

Deepwater Horizon
Open Ocean Trustee Implementation Group

Developing Methods to Observe Sea Turtle Interactions
in the
Gulf of Mexico Menhaden Purse Seine Fishery

Proof of Concept Summary Report

December 2021

NOAA completed this report and is making the final recommendations for the pilot phase field work. The following members are part of the steering committee that collaborated on the proof on concept testing and the recommendations for the pilot phase:

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Background

In 2016, the Deepwater Horizon Natural Resource Trustees reached a settlement resulting from the Natural Resource Damage Assessment process to resolve BP Exploration and Production's liability for natural resource injuries caused by the Deepwater Horizon oil spill in the Gulf of Mexico. Part of the settlement requires BP to pay up to \$8.8 billion dollars to federal and state trustees for the purposes of restoring natural resources that were injured by the spill, and the services they provided. NOAA is leading implementation of the project, "Developing Methods to Observe Sea Turtle Interactions in the Gulf of Mexico Menhaden Purse Seine Fishery" for the Open Ocean Trustee Implementation Group to restore resources injured in the Gulf of Mexico by the 2010 Deepwater Horizon oil spill. The DWH Open Ocean Trustee Implementation Group includes the four federal Trustee agencies: National Oceanic and Atmospheric Administration (NOAA); U.S. Department of the Interior (DOI); U.S. Department of Agriculture (USDA); and U.S. Environmental Protection Agency (EPA). The trustees work together to plan and conduct restoration for species injured by the oil spill, including wide-ranging and migratory species.

Introduction

This report summarizes the results of the proof-of-concept (PoC) testing phase for the project, "Developing Methods to Observe Sea Turtle Interactions in the Gulf of Mexico Menhaden Purse Seine Fishery." The project is a joint effort with the menhaden industry that focuses on developing effective observer methods to collect information about interactions with sea turtles and bottlenose dolphins in the Gulf of Mexico (GOM) menhaden purse seine fishery, and to identify opportunities for voluntary measures to avoid and reduce interactions, if necessary. The time and location of the fishery overlaps with the presence of sea turtles, resulting in the potential for interactions. However, information on interactions with sea turtles and dolphins is very limited, and there is currently no effective observer methodology to determine the nature of the interactions.

The project is divided into 3 distinct phases. The initial phase of the project included planning and industry engagement, including the establishment of a steering committee. The second phase, and subject of this report, was PoC testing to determine what methods are feasible for the pilot observer effort. Since the likelihood of encountering a sea turtle during PoC testing was low, sea turtle models/effigies of different sizes were used (only one during any set) during the PoC testing to better understand the ability to observe a sea turtle using each method. Three sizes of effigies were available: small (24.3 cm straight carapace length [SCL]), medium (34.2 cm SCL), and large (38.0 SCL), all of which fall within the range of sizes found in stranded sea turtles in the area. The final phase will be a pilot observer effort, taking place over one to two fishing seasons to implement a full observation protocol to test its effectiveness, fine tune the methodologies, and gather information on sea turtle and dolphin interactions during normal fishing operations.

Fishery Operations

The Gulf of Mexico menhaden purse seine fishery occurs in state waters, primarily off Louisiana and Mississippi, with limited effort off Texas and Alabama. Fishery operations include a steamer (approx. 140-200 feet long) with two (2) purse boats (approx. 40 feet long) that encircle the school of menhaden with the purse seine, and then cinch the bottom of the seine closed while reducing the volume inside the seine to concentrate the menhaden catch. The purse seine is typically 1,200 feet long, resulting in a diameter of over 380 feet before the seine is cinched together and reduced in size to concentrate the catch prior to tying it up with the steamer (see photo 1). The purse boats then bring the net alongside the steamer, where the crew on the steamer uses a large hose, outfitted with an exclusion grate on the end (for the purpose of excluding large species and debris), to pump the menhaden out of the net and up into the ship's hold (see photos 2 and 3). Following the pumping operation, the crew at the net then performs a "roll over" where the cork line of the net is submerged and all the larger animals that were excluded by the hose exclusion grate are released from the net. This ends the set operation. The purse boats will reset the purse seine for their next set.

Photo 1. Net-setting operation.



Photo 2. Purse boats with net tied off to steamer and ready to pump



Photo 3. Pumping of the net contents.



