.
* The fishery would not be in competition with recreational fishermen for the fish.
* The fish would exist in large numbers.
* The number of fishermen in the fishery would be small enough to monitor their catch accurately.
* All parts of the fish would be used, with no backbones, skin, shells, or other waste to discard.
* The fishery would be consistently profitable.



One Gulf of Mexico fishery, the menhaden fishery, comes very close to meeting these standards. The only goal not met is the last one, the one on consistent profitability. The fishery targets the gulf menhaden, *Brevoortia patronus* in the northern gulf, between Orange Beach, Alabama and Freeport, Texas. Some yellowfin menhaden, *Brevoortia smithi*, are also caught at the eastern end of the fishery and some finescale menhaden, *Brevoortia gunteri* are caught on the western end. Off of Louisiana, where the bulk of the fishery is located, almost all of the targeted catch is gulf menhaden, although some net sets are made on Atlantic thread herring, *Opisthonema oglinum.*

Menhaden, also known as "pogies" are small (seldom over 8 inches), oily, boney members of the herring family that swim in immense schools in the Gulf of Mexico. The size of these schools is what allows the menhaden fishery to use large purse seines with very little bycatch of other species. The fishery is the largest commercial fishery in the gulf, averaging slightly over a billion pounds per year. One to two percent is harvested for

sale as bait for recreational or other commercial fisheries, but the bulk of it is reduced into fish oil, meal and solubles.



Menhaden are caught with large purse seines, but located by the pilot of a small spotter airplane. Once the spotter pilot sees the "color" or "whip" of a menhaden school, he radios the captain of the menhaden carrier vessel, who moves the vessel near the school with the guidance of the spotter pilot. Carrier vessels are large 140-200 foot vessels with crew quarters for 14 people and large chilled seawater holding tanks to hold the catch. Each carrier vessel also carries two 40-foot purse boats and the purse seine.

When the carrier vessel nears the spotted menhaden school, both purse boats are launched. Each purse boat carries half of the purse seine, and together they race to the spotted school of fish. Once there, the boats separate, each playing out its end of the net in a half-circle. When they meet, part or all of the school has been surrounded. The bottom of the net is then closed by pulling the purse line through the bottom rings. Part of the closed net is then picked up by power blocks on board each purse boat. This concentrates the catch into a small section of the net known as the "bunt".

The large carrier vessel then moves to the purse boats and net, and uses its large boom to raise the net nearer to the surface. A flexible hose attached to a suction pump is used to pump the menhaden aboard the vessel across a screen. Since larger, non-target species could damage the pump or slow the process, attempts are made to remove large bycatch species from the net before pumping. A hose cage is used to prevent larger fish from entering the pump and a large fish excluder is used to prevent larger non-target species from entering the hold.

Many studies have been done on bycatch in the fishery, showing bycatch ranges of 0.06 - 3.9% by number and 1.0 - 2.8% by weight. In every study, croakers ranked first or second as the most common bycatch species. Other bycatch species include striped mullet, spot, gafftopsail and hardhead catfishes, threadfin shad, sand and silver seatrout, and Atlantic bumper. Very few speckled trout and redfish are found in the bycatch. No sea turtles have been reported in gulf bycatch studies.

Menhaden catches are closely monitored. The menhaden companies provide catch records and the Captain's Daily Fishing Reports directly to the National Marine Fisheries Service (NMFS). Port agents with NMFS also regularly take samples of menhaden

catches at dockside. Size and age data from these samples are used along with catch records to assess the health of the menhaden stock. In the Gulf of Mexico, annual menhaden harvests have been at or below 1.4 billion pounds since 1988, except for 1994. This is below the maximum safe harvest level of 1.58 -1.66 billion pounds.

At the dock, the menhaden are unloaded from the carrier vessel by pumps which move the fish directly to a steam cooker. The fish are then moved to a press that squeezes oil and water from the fish, leaving what is known as "press cake". This press cake is dried and ground into meal and treated for storage.

