UNITED STATES DEPARTMENT OF COMMERCE
National Oceanic and Atmospheric Administration
NATIONAL OCEAN SERVICE
National Centers for Coastal Ocean Science
Silver Spring, Maryland 20910

MEMORANDUM FOR: The Record

FROM: Margo Schulze-Haugen
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SUBJECT: Programmatic E5 Categorical Exclusion for NCCOS Habitat Monitoring and Data Collection Activities for the Gulf of Mexico

ENCL(s) (1) NOAA Unmanned Aircraft Systems (UAS) Handbook
(2) AOC Operations Manual and Operations Policy 220-1-5

NOAA Administrative Order (NAO) 216-6A, Environmental Review Procedures, requires all proposed projects to be reviewed with respect to environmental consequences on the human environment. This memorandum addresses the determination that NCCOS habitat monitoring and data collection activities as described in the memorandum, qualifies to be categorically excluded from further National Environmental Policy Act review.

Applicability to the Process

This E5 (activities involving invasive techniques or methods for scientific purposes) categorical exclusion memorandum will be used as follows: A project level review will be conducted to ensure consistency with the scope of activities, geographic area and impacts outlined in this memorandum and that all required consultations, permits and/or permissions are acquired prior to work beginning. This CE memorandum must be associated with a project level review checklist to be valid.

Categorical Exclusion Determination

NCCOS determines that the activities described in this memo (e.g. marsh and seagrass monitoring actions, establishment of benchmarks and water sensors) are covered under the E5 Categorical Exclusion described as: Activities involving invasive techniques or methods that are conducted for scientific purposes, when such activities are conducted in accordance with all applicable provisions of the Endangered Species Act, Marine Mammal Protection Act, Migratory Bird Treaty Act, and Magnuson-Stevens Fishery Conservation and Management Act. Such activities will be limited to impacting living resources on a small scale relative to the size of their populations, and limited to methodologies and locations to ensure that there are no long-term adverse ecosystem impacts. Further, project activities will be analyzed in a project review checklist to ensure compliance with all environmental statutes.

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1.0 Purpose and Need:

With the increasing risk of sea level rise, more frequent and/or severe storms, and a decline in suspended sediment in coastal environments, islands and marshes are disappearing. The value of nature-based solutions (NBS) such as islands, marshes, oyster reefs and seagrasses (also known as natural and nature-based features (NNBF)) is that they can provide storm and flood protection while also providing a suite of socio-economic and environmental benefits. However, the perceived uncertainties in the performance and benefits of nature-based solutions are still considered a barrier to widespread adoption and implementation of NBS. NCCOS science addresses these data gaps through collection of monitoring parameters, mapping, and predictive modeling and adaptive management efforts.

To meet these research needs, NCCOS conducts and funds Habitat Monitoring activities to monitor, evaluate, and quantify the performance and benefits of NNBF approaches through the use of predictive simulation modeling, tool development and development of guidance that would all inform future habitat restoration projects. Monitoring and field data collection before and after restoration actions and/or storm events will help to determine the best restoration approaches from an engineering standpoint, and predict and compare results and conditions with and without the project. Further, NCCOS studies the effects of sea level rise and storm events in restored marshes, dunes, and islands to inform implementation and design of future projects.

2.0 Geographic and Temporal Scope

The scope of NCCOS activities proposed to be funded and conducted include tidally influenced coastal beaches, dunes, shorelines, marshes and islands along the Gulf of Mexico Coast (Figure 1). For any given project, NCCOS generally conducts monitoring and evaluation activities approximately four (4) to six (6) times a year at up to six (6) different project locations. NCCOS also supports anywhere between four (4) and ten (10) projects per year funded by the Effects of Sea Level Rise (ESLR) grants program. Total time spent sampling at any one site varies between 1 to 14 days per year in coastal areas that are diverse in their geomorphology, natural processes, and human influence, ranging from dynamic, sedimentary systems with superimposed

communities to more geologically stout coastal areas with adjacent population centers to sites within well-developed, well-populated urban centers. Additional sampling may occur before and after storm events, king tides or other natural events to evaluate the performance of NNBF.

Figure 1. Map of gulf coast areas where project activities may take place (encircled in yellow polygon).

3.0 Activity Description

The scope of activities analyzed in this memorandum include field-based data collection and monitoring of a suite of variables, including sediment/porewater collections, vegetation surveys and sampling, native vegetation planting. In addition, monitoring actions may include establishment of permanent and temporary benchmarks, surface elevation tables, deployment of small sensors or sampling devices and small vessel operations. Researchers are required to operate under the conditions of all applicable Federal and State permits. This memorandum does not cover the implementation and installation of beneficial use of sediment or oyster restoration projects, but does cover monitoring of existing projects.

The following activities may be conducted (Table 1):

Table 1. Habitat monitoring activities.

Activity Category	**Activity Type**
Data Collection and Monitoring	Marsh elevation (e.g., RTK GPS, ground-based terrestrial laser scanning)
	Localized plant collections (above-ground and below-ground biomass sample collection)

	Coastal Lidar and Radar Imaging System (CLARIS)
	Vibracore
	Bathymetric surveying (single-beam and multi-beam)
	Vegetation and cover type monitoring
	Sediment sample collections (surface and core)
	Porewater sample collections
	Seagrass monitoring and surveys
	Oyster population surveys
	SET reading
	Planting native vegetation
Deployment or Establishment of Small Structures/Sensors	Invertebrate Settlement plates (Hesty-Dender)
	Fiberglass or wood boardwalks
	Benchmark installation
	Camera (e.g., minirhizotron camera)
	Water level sensors
Vessel Operations	Transit of personnel and equipment
	Seagrass transects
	Oyster dredge transects
	Miscellaneous water/sediment sampling
Unmanned Aerial Systems	Transects at 30 to 400 m elevation
	Temporary placement of ground control targets