Observation Methods

Based on discussions with the menhaden industry and the NOAA Southeast Fisheries Science Center (SEFSC), and the logistics of the fishery operations, the methods chosen for testing during the PoC testing included:

- Stationary cameras mounted on a steamer vessel/electronic monitoring (EM)
- Human observers operating from an alternative platform vessel
- Human observers operating from an industry steamer/run vessel
- Drone/unmanned aerial survey

The PoC testing was conducted from October 11-15, 2021. Human observers and EM systems were contracted through Saltwater, Inc. and drone work was provided by the NOAA Office of Marine and Aviation Operations (OMAO). Information on the results of each method is provided below.

Electronic Monitoring

An EM system camera was installed on the crow's nest of the F/V Sea Wasp (the Westbank LLC steamer vessel used for POC testing) based on vessel design, operational logistics, and discussions with industry (see photo 4). The primary intent of the EM system was to be able to observe and record the pumping operation and net rollover, which is expected to be a primary location for observing any interactions with sea turtles that may occur. An additional camera was also installed to observe the on-deck sorting grate and water discharge area (see photo 5).

Photo 4. View from EM camera installed on crow's nest, showing pumping/net rollover operational area.



The EM system as installed did not allow for observation/recording of the encircling or net setting operation as that occurs further away from the steamer vessel. A total of 16 fishing sets were observed/recorded on the Sea Wasp using the EM system.

The camera placement of both cameras offered a high vantage point, however, it was determined that camera height or resolution was an issue during some sets. It was difficult to be able to identify the larger catch items to species in the video of some of the sets as a result of image size and occasional image quality/focus and glare issues (see photos 6 and 7 below for an example). Also, intermittent camera dropouts/power loss occurred during some sets, resulting in lack of video for portions of the operations. Per the EM contractor, Saltwater, Inc., such technical issues are typical during the initial installations of EM systems. Adjustments to camera settings, lens type, and location after the first couple of trips would resolve these issues when conducting operations over the fishing season.





Table 1. Summary of EM sets on the F/V Sea Wasp

# Sets Recorded	# Sets Sampled	# Sets with missing video	# Sets with image quality issues (glare, focus)
16	16	3	9

EM Operations Findings:

- The use of 2 cameras was determined to be sufficient to cover pumping and discard locations throughout the steamer vessel
- The 2 cameras do not offer views on purse vessel deployment or net setting operations. It may be possible to install cameras oriented to capture at least some of those views. However, that part of the operation is substantially further away than the pumping/net rollover, and the distance and low angle would result in limited ability to observe sea turtles during the net setting operation. Observation of the net setting operation is better suited for other methods.
- Some resolution, glare, and focusing issues along with intermittent camera dropouts resulting in loss of data. The EM contractor will adjust camera settings, lenses, and location within the first few trips at the beginning of the pilot effort to ensure optimal video of the pumping and net rollover operations.

- The use of EM systems for observation of the pumping/net rollover operation shows great promise.

Human Observers

A team of two fisheries observers were contracted for the project through Saltwater, Inc. An alternative platform vessel was provided by Westbank Fishing LLC, one of the menhaden industry companies. The observers varied the location of observation throughout the PoC testing in order to evaluate the logistics of different observation methods/locations and the ability to detect protected species interactions during fishing operations. Due to the nature of fishing operations, the F/V Sea Wasp was not always available for observation during the PoC week. Various mechanical issues occurred throughout the week causing the vessel to go back to port, requiring the observation team to change plans throughout the week. The observation team was able to use this to their advantage and was able to observe sets from multiple vessels in the fleet to watch for differences in fishing operations.

They were also able to observe operations from the pump and run vessel for a day to collect data that will help the NMFS project team determine whether the run vessel could be used as an observation platform. The run vessel is a steamer that does not have its own purse boats, and is used to pump out nets from other steamer/purse boat teams to allow them to continue fishing without filling up their hold and having to return to port. The observers viewed fishing operations from the following locations:

Day 1: Both observers viewed fishing operations from the alternative platform.

Day 2: One observer remained on the alternative platform vessel while the other observer transferred to the steamer vessel.

Day 3: Both observers transferred to the steamer vessel.

Day 4: Both observers transferred to the run vessel.

Day 5: Both observers transferred to the steamer vessel.