The oil and water is pumped through screens and filtered to remove particles which are added back to the press cake before it is dried. The oil is separated from the water and purified for storage or shipment. The water with its remaining dissolved solids, called "stickwater", is reduced in volume by an evaporator. Some of this concentrated liquid is added back to the press cake. Fish meal that has this added to it is called "whole" or "full" meal. Stickwater not used for this process is concentrated to a 50% solid content and treated for storage as condensed fish solubles.

Menhaden meal has a minimum of 60% protein and a well-balanced amino acid profile. It is a valuable animal feed. Aquacultured catfish, trout, salmon, and shrimp feeds may contain up to 40% fish meal. A huge percentage of menhaden fish meal is used in poultry feeds, which may be up to 7% fish meal. It is also used in swine feeds.

In the U.S., some menhaden oil is used to make marine lubricants and greases, paints, and alkyd resins. Fatty acids from the oil are used in the rubber industry. In Europe and South America the oil has been used for many years to make cooking oils, shortening, margarine, and other products for human consumption. In fact, about 90% of the oil produced is exported to Europe. Use of menhaden oil in human foods in the U.S. was approved in 1997.

Menhaden solubles have the consistency of molasses and contain 30% protein, 10% fat and 10% minerals. They are a valuable ingredient or additive for swine, poultry and cattle feeds.

Menhaden products compete with other products in a world market and as a result, the menhaden industry has struggled financially in recent years. Menhaden oil competes not only with other fish oils, but with soybean, rapeseed, and palm oils. The world market for fish meal is dominated by production from Chile, Peru, Ecuador, Denmark, Ireland, and Japan. The meal must also compete with the huge amounts of soybean meal produced worldwide. When a surplus of soybeans exists, prices for menhaden products decline.

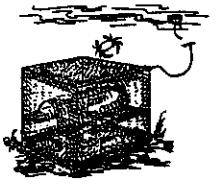
In order to stay economically competitive, the gulf menhaden industry has had to consolidate by merger. As recent as 1968, 14 menhaden reduction plants operated in the gulf states. Today only 4 exist, 3 in Louisiana and 1 in Mississippi. Since the plants also own the vessels, the number of vessels has also declined, from a high of 92 in 1966 to 50 in 1998. The size and efficiency of the vessels has increased somewhat, however. The high investment required to enter the reduction fishery keeps numbers stable during periods of higher profits in the industry. A processing plant costs $10-15 million. Three to five vessels at over $2 million each are required to keep the plant operating, and at least 2 spotter airplanes are needed to keep the vessels working.

Yearly menhaden harvests are influenced by the size of the available stock and by weather. Since most of the menhaden harvested are two years old or less, good conditions for survival and growth of young menhaden in estuaries will produce a good harvest the next year, unless weather interferes. The record-setting six year stretch of landings in the mid 1980's was due to such conditions in the estuaries. Tropical storms and hurricanes strongly affect menhaden fishing effort and landings. Years of high tropical activity, such as 1998 with its 5 tropical storms on top of windy June weather, usually result in low landings.

The menhaden bait fishery, although small compared to the reduction fishery, is still a 20 million pound fishery. It is located in Louisiana and Florida. After the Florida net ban in 1995, bait menhaden landings there dropped by 82%. Since 1997, Florida menhaden fishermen have used a new gear called a tarp net. Louisiana's bait harvests are made with purse seines, similar to the reduction fishery.

SOURCE: *The Menhaden Fishery of the Gulf of Mexico, United States: A Regional Management Plan. 2002 Revision.* Edited by Steven J. VanderKooy and Joseph W. Smith. Gulf States Marine Fisheries Commission. March 2002.

CRAB TRAP CLEANUP IS A SUCCESS



The two week February crab trap cleanup in Texas has been declared a success by the Texas Parks and Wildlife (TPW) Department. A total of 8,008 abandoned and lost crab traps were picked up by volunteers, and TPW coastal fisheries staff and game wardens. According to TPW, 541 volunteers and 233 vessels were used.