3.1 Field Based Data Collection and Monitoring

1. Marsh Elevation: Marsh surface elevation measures are collected by NCCOS staff walking through a site with either an RTK GPS (hand-held, receiver-based, or mounted on a bike) collecting data points at regular intervals to establish the full elevation gradient occupied by *Spartina alterniflora* and other marsh species (Figure 2). Elevation may also be determined by walking the site with an optical or leveling survey instrument. Elevation measures are usually tied to a permanent or temporary benchmark. Terrestrial laser scanning: To obtain detailed topographic variation over space and time, a terrestrial laser scanning approach may be used. These systems use laser light to map features. They can be mounted on a tripod or a mobile platform such as a cart, UTV or truck. This approach is typically combined with RTK GPS mapping to have controlled georeferenced points for verification. If used, the approach must be tailored to the setting (vegetation cover, structure, access) and any restrictions (e.g., regarding motorized vehicles).
2. Localized Plant Collections: Local plant collections may occur at select sites, (e.g., 5 sites along a transect). These harvests may involve clipping of stems using scissors at the soil surface, and taking sediment cores with root material for laboratory processing. The specifics of the plant collection protocol (frequency, type, species, etc.) will be described in the accompanying project review checklist.

3. Coastal Lidar and Radar Imaging System (CLARIS): CLARIS LIDAR mapping involves driving on the beach during low tide and as close as possible to the mean high-water line (e.g., far from the dune toe), and typically involve use of a vehicle for transportation. Since these operations typically occur within the hard-packed portion of the intertidal zone, there are not typically deep tracks or ruts left. If operations require driving on the upper beach to avoid obstacles (e.g., other vehicles, beach-goers), the CLARIS system is operated in the ruts of previous tire tracks of the lifeguards.
4. Vibracore: Sediment cores (vibracores) to be collected using lightweight, hollow aluminum tubing, commonly used for farm irrigation. These tubes are 3" (7.6 cm) in diameter and 20' long. They are inserted into the subsurface using vibration associated with a cement vibrator attached to a small engine. The coring equipment emits a less than 30 second burst of engine noise for each core that is collected.
5. Bathymetric survey: Single and multi-beam bathymetric surveying may be conducted from vessels at coastal areas (25-100m from shore) in accordance with permit restrictions. Survey area, methodology, and frequency will be described in the accompanying project-specific checklist. Single-beam bathymetric survey systems operate at a frequency of 200 kHz and the multibeam systems operate at 200-400 kHz. Both systems would be focused on the seafloor and have minimal lateral acoustic spreading.
6. Vegetation and cover type monitoring. This includes both estimates of percent cover of marsh plants, epifauna, and debris in vegetation plots, as well as counts of stem density and measure of plant height. For example, a 1m^2 PVC quadrat may be placed directly over the substrate in order to estimate percent cover of marsh plants and epifauna (Figure 3). The methodology for monitoring will be described in the accompanying project review checklist.
7. Sediment Sample Collections: May be collected by hand cores (6 cm x 15cm or smaller) or a Young-modified Van Veen grab (100 cm^2 x 8 cm depth) lowered by hand from a small boat. Sediments may be analyzed for bulk density, carbon content, total organic carbon (TOC) particle size distribution and infauna. The sediment collected is a small amount and holes created in the benthic environment are localized and temporary, refilling within a matter of hours to days. The methodology for sediment sample collections will be described in the accompanying project review checklist.
8. Porewater Sample Collections: The samples are obtained with a narrow metal tube connected to a peristaltic pump, and the total volume of porewater removed is less than 25 ml per sample. Generally, may be collected for analysis of chemical constituents such as sulfide, NH^4 and PO^4 content.
9. Seagrass surveys may involve conducting presence/absence transects by walking, snorkeling, diving, or towing of a video camera by boat (Figure 4). Towed camera surveys are described in the Vessel Operations section below. Seagrass surveys may also involve the use of meter tapes and quadrats to estimate percent cover and species distribution.

10. Localized Seagrass collections - Seagrass cores (6” or 10” cores) may be collected to estimate above and below ground biomass and density may be collected under the terms and conditions of applicable State permits. Generally no more than 30 seagrass cores per site are collected, usually along a transect and spaced greater than 1 meter apart.
11. Oyster population surveys – Generally involve activities to visually survey subtidal locations, by walking, snorkeling, diving or collections using hand oyster dredge. The Oyster dredge is a small hand deployed device weighing approximately 10 kg with an approximate 35 cm mouth opening and length of 40 cm and a mesh size of 4 x 4 cm (Figure 5). The dredge is towed from the side and behind a small outboard boat in a circular pattern or in a transect around the "site center" for a period of only 1 to 2 minutes in the bottom. During the tow the dredge has either filled up with oysters, refractory shell fragments, and or debris. Minimal oyster collections may occur under the terms and conditions of various permits.
12. Surface Elevation Table (SET) – A SET is a metal apparatus designed to measure changes in marsh surface elevation to an accuracy of +/- 3 mm. Reading a SET involves placing it on a permanent class B benchmark (installation described below) and measuring the distance of fiberglass rods to the marsh surface (Figure 6). Note that the SET is removed from the benchmark between readings.
13. Planting native vegetation - In some cases planting of native vegetation that matches the species of adjacent marsh may be required for restoration purposes. Practices generally involve installing plugs of nursery reared native plants on 1 meter intervals according to established protocols.

Figure 2. RTK marsh survey with bike mounted rover. Base receiver is occupying a surveyed benchmark position.

Figure 3. Estimating vegetation percent cover from a 1m2 plot using a PVC quadrat. The plot is established along a transect from the shoreline to the upper edge of the marsh.