Table 2. Distribution of observer effort by sets

Observer Location	Sets Observed (Obs. 1)	Sets Observed (Obs. 2)
Alternative Platform	7	5
Steamer Vessel	7	9
Pump and Run Vessel	4	4

Observer Operation Findings:

- **Alternative Platform:** Observing from the alternative platform vessel allowed the observation of the encircling or net setting operation, where they were able to detect the sea turtle effigy on every set where it was deployed. However, they were unable to see the effigy during the pumping or net rollover operations because the positioning of the purse boats alongside the steamer prevents a suitable vantage point (see photo 8).
- **Steamer Vessel:** Transferring from the alternative platform to the steamer vessel to observe the pumping and net rollover operations provided the best vantage point to allow the observer to view what was in the net and what was released during the net rollover (see photo 9).
 - The observers tried various locations and determined that the 3 best locations for observing pumping operations and net rollover were:
 - Near the captain's controls on the second level of the vessel just forward of where the net is being pumped out
 - On top of the pump room on the second level of the vessel slightly aft of where the net is being pumped out
 - On the main deck near the rail just forward of where the net is being pumped out
 - There are safety concerns regarding the use of vessel transfers by observers as a regular methodology. Very close coordination between the steamer pilot and the industry-provided alternative platform vessel was required to ensure that both were aware of each other's movements to ensure a safe transfer. Such coordination is not as feasible between an industry steamer vessel and observer program or contractor observer vessel.
- **Run Vessel:** The observers positioned themselves in the same locations described in the above section to view pumping and net rollover. As far as pumping operations are concerned, the pump and run vessel operations were identical to those of the steamer vessels. Because the pump and run vessel's captain doesn't always know which net they will be pumping, the observers were only able to capture the set begin and set end data on two of the sets observed. Use of run vessels in the GOM menhaden purse seine fishery is not regular and consistent at this time, and therefore, may not be a suitable platform for an observer program to rely on.



Drone Operations

A total of 13 sets were observed and recorded via drone. The drone video was able to capture the net setting operation, scanning the area in and around the net as it is being set and cinched (see photo 10). At times the drone video was taken from too high of a vantage point to identify smaller objects in the water in and near the net (such as a sea turtle), but at lower altitudes detection of the sea turtle effigy occurred. However, observation of the pumping operation and net rollover via drone was sometimes difficult because the drones are not allowed to operate directly over the vessels or directly above

people. The pumping and net rollover could be viewed from a sufficiently low altitude (unless dolphins are in the vicinity) but the footage has to be captured from a vantage point that does not place the drone directly above the operation.

Photo 10. Drone view of netting operation.



Drone Operations Findings:

- Flying lower would help with resolution however, there are altitude requirements and restrictions that can preclude flying the drone at an optimal altitude. For example, if dolphins are seen in the area, drones must operate at an altitude of 100 feet or higher. The drone may descend to no lower than 30 feet for detailed images and 6 feet for breath sampling.
- Drones are most effective for the net setting portion of fishing efforts
- Drones consume more resources and logistical bandwidth for duration of effort, thus would limit deployment
- Permit stipulations do not allow for drones to be operated from a commercial vessel actively engaged in a commercial activity. Therefore, any drone work would have to be piloted from the alternative platform observer vessel, and could not be done from an industry run boat if one were being used.

Conclusions for PoC

- All 4 observing methods/locations (alt platform observer, steamer vessel observer, drone and EM system) were able to spot the sea turtle effigy at some point while in the net.
- However, the alternative platform observer was unable to see the sea turtle during pumping or net rollover while the other methods were able to.
- The drone was better suited for observing the net setting operation than the pumping and net rollover operation.
- Both the drone and camera system operations were able to capture the required data fields with some identified limitations and steps for refinement.
- Further refinement during the pilot program would be necessary refine these two data collection methods for this fishery.
- Observations from the steamer vessel itself proved to collect the best data in this PoC trial for the pumping operation and net rollover. However, safety and liability concerns with observers regularly transferring between vessels limits feasibility of this method as a standard protocol.
- Drones are not a feasible option for a full pilot observer effort at this time. NOAA's project team does not intend to pursue the use of drones as a primary part of the pilot observer effort. However, we will work with OMAO to see if there are opportunities where they can conduct drone observations periodically during the pilot program.

Recommendations for Pilot Phase

Based on the conclusions of the proof of concept phase of work and subsequent discussions with the steering committee, including industry partners, NOAA recommends the following for use during Year 1 of the Pilot Observer Effort. The Pilot effort is planned for up to 2 years, or 2 full fishing seasons. The results of Year 1 will inform the protocol for Year 2.

Pilot Observer Effort Protocol Recommendations for Observer Pilot Year 1:

NOAA recommends using a combination of human observers and electronic monitoring as described below. During the course of the pilot program, adjustments to camera systems/locations and human observer methods may occur as we learn more over the fishing season related to efficiencies, problems, etc.