The crab trap cleanup program was created by the Texas legislature with a short season closure. During the closure, any trap was fair game for removal. During the first week, only TPW game wardens were allowed to pickup traps. During the second week, volunteers were used as well.

While abandoned derelict traps are unsightly and a nuisance, lost crab traps in fishable condition can continue to fish as "ghost traps." Trapped animals that die serve as bait to catch even more creatures. The Louisiana Crab Task Force at its April meeting approved planning for a pilot crab trap cleanup for Louisiana in 2003.

ANOTHER CRAB TRAP CLEANUP

Following the announcement of the success of the Texas crab trap cleanup, the state of Alabama has announced its own crab trap cleanup. Like the Louisiana proposal reviewed by the Louisiana Crab Task Force, the Alabama effort will have a "deep water phase" and a "shallow water phase."

The Alabama deep water phase takes place the first 7 days of the 2002 shrimp season. During that period, the use of crab traps will be prohibited, and any traps found will be considered marine litter and can be removed and disposed of by any person. The shallow water phase will take place on Saturday, June 15. On that one day no crabbing with traps will be allowed within 100 yards of the shoreline. Any traps found in this area will again be considered marine litter and can be removed by any person for disposal.

It is anticipated that most derelict crab traps will be removed by shrimpers during the deep water phase and by volunteers during the shallow water phase. A larger derelict trap removal program will be planned for the winter, based on experience with this pilot program.

Source: *Sea Harvest News.* Richard Wallace. Alabama Sea Grant Extension Program. May 3, 2002.

UNDERWATER OBSTRUCTION LOCATIONS

The Louisiana Fishermen's Gear Compensation Fund has asked that we print the coordinates of sites for which damage has been claimed in the two months. The coordinates are listed below:

Loran Sites

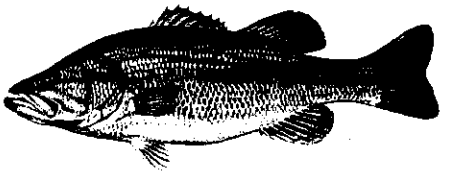
27001	46952	JEFFERSON
27093	46948	VERMILLION
28286	46857	TERREBONNE
28611	46853	JEFFERSON
29102	46849	PLAQUEMINES
29153	47055	ORLEANS

Lat. & Long. Sites

29 03.190	89 14.510	PLAQUEMINES
29 04.619	89 22.692	PLAQUEMINES
29 09.250	90 05.420	LAFOURCHE
29 12.260	90 27 580	TERREBONNE
29 15.720	89 57.791	JEFFERSON
29 22.948	91 14.833	LAFOURCHE
29 24.358	90 03.424	JEFFERSON
29 53.124	89 45.128	ST. BERNARD
29 56.979	93 20.203	CAMERON
29 58.197	89 18.860	ST. BERNARD

MARSH BASS AND SALINITY

During the last two years Louisiana endured its worst drought in history. Among other things, the recreational largemouth bass fishery in the coastal marshes really suffered. In fact, bass fishing became so bad that many anglers predicted that almost no bass would be left at the end of the drought. With the return of the rains, marsh bass fishermen were pleasantly surprised to find fair numbers of bass in the marsh this spring, although smaller fish seemed to be in short supply. The situation has sparked some interest in how bass react to salinity changes.



In the late 1980s, LSU scientists conducted intensive studies on just that subject. The biologists studied salinity preferences of bass held in tanks and also tagged bass in marshes with electronic transmitters and followed them. For the salinity preference part of the study, the biologists caught 12 adult and 12 juvenile (2-4 inch) marsh bass from a marsh in central Lafourche Parish. For comparison, they also collected 12 adult and 12 juvenile bass from a small freshwater lake near Baton Rouge.

After the fish were held to allow them to recover from the stress of being captured, they were put in special tanks that allowed them to move into the salinity that they preferred. These tanks had partitions that extended from the bottom upward to fairly near the surface. Enough space was left for fish to be able to swim over the partitions to the salinity compartment that they preferred, yet the partitions were high enough to prevent the different salinities from mixing. The tank had 5 compartments with salinities of 0, 3, 6, 9, and 12 ppt (parts per thousand). Full strength sea water is 35 ppt. The bass were each placed in the freshwater compartment and allowed to settle in for one hour before testing, then they were observed every 30 minutes for 9 hours to see to where they had moved.