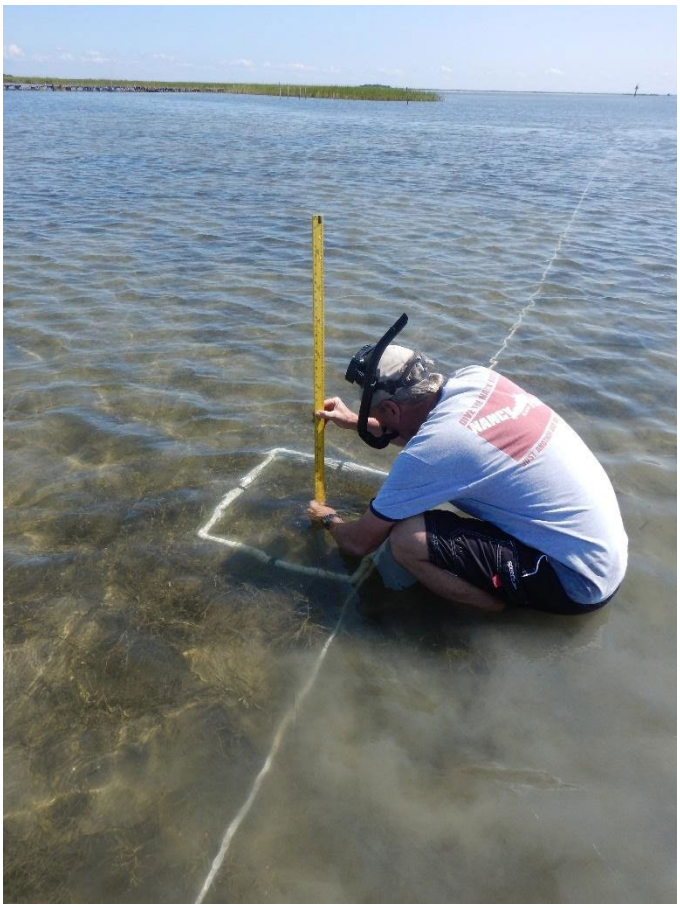


Figure 4. Photo of scientist using a quadrat to measure seagrass percent cover.

Figure 5. Photo of small oyster dredge that may be used as part of monitoring activities.

Figure 6. Photo of a surface elevation table (SET) instrument mounted on a benchmark (see Figure 10). A temporary boardwalk is shown being used by the scientist to access a benchmark without walking on marsh surface. The distance to marsh is read with the fiberglass rods. Only the benchmark (small PVC-capped object in center of photo) remains in the marsh.

3.2 Deployment of Establishment of Small Structures and Sensors

1. Installation of temporary sessile invertebrate plates to assess recruitment of sessile invertebrates may be conducted using Hester-Dendy samplers may also occur (Figure 7). The samplers are typically placed in waters less than 3 feet deep, but possibly closer to 1-2 feet of water depth, in the nearshore environment adjacent to the marsh site. The samplers (i.e. settlement plates) can be composed of 8 plates that are 3 inches across, with the stack measuring approximately 1 foot in length, and are placed on a cinderblock approximately 6 inches above the sediment substrate. The samplers are directly attached to a cinder block (or similar object in weight and size) and may be marked (as needed) with a highly visible buoy with the shortest amount of line necessary so that the float remains close to the cinderblock reducing entanglement hazards. Up to three samplers may be attached to a single anchor (e.g. cinder block) and usually are deployed for approximately 2-3 months. At that point, samplers, anchors (cinderblocks) and buoys will be removed from the environment.

2. Fiberglass or wood boardwalks may be required to minimize disturbance to vegetation (Figures 8, 9). Boardwalks are used if permanent plots are established, and/or repeated sampling is anticipated, in soft sediment marshes. When used, boardwalks require some maintenance. All boardwalks are removed when the project or monitoring period is over.
3. Benchmark Installation – Benchmarks are established to support Surface Elevation Tables (SETs) (e.g. Class B Benchmarks) to obtain accurate measures of marsh surface elevation and sediment accretion These elevation benchmarks are installed by driving a steel rod up to 10 m (30 ft) into the ground, and encasing it with concrete (Figure 10). Benchmarks may also be installed to provide a reference point for measures of marsh surface elevation using surveying instruments (Figure 11). In this case 6-10 ft metal rods are driven into the ground, with approximately 12 inches of the rod above the surface of the sediment capped PVC sleeve with a diameter of approximately 6" inserted around the elevation benchmark for protection (Figure 12).
4. A camera, such as a minirhizotron camera, may be installed in sand dune sites for monitoring purposes. A minirhizotron camera is a three (3) meter long, ten (10) centimeter diameter clear polycarbonate tube used to take pictures of subsurface roots and sediment. The tubes can be left in the ground and removed at the end of the project period. The tubes are capped off when not in use, so can be inserted to a depth nearly even with the ground, though generally are installed with ~1-2 feet sticking out of the ground at a ~30 degree angle.
5. Deployment of water level sensors such as HOBO water level sensor (6"x 3"X 2") may be attached to a PVC pole via a cable tie to record water levels during each sampling event. Pole will be removed upon completion of sampling.

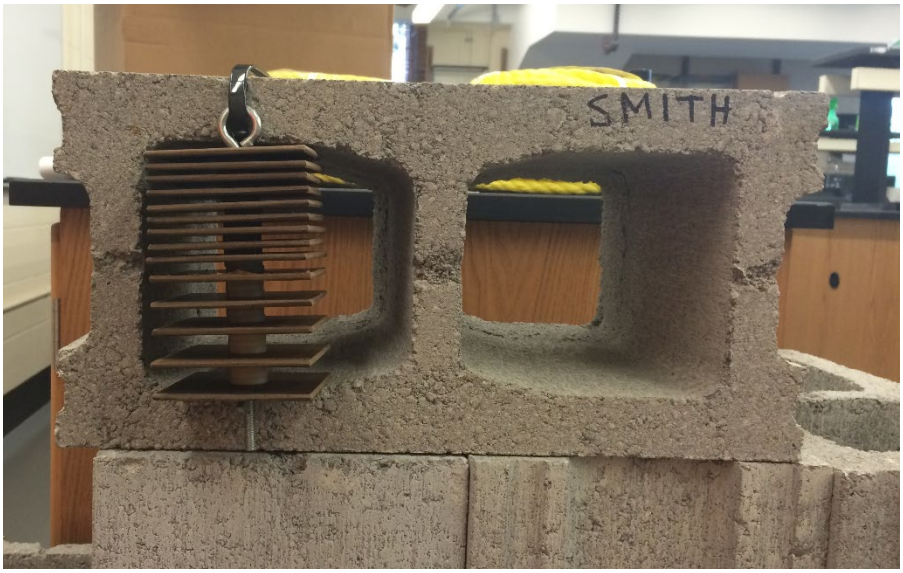


Figure 7. Image of Hester-Dendy samplers placed within a cinder block and ready for deployment. A marker buoy may or may not be attached.