Drones will not be a primary component of the pilot phase due to operational limitations in flight time, altitude, and limited utility for observing the pumping/net rollover. However, we may pursue the use of drones during the pilot program on a periodic, opportunistic basis if possible.

EM Monitoring Systems

Camera systems will be installed on 8 steamers for the duration of the fishing season, geographically spread across the fleet. Based on fishing effort, cameras will be installed on 2 boats operating out of Abbeville, LA, on 3 boats operating out of Empire, LA and on 3 boats operating out of Moss Point, MS. Distribution of the camera systems is based on a review of recent effort (total sets fished by vessels from each port) and discussions with industry on fishery effort distribution. Abbeville vessels account for approximately 25% of total effort and operate in the western side of the fishing area, so we recommend installing 2 cameras on Abbeville vessels (2/8 total camera systems = 25% of the cameras). There is substantial overlap of effort in the eastern portion of the fishing area by vessels from both Empire and Moss Point, where approximately 75% of the fishing sets are conducted. Therefore, we recommend moving forward with splitting camera systems evenly between vessels from Empire and Moss Point (3 camera-equipped vessels per port).

NOAA will work with our contractor to ensure that camera systems installed for the pilot phase are properly adjusted and located on the crow's nest of the steamer to clearly record the pumping/net rollover, ensuring that sea turtles in the field of view can be readily seen and identified. In addition, the contractor will work to ensure that installations are modified to eliminate the occasional power loss issues identified during the PoC testing.

Assuming there are no mechanical issues on the boat or with the camera, these cameras would record all fishing sets on the boats in which they are operating over the season, up to 150 fishing days. Video would be downloaded and reviewed on a regular basis. Potentially moving the systems to different steamers during the course of the season if deemed necessary to get a representative observation of the fishing operations.

EM Systems would collect data independent of the other observation methods, not in conjunction with the human observers. Human observers would only be observing the net setting part of operations as described below.

Human observers

NOAA will work with our contractor to employ one observer and one vessel pilot on an alternative platform vessel to observe the netting operations. Based on logistics and spatial fishing effort, the observation days will be split to include up to 1 week per month in the Abbeville vicinity and up to 3 weeks per month in Empire-Moss Point vicinity. Thus, effectively conducting approximately 25% of the observer efforts in the western fishing area where Abbeville vessels typically fish, and 75% in the eastern fishing area where Empire and Moss Point vessels typically fish.

Observers will utilize their alternative platform vessel to move from steamer to steamer as fishing sets are conducted observing the net-setting operation throughout the season, up to 150 fishing days. Due to coordination, safety, and liability concerns transferring from the alternative platform vessel to the steamer vessel to observe the pumping/net rollover operation will not be incorporated in the pilot effort.

Human observers would collect data independent of the other observation methods, not in conjunction with the EM. Due to the number of steamer vessels that will be equipped with EM systems, the team has agreed to rely on coincidental overlap of EM and human observations if any data need to be ground-truthed. This level of overlap will be identified mid-season and assessed if more is needed.

Pilot Phase Year 1 Coordination and Adaptive Management

NOAA will work with the contractor throughout the season to assess any issues, review interim reports submitted with video and human observer data, and modify the protocols as needed. At the request of the Steering Committee, data and reports will be shared electronically and at any convened Steering Committee meetings to review data and resolve any operational issues. The Steering Committee will have at least one meeting in the first three months of the fishing season to check in on progress of the pilot phase field work. Additional meetings may be convened as needed.

After the fishing season has ended and year-end reports are received from the contractor, the Steering Committee will convene in late 2022 to review the data and discuss next steps for the pilot phase, which may include another year of data collection.

Reporting of interactions and disposition of dead or injured sea turtles and bottlenose dolphins

Pilot project observers

- In addition to recording any observations of sea turtles and dolphins near or interacting with the net-setting operation, if a dead or injured animal is encountered the observer will do the following:
 - Sea turtle: Any dead or injured sea turtles will be collected by the observer if it can be done safely, and the Sea Turtle Stranding Network will be immediately contacted to arrange pick up of the turtle.
 - Bottlenose dolphin: Any dead or injured dolphin will not be collected or sampled, but the observer must note the location and immediately contact the Marine Mammal Stranding Network to help coordinate their response.

Fishing industry personnel

- Fishing industry personnel must report any interactions with sea turtles, marine mammals, or other protected species as required by regulation.