The juvenile largemouth bass from both freshwater and marsh areas preferred the 0 ppt or freshwater compartment. In contrast, the adult fish from both sites preferred 3 ppt salinity, although the freshwater bass spent slightly more time in the 0 ppt compartment than the marsh bass. This preference was interesting because other studies have shown that at salinities of 3-4.5, largemouth bass do not spawn successfully.

The biologists' theory was that the 3 ppt salinity was slightly less stressful to the adults because it was closer to the salinities within their bodies. The salinity preference of 0 ppt by young fish was similar to what conditions would be in the marsh in the springtime when spawning occurs.

For the second part of the study, 6 marsh bass from the same area were captured on March 26, tagged with electronic transmitters, and released. The biologists located their position every 6 hours for three days and twice a week after that. During the first 3 days, the fish moved up and down the canal an average of 406 feet per day. One fish was lost immediately, but the other 5 were relocated in the same canal through April 19. During this time, salinities ranged from 2 to 4 ppt. On May 3, salinity increased to 8 ppt and all of the tagged bass disappeared. None of the fish were ever relocated, in spite of the fact that the batteries in the transmitters were good for one year.

Two more fish were tagged on July 31, and another two on August 13. All 4 fish were tracked through September 10. During that time, salinity was 3-5 ppt and water temperatures ranged from 82 to 86°F. None of the fish could be relocated on September 27 when salinity reached 12 ppt and water temperatures reached 90°F.

The biologists, with their limited data, concluded that adult marsh bass may move long distances in search of low-salinity water when salinities are over 5 ppt. They did note that the speed of the salinity change may have influenced the behavior of bass more than the actual level of salinity. Also, temperature and oxygen levels deserve consideration as factors that can cause bass to move.

Interestingly, while the tagged adult fish in the study left the canal, the researchers observed that some smaller largemouth bass stayed in the canal. They speculated that movement of these small fish into less protected waters may have been partially prevented by large predators such as alligator gar and alligators.

Source: *Behavior and Movements of Largemouth Bass in Response to Salinity.* Michael R. Meader and William E. Kelso. Transactions of the American Fisheries Society. 118: 409-415. 1989.

SCIENTISTS SAY M.P.A.s WORK

When the idea of creating marine protected areas (MPAs), or marine reserves as they are also called, first came up, it looked good on paper. By closing off these areas to all fishing, they should supply large numbers of fish eggs to areas outside of the MPAs. Additionally, as stocks build up in the protected areas, local fisheries should benefit from spillover of both young and adult fish from the strong populations on the reserve.

Concept is one thing; proof is another. Studies on the effectiveness of MPAs are hard to do because researchers must find an area where they can compare catches and conditions before and after the reserve was established. Recently, scientists studied two such areas, the Soufriere Marine Management Area (SMMA) along the Caribbean island of St. Lucia and the Merritt Island National Wildlife Refuge at Cape Canaveral, Florida.

The SMMA was created in 1995 for fisheries improvement and covers about 35% of the coral reefs in the traditional fishing grounds of the area. Biologists studied the local fishery, which uses fish traps of two sizes to catch reef fish, for a 5-month period in 1995-96 and again for 5 months in 2000-2001, five years after the reserve was created. Between the two periods, the number of fishermen and the number of trips they made per week stayed about the same. Fish catches per trap increased, however, by 36% for big traps and 80% for small traps. Surveys by divers over the period noted that the amount of 5 commercially important families of fishes tripled on the reserve and doubled in nearby waters off of the reserve in 3 years. Surveys of the local fishermen showed that most of them, especially younger ones, felt better off with the reserve than without it, in spite of struggling the first year after it was created. The researchers concluded that the fishery of the region improved, even though 35% of the fishing grounds were closed.