Figure 8. NCCOS staff install temporary boardwalks to minimize impacts to vegetation during sampling.

Figure 9. Boardwalk made of fiberglass grating allows for maximal light penetration to marsh surface.

Figure 10. Photo of a Class B Benchmark where the SET receiver (see Figure 6) is mounted to support Surface Elevation Table readings. Diameter of PVC collar is 6 inches. PVC cap covers the receiver, and a brass marker is placed in the concrete identifying the benchmark.

Figure 11. Photo of RTK (Real-time Kinematic) GPS gear set up on an elevation benchmark to accommodate elevation surveys of the site.

Figure 12. Installation of an elevation benchmark. Diameter of PVC collar is 6", and steel rod can be seen centered in the concrete inside the collar. A Class B or SET benchmark would have an additional stainless-steel fitting around the metal rod to accommodate the SET during readings (see Figure 10).

3.3 Vessel Operations

Shallow-draft vessels from 15 to 30' may be operated by trained members of the team and project partners. Sites also may be accessible from land-based vehicles on public roads. Transit would generally be from nearby boat launches to bring personnel and equipment to and from research sites. Vessel operations may include towing small video transects in seagrass beds or a small oyster dredge to assess oyster populations, water or sediment samples may also be collected from a stationary vessel. Best management practices as described in Section 7 would be incorporated in all vessel operations to minimize impacts to protected or managed resources.

Seagrass video transects involve slowly towing a roller trawl outfitted with an underwater camera approximately 50 meters behind the boat or running slow transects with a camera mounted near the transducer or side of the shallow draft vessel. The roller trawl would have temporary direct and indirect effects to the seagrass bed through contact with the substrate. However, it is designed to roll smoothly over the seagrass blades. This technique is routine and has been shown to have no discernible impact on seagrass beds, either above or below ground.

3.4 Unmanned Aerial Systems (UAS)

A NOAA approved UAS platform (e.g. DJI Phantom 4 Pro [Figure 13]) in conjunction with structure from motion image analysis will be used to support wetland research through the development of methods for quantifying biomass of emergent vegetation, creation of high-resolution digital elevation models and analysis of nearshore vegetative communities. The use of UAS-based methods to collect these data will require significantly fewer man-hours, result in less damage and allow for greater spatial coverage. A description and specifications of the UAS platform will be provided in the accompanying project-specific checklist.

Maximum flight times, heights, and speeds the UAS will be flying will be provided in the project-specific checklist. Typically, maximum flight times are on the order of 10 to 30 minutes, at heights ranging 30 to 400 feet above sea level (nominally 100 feet) at approximately 14 mph airspeed.

Ground control targets (hereafter GCT's) can be placed on the sediment surface to facilitate ground-truthing of the acquired imagery. GCT's can be 6 to 10" flat discs of wood or plastic painted black and white. The total number and placement of GCTs are determined in the field. GCTs are separated to encompass the full range of the targeted study area. GCTs must be placed in unvegetated patches. The specific location and elevation of each GCT placement site will be determined with RTK-GPS. GCT's are removed at the end of each flight day.

Flight restrictions and conditions:

1. Operations will not be conducted if:
    - Ceiling less than 800 m
    - Visibility less than 1.5 km
    - Wind greater than 15 kts
    - Light rain
    - Presence of people in UAS operational area
    - Presence of marine mammals, sea turtles or bird activity detected in the operational areas
2. PIC will brief all participants on safe zones for launch and landing.
3. Minimum/Maximum flight Altitudes in airspace shall be defined as "minimum flight altitude of 30 ft, maximum flight altitude of 400 ft."
4. Max distance from GCTs will be line of site (estimated at 500 m), weather permitting.
5. All flights will be conducted in daylight hours.
6. Any non-participating aircraft encountered will be avoided as much as possible. Operations are limited to ensure proper separation from manned aircraft.
7. Routine maintenance checks must be performed before and after each flight.
8. Batteries must be charged or replaced as needed.
9. Flight data from the ground control station must be reviewed after each flight as necessary to ensure safe operation for subsequent flights.
10. PIC to maintain safe flight or terminate flight if unable.
11. All flights will comply with AOC Operations Manual and Operations Policy 220-1-5 and NOAA Unmanned Aircraft Systems Handbook.

Site-specific analysis of UAS operations will occur within the associated project level checklist to ensure compliance with Federal, state, and local regulations and the NOAA clearance and review process for UAS.

Figure 13. Photo of a DJI phantom 4 to be used in monitoring research.

4.0 Environmental Impacts

4.1 Endangered Species

Section 7(a)(2) of the Endangered Species Act (ESA) requires that each federal agency, in consultation with NMFS and/or the U.S. Fish and Wildlife Service (USFWS), ensure that any action authorized, funded, or carried out by the agency is not likely to jeopardize the continued existence of any endangered or threatened species or result in the destruction or adverse modification of designated critical habitat. This section will be divided into NMFS-protected species and USFWS protected species, with the exception of the West Indian Manatee.

4.1.1 NMFS Protected Species

Marine Mammals

The Marine Mammal Protection Act (MMPA) of 1972 (16 U.S.C. 1361 et seq.), as amended, prohibits, with certain exceptions, the "take" of marine mammals in U.S. waters and by U.S. citizens on the high seas, and the importation of marine mammals and marine mammal products into the U.S. The MMPA defines "take" as: "to harass, hunt, capture, or kill, or attempt to harass, hunt, capture or kill any marine mammal." 16 U.S.C. § 1362. Harassment means any act of pursuit, torment, or annoyance that has the *potential to injure* a marine mammal or marine mammal stock in the wild (Level A harassment); or that has the *potential to disturb* a marine mammal or marine mammal stock in the wild by causing disruption of behavioral patterns, including, but not limited to, migration, breathing, nursing, breeding, feeding, or sheltering, but does not have the potential to injure a marine mammal or marine mammal stock in the wild (Level B harassment). 16 U.S.C. § 1362; http://www.nmfs.noaa.gov/pr/dontfeedorharass.htm.