The researchers studied the Merritt Island National Wildlife Refuge to test the theory that marine reserves "spillover" a number of larger fish into the waters around a reserve. This area is the oldest fully protected marine reserve in the U.S., being created in 1962 for the security of the Kennedy Space Center. It consists of two water areas separated by a neck of land. An earlier study of the area showed that 12.8 times as many black drum, 6.3 times as many redfish, 2.3 times as many speckled trout, and 5.3 times as many common snook were on the area than in the fished waters outside the reserve.

In this study, the biologists compared the world records for these 4 species that were recorded by the International Game Fish Association (IGFA) for the waters within 60 miles of the reserve to the number of world records taken from waters further than 60 miles from the reserve. If reserves do work to provide large fish by spillover, the number of world records for the area near the reserve should be higher than for the areas further away.

This was indeed the case. The area near the reserve has only 13% of the Florida coast, but of world record-size fish caught in Florida between 1939 and 1999, it accounted for 62% of the records for black drum (24), 54% of the records for redfish (36), 50% of the records for speckled trout (16), but only 2% of the records for common snook (2). The reserve is at the northern edge of the snook's range and the fish leaves the area in winter.

Since it takes time to grow world record-size fish, it would be logical to assume that the reserve would have had to be in place a number of years before these large fish began to show up in waters near the reserve. Once these large fish began to appear, they should have done so in increasing numbers.

Both theories proved true. Record-size speckled trout, which have maximum life span of 15 years, began to show up in numbers 9 years after the reserve was created, and numbers steadily increased for 15 years. Record redfish, which live up to 35 years, began appearing 27 years after the reserve was created and the number of records were still increasing 38 years later. Record black drum, with a 70-year life span, showed up at 31

years and are also still increasing. Since 1985, all new world records taken in Florida for black drum and most of the records for redfish have been for fish caught near the Merritt Island Refuge.

Callum Roberts, from the University of York in England and one of the researchers, says "the idea is snowballing, the more we study reserves, the more compelling the arguments for them are becoming." John Ogden, director of the Florida Institute of Oceanography added that reserves "have captured the imagination of a great many people" and the new study is "a hard case for recreational fishers to answer."

Of course, not everyone agrees. Ray Hilborn, a fisheries biologist with University of Washington argues that less severe regulations, from closed seasons to size limits, can produce the same fisheries improvements. Pro-reserve scientists reply by saying that these methods haven't worked to stop most overfishing, because limits tend to get changed during the political process.

Recreational fishermen have expressed the most opposition to marine reserves. "Reserves take the focus from where it should be, which is good conservation throughout the fishery," says Rick Farren, communications director of the Florida Coastal Conservation Association, a group "adamantly opposed" to marine reserves.

Fishermen in California have challenged their state's effort to create reserves, at one stage flinging dead fish onto the stage at a meeting. The Bush Administration has been asked to roll back the huge Hawaiian marine reserve created by the outgoing Clinton Administration. Last August, the American Sportfishing Association and other groups convinced Louisiana Senator John Breaux and Texas Senator Kay Baily Hutchinson to introduce the Freedom to Fish Act, which would require fisheries managers to make reserves as small as possible.

Sources: *Effects of Marine Reserves on Adjacent Fisheries.* Callum M. Roberts, James A. Bohnsack, Fiona Gell, Julie P. Hawkins, and Renata Goodridge. Science, Volume 294. November 30, 2001. *Reserves Found to Aid Fisheries*. David Malakoff. News of the Week. www.sciencemag.org. Science, Volume 294. November 30, 2001. *Reserves Raise Fish Stocks.* John Whitfield. Science Update. www.nature.com/nsu/011206/011206-1.html. Nature, 12/21/02

D.O.A.

One of the most controversial management tools used for reef fish is the minimum size limit. Fish, such as snappers, caught from deep waters often show signs of decompression stress, such as their stomachs protruding from their mouths. Such fish under the minimum size must be released and often float away on the surface, leaving

fishermen convinced that they all die. Researchers working off of the northern Florida gulf coast recently shed more light on just how many released reef fish die.