There are a total of seven (7) marine mammals that may occur in the action area. Six (6) are ESA-listed Cetaceans and one (1) is a manatee (Table 2). All Marine Mammals are protected under the Marine Mammal Protection Act.

Table 2. ESA-listed marine mammals and designated critical habitat that may occur in the action area of NCCOS habitat monitoring activities in coastal marshes and adjacent subtidal waters.

Species	ESA Status	Jurisdiction	Critical Habitat
Marine Mammals			

Blue whale (*Balaenoptera musculus*)	E – 35 FR 18319	NMFS	none
Fin whale (*Balaenoptera physalus*)	E – 35 FR 18319	NMFS	none
Sei whale (*Balaenoptera borealis*)	E – 35 FR 18319	NMFS	none
Sperm whale (*Physeter macrocephalus*)	E – 35 FR 18319	NMFS	none
Bryde's Whale (*Balaenoptera edeni*)	E – 84 FR 15446	NMFS	none
Rice's Whale *(Balaenoptera ricei)*	E - 86 FR 47022	NMFS	Yes* Core Distribution Area
West Indian Manatee *(Trichechus manatus)*	T - 82 FR 16668	USFWS	81 FR 7413*

Marine Mammal Critical Habitat and Effects Determination

There is critical habitat designated for West Indian manatees in shallow water near-coastal and freshwater and estuarine areas of Florida (Figure 14). USFWS has identified the specific habitat needs of the Florida manatee, as including the use of warm-water sites, adequate forage within dispersal distance of a warm-water refuge, areas needed for calving and nursing, and important travel corridors for movements throughout Florida and beyond (74 FR 49842). Project activities such as sample collections and routine vessel transit would not destroy or adversely modify the features that meet the specific habitat needs of the Florida manatee. In addition, NCCOS would employ all Best Management Practices (Section 7) that include maintaining 100% protected species observer coverage, minimum approach distances (50 meters) and reducing speed or stopping work if manatees are observed. Vessels are used routinely for these activities and do not represent an increase in vessel traffic, noise, or pollution potential.

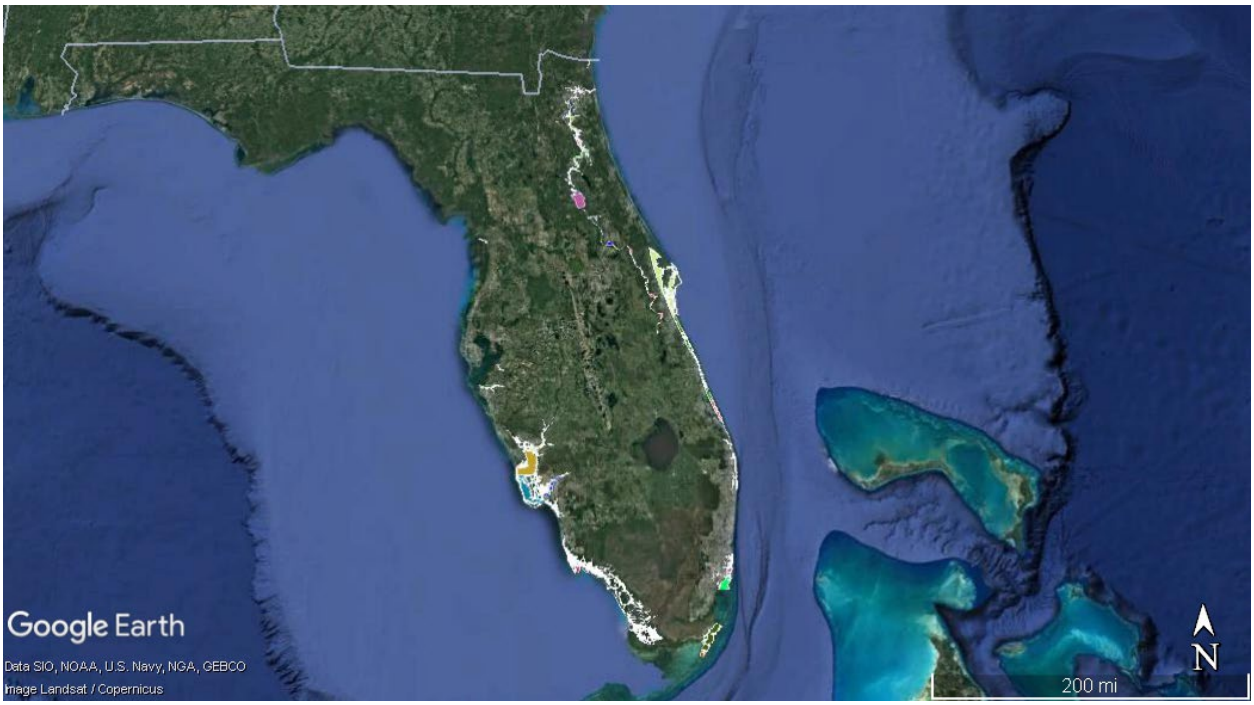


Figure 14 Critical habitat for the West Indian Manatee in Florida. Solid white, purple, green, and yellow colors.

In 2019, NMFS determined that Rice's Whales, formerly thought of as a subspecies of Bryde's Whales, were actually a different species. Rice's Whales were added to the ESA list in 2021. Critical habitat is likely to be proposed by NMFS. The current Core Distribution Habitat was determined by sightings and tag data of Rice's Whale that have occurred in this area of the northern GOM as of 2019 (Figure 15). The core distribution area is outside a potential action area for projects covered by this memo, as projects will only occur near shorelines and in terrestrial marshes.

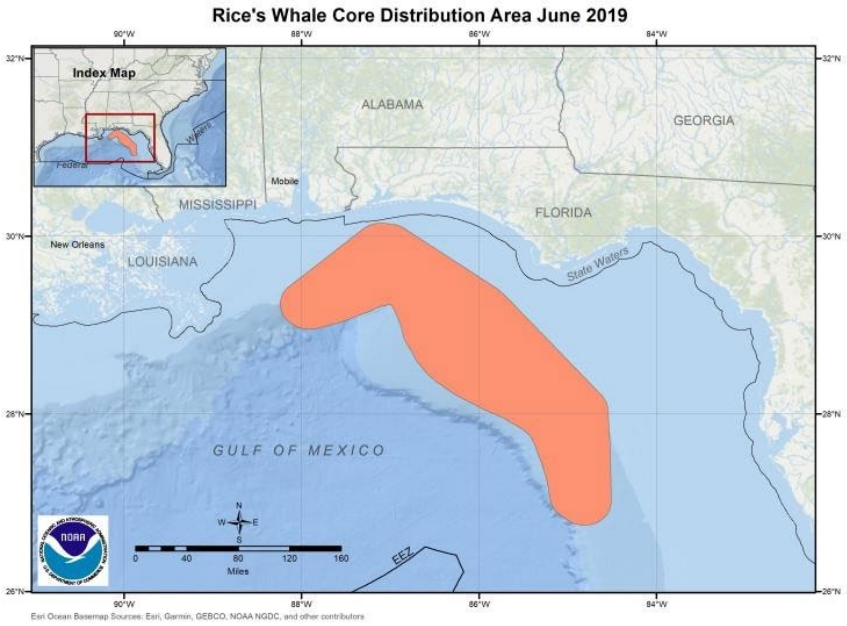


Figure 15. Core Distribution Habitat for Rice's Whale.

Marine Mammal Effects Determinations

Activities to be conducted fall into four main categories (Table 1): 1. Data Collection, and Monitoring (hereafter Collection and Monitoring) 2. Deployment of Establishment of Small Structures/Sensors (hereafter Establishment of Small Structures) 3. Vessel Operations, and 4). Unmanned Aerial Systems.

<u>Collection and Monitoring/Establishment of Small Structures</u>

Collection and monitoring activities and establishment of temporary or permanent structures would have no effect on large whales as these activities either occur in the terrestrial environment or in waters too shallow to support large whale species. Manatees and other marine mammals (non-ESA listed) may occur in shallow water areas within the project area. Field operators will cease work and avoid manatees and other mammals if they occur in the project area. If bathymetric surveys using single- or multi-beam scanners are conducted, the equipment operates at frequencies of 200-400 kHz, outside the hearing range of manatees (0.4-0.6 kHz), therefore manatees would not be exposed to the sound. During survey operations, vessels will move in a slow rate of speed and vessel operators will abide by all BMPs to avoid impacts to manatees, such as maintaining minimum approach distances, 100% observer coverage, and ceasing activities while a manatee is in the area.

<u>Vessel Operations</u>

Vessel operations include transit of personnel and equipment, towed camera seagrass transects, towed oyster dredge surveys and/or sample collections from a stationary vessel. Transit operations would primarily occur from the closest boat launch to the project site and within well-marked channels. While manatees and smaller marine mammal species may occur in shallow water areas, small vessels are highly maneuverable and researchers would maintain 100 percent

protected species observer coverage, maintain minimum approach distances from all protected species (e.g. 50 yards from Manatees) while underway and reduce speeds when protected species are observed (BMPs Section 7). Towed transects (video, oyster dredge) would occur at slow speed (~ 5 knots) from small shallow draft vessels and be of short duration. Both the video and oyster dredge are small and would be towed within 100ft of the vessel, while operators maintain visual contact at all times. Given the minimal power of the vessel, short duration of the deployment, and 100 percent observer coverage there is no potential for adverse effects to marine mammals from entanglement, entrapment or injury. Vessel operations will only occur during daylight hours, are routine and do not represent an increase in vessel traffic, noise or pollution potential above baseline levels as vessels are used routinely for other research purposes within the area.

UAS Operations

The UAS is small and lightweight (Figure 13) and will be used for the purposes of photographic mapping. As such, there is no potential to adversely affect marine mammals as they will be avoided during all operations. Further, drone pilots will employ appropriate BMPs (Section 7) to avoid disturbing hauled-out marine mammals. Real-time flight and survey observations and maintaining line of sight will allow researchers to avoid all marine mammals during UAS flight operations. Therefore, operation of UAS such as a small quad copter would have no adverse effects on ESA-listed marine mammals and would not result in unauthorized take of other marine mammals.

Based on this analysis NCCOS determines that habitat monitoring activities (Table 1) would not have any effects to ESA-listed marine mammals and would not result in unauthorized take of other marine mammals. In addition, ocean mapping or data collection are not planned for these types of projects (i.e., only shoreline or estuarine areas will be examined), so ocean habitat for marine whales will not be affected by the scopes of projects covered by this memo.

Sea Turtles

There are five (5) species of sea turtles that may be found in the action area; green, hawksbill, Kemp's Ridley, loggerhead and leatherback (Table 3). Sea turtles are under both NMFS and USFWS jurisdiction. These five species of sea turtles may be found in the action area during the spring, summer and fall. Loggerheads are especially common in the inland bays, estuaries and coastal environments, as well as nesting on gulf coast beaches.

Table 3. ESA- listed sea turtles and designated critical habitat that may occur in the action area of NCCOS habitat monitoring activities in coastal marshes and adjacent subtidal waters.

Species	ESA Status	Jurisdiction	Critical Habitat
Sea Turtles			
Green sea turtle (*Chelonia mydas*) North Atlantic distinct population segment (DPS) NMFS link	T – 81 FR 20057	NMFS/USFWS	63 FR 28359*

Hawksbill sea turtle (*Eretmochelys imbricata*)	E – 35 FR 8491	NMFS/USFWS	57 FR 38818*
Kemp's Ridley sea turtle (*Lepidochelys kempii*)	E – 35 FR 18319	NMFS/USFWS	N/A
Loggerhead sea turtle (*Caretta caretta*) Northwest Atlantic Ocean DPS	T – 76 FR 58868	NMFS/USFWS	79 FR 39856
Leatherback sea turtle (*Dermochelys coriacea*)	E – 35 FR 8491	NMFS/USFWS	63 FR 28359*

* Indicates critical habitat outside the scope of the Gulf of Mexico region (Figure 1).