Part of their study involved putting gag, red snapper, vermilion snapper, and red grouper in cages after they were caught and returning them to deep water to see what the effects of being reeled to the surface were. After one to two weeks, the cages were returned to the surface and the fish inspected.

Of the three species in the study, red snapper easily had the highest mortality (death) rate. For red snapper and gag, mortality increased as water depth increased between 65 and 130 feet. The death rate hit 50% at 114 feet for red snapper and at 122 feet for gag. At depths between 130 and 195 feet, mortality for both species leveled off at 60-70%. Vermilion snapper showed none of the decompression damage such as protruding stomachs or eyes that the other 3 species did. The research did show that the longer any of the fish were at the surface, the higher the likelihood of death was. Mortality was not found to be related at all to the speed that the fish were reeled in.

Source: *Evaluation of Multiple Factors Involved in Release Mortality of Undersized Red Grouper, Gag, Red Snapper and Vermilion Snapper.* Karen M. Burns, Christopher Koenig, and Felicia Coleman. Marfin Grant No. NA87FF0421

COASTWIDE NUTRIA BOUNTY PROGRAM MEETINGS

A series of public meetings will be held from June 24, 2002 through July 2, 2002 to provide information and receive public input regarding the Coastwide Nutria Control Program that will be implemented during the 2002-2003 Louisiana fur trapping season. The goal of the program is to reduce or eliminate damage to marsh habitats that is being caused by overpopulation of nutria. The program will be implemented by the Louisiana Department of Wildlife and Fisheries, with funding and oversight provided by the Louisiana Department of Natural Resources and the USDA-Natural Resources Conservation Service.

The program will provide incentive payments (harvest bounties) to registered participants. To register for the program, one must possess a 2002-2003 Louisiana fur trapping license and have written permission to harvest nutria from a landowner who owns property in Louisiana, south of Interstates 10 and 12. Registration is anticipated to begin in September 2002.

Additional information can be obtain by attending one of the following meetings that will be hosted by the LSU Agricultural Center's Sea Grant Extension Agents:

June 24: 6:00 pm, Cameron, Police Jury Annex (contact: Kevin Savoie, 337/491-2065)

June 25: 6:00 pm, Abbeville, LSU AgCenter Extension Office 1105 West Port Street, (Mark

Shirley, 337/898-4335)

June 26: 6:00 pm, Patterson, Patterson Civic Center, Kemper Williams Park, exit off of - Hwy 90 (Sandy Corkern, 337/828-4100 Ext. 300)

June 27: 6:00 pm, Houma, Houma Municipal Auditorium, 800 Verret St. (David Bourgeois, 985/873-6495 or 985/632-6852)

July 1: 6:00 pm, Chalmette, St. Bernard, Isleños Center, 1357 Bayou Rd. (Rusty Gaudé, 504/682-0081, ext.1242)

July 2: 6:00 pm, Harvey, Jefferson Parish School Board Administration Building, 501 Manhattan Blvd. (Mark Schexnayder,504/838-1170)

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THE GUMBO POT

Deviled Oysters

This recipe does not disguise the native taste of oysters, in spite of all the seasonings; instead, the ingredients showcase the oysters. If you like oysters, you will like this dish.

1½	pt oysters	½	tsp tabasco sauce
2	tbsp onion, minced	1	tsp prepared mustard
2	tbsp butter	1	tbsp worcestershire sauce
4	tbsp flour	1	tsp parsley, chopped
1½	cups milk	1	egg beaten
1	tsp salt	½	cup bread crumbs
¼	tsp nutmeg	2	tbsp butter

Chop oysters and set aside. Cook onion in butter until tender. Blend in flour, add milk, and cook until thick, stirring constantly. Add seasonings, beaten egg, and oysters, and heat. Put mixture in a glass baking dish and cover with buttered crumbs. Bake in 400° oven for 10 minutes, or until browned. Serves 4

Sincerely,

Jerald Horst
Associate Specialist (Fisheries)