Sea Turtle Critical Habitat and Effects Determination

There is critical habitat designated for the loggerhead sea turtle Northwest Atlantic Ocean DPS within the Gulf of Mexico region. There are vast areas offshore that include foraging (Sargassum) habitat (Table 4, Figure 16). Nearshore reproductive habitat is also designated on multiple beaches and barriers islands in Mississippi, Alabama and Florida (Figure 17-18). The scope of activities described only have the potential to overlap with the foraging critical habitat of the loggerhead sea turtle. NCCOS small vessel operations would not affect the essential features of this critical habitat (Table 4).

NCCOS activities should be conducted to avoid destruction or modification of the essential features of loggerhead sea turtle habitat (Table 4). Activities associated with collection and monitoring and establishment of temporary or permanent structures would have no effect on sea turtle critical habitat as these activities either occur in the terrestrial environment and/or are non-invasive activities conducted in shallow localized areas near marsh restoration sites (see vessel operations component below. Activities could potentially occur on or near designated nearshore reproductive critical habitat (Figure 17-18). However, researchers would avoid areas where sea turtles may be nesting during all activities. Further, activities would not occur at night and would not occur in proximity to sea turtle nests or otherwise obstruct the progress of adult loggerheads to their nesting sites or hatching sea turtles' access to the ocean.

Table 4. Essential features of loggerhead sea turtle Northwest Atlantic Ocean DPS critical habitat.

Loggerhead Critical Habitat Unit	Essential Features
Nearshore Reproductive Habitat	• Waters off of the highest density nesting beaches; • Waters sufficiently free of obstructions or artificial lighting; and • Waters with minimal man-made structures.
Constricted Migratory Habitat	• Constricted Continental Shelf area relative to nearby Continental Shelf waters; and • Passage conditions to allow for migration to and from nesting, breeding, and foraging areas.
Winter Habitat	• Water temperatures above 10°C from November to April;

	● Continental Shelf waters in proximity to the western boundary of the Gulf Stream; and ● Water depths between 20 and 100 m.
Foraging Habitat	● Sufficient prey availability and quality, such as benthic invertebrates; and ● Water temperatures to support loggerhead inhabitance, generally above 10°C.

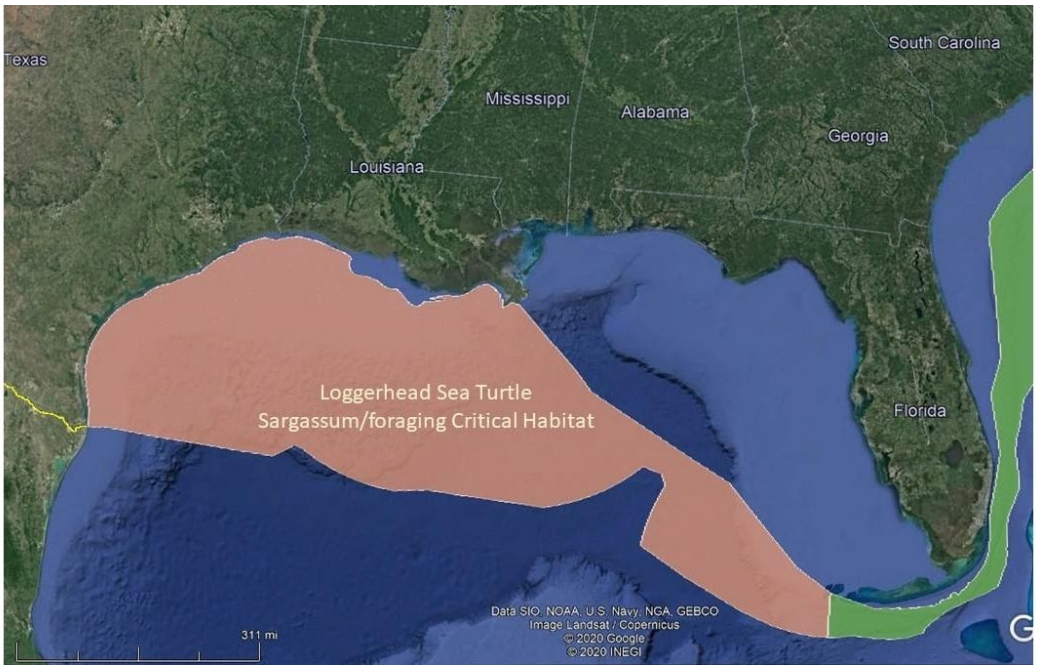


Figure 16 Loggerhead foraging critical habitat in the Gulf of Mexico.

Figure 17. Nearshore reproductive critical habitat in Mississippi, Alabama, and Florida.

Figure 18. Nearshore reproductive habitat along the west coast of Florida.

Sea Turtle Effects Determinations

Collection and Monitoring/Establishment of Small Structures

Activities associated with collection and monitoring and establishment of temporary or permanent structures would have no effect on sea turtles as these activities either occur in the terrestrial environment and/or are non-invasive activities conducted in shallow localized areas near marsh restoration sites (see vessel operations component below). If activities occur on

beaches and dune sites, transit and access to dune sites will be from a land-based vehicle designed to drive on the beach and leave no deep tire tracks that would impact nesting sea turtles. If available, existing publicly-accessible roadways and walking paths will be used. Activities could potentially occur on or near designated nearshore reproductive critical habitat (Figure 17-18). However, researchers would avoid areas where sea turtles may be nesting during all activities. Further, activities would not occur at night and would not occur in proximity to sea turtle nests or otherwise obstruct the progress of adult loggerheads to their nesting sites or hatching sea turtles' access to the ocean.

Bathymetric surveying using single beam or multibeam sonar may be conducted. The functional hearing ranges of ESA-listed sea turtles are not well understood, and vary by species. Available information on sea turtle hearing in general indicates that their hearing thresholds are less than 1 kHz (Moein et al. 1994). Loggerhead sea turtles are thought to have a functional hearing range of 250 to 750 Hz (Brill et al. 2004), Kemp's ridley sea turtles a range of 100 to 500 Hz, and green sea turtles 100 to 800 Hz (Brill et al. 2004). The operating frequencies of all proposed sonar devices are outside the functional hearing range of ESA-listed sea turtles, meaning that operation of these devices will have no effect on ESA-listed sea turtles.

Vessel Operations

Vessel operations include transit of personnel and equipment, towed camera seagrass transects, towed oyster dredge surveys and/or sample collections from a stationary vessel. Transit operations would primarily occur from the closest boat launch to the project site and stay within well-marked channels. While sea turtles may occur in shallow water areas, small vessels used in this project are highly maneuverable and researchers would maintain 100 percent protected species observer coverage, maintain minimum approach distances from sea turtles (50 yards) while underway and reduce speeds when protected species are observed (BMPs Section 7). Towed transects (video, oyster dredge) would occur at slow speed (~ 5 knots) from small shallow draft vessels and be of short duration (2 to 15 minutes). Both the video and oyster dredge are small and would be towed within 100ft of the vessel, while operators maintain visual contact at all times. Given the minimal power of the vessel, short duration of the deployment, and 100 percent observer coverage there is no potential for adverse effects to sea turtles from entanglement, entrapment or injury. Vessel operations will only occur during daylight hours, are routine and do not represent an increase in vessel traffic, noise or pollution potential above baseline levels as vessels are routinely used for other research purposes within the area. There is no potential for vessel operations to adversely affect nearshore reproductive critical habitat for Loggerheads (Figure 17-18) as vessel operations would not restrict sea turtle adults' or hatchlings' access to these areas and no operations occur at night.

UAS Operations

The UAS is small and lightweight (Figure 13) and will be used for the purposes of photographic mapping. Real-time flight and survey observations and maintaining line of sight will allow researchers to avoid all marine mammals during UAS flight operations. Therefore, operation of UAS such as a small quad copter would have no adverse effects on sea turtles. Further, drone pilots will employ appropriate BMPs (Section 7) to avoid disturbing sea turtles. There is no potential for UAS operations to adversely affect nearshore reproductive critical habitat for

Loggerheads (Figure 17-18) as operations would not restrict movement or access of sea turtle adults or hatchlings to these areas and no operations occur at night.

Based on this analysis NCCOS determines that habitat monitoring activities (Table 1) would not have any adverse effects on sea turtles or their critical habitat.

Fish

There are seven (7) ESA-listed fish species that may occur in a project action area (Table 5).

Table 5 ESA-listed fishes and designated critical habitat that may occur in the action area of NCCOS habitat monitoring activities in the US gulf coast's coastal marshes and adjacent subtidal waters

Species	ESA Status	Jurisdiction	Critical Habitat
Fishes			
Scalloped Hammerhead Shark (*Sphyrna lewini*) Southwest Atlantic DPS	T-79 FR 38213	NMFS	None
Shortnose sturgeon (*Acipenser brevirostrum*)	E – 32 FR4001	NMFS	None
Nassau Grouper (*Epinephelus striatus*)	T – 81 FR 42268	NMFS	N/A
Oceanic Whitetip Shark (*Carcharhinus longimanus*)	T – 83 FR 4153	NMFS	N/A
Giant manta ray (*Manta birostris*)	T – 83 FR 2916	NMFS	N/A
Gulf Sturgeon (*Acipenser oxyrinchus desotoi*)	T – 56 FR 49653	NMFS	68 FR 13370
Smalltooth Sawfish (*Pristis pectinata*)	E – 68 FR 15674	NMFS	74 FR 45353

.

Gulf Sturgeon Critical Habitat

There are at least 13 rivers and their associated estuaries designated as Gulf sturgeon critical habitat within in Florida, Alabama, Mississippi and Louisiana (Figure 19).

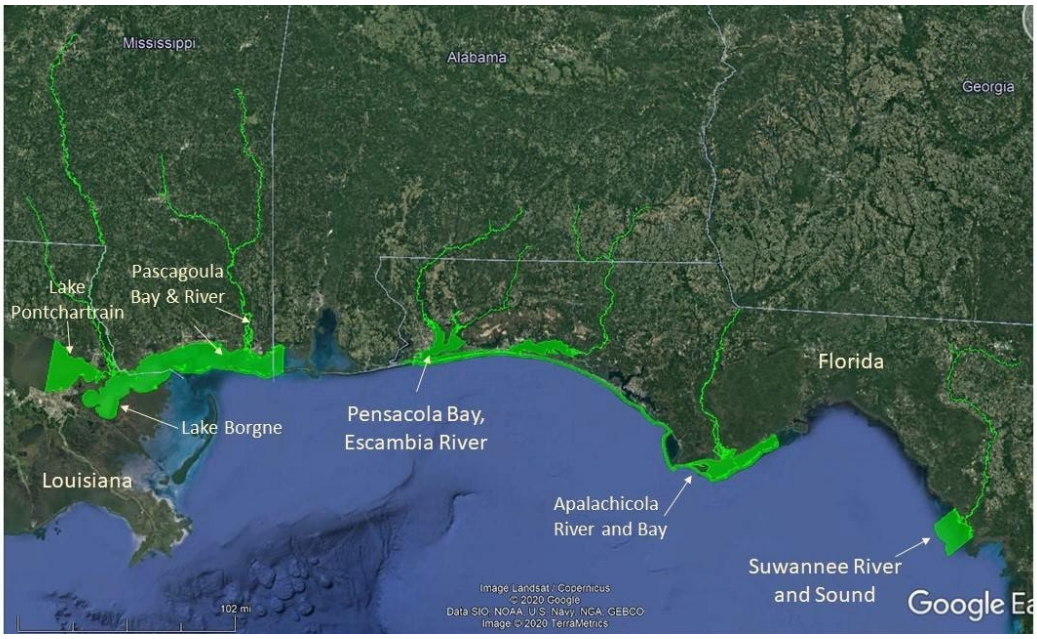


Figure 19. Map showing the rivers (in green) where Gulf Sturgeon critical habitat has been designated in Louisiana, Mississippi, Alabama, and Florida.

Smalltooth Sawfish Critical Habitat

There is critical habitat designated for Smalltooth sawfish off the southwest tip of Florida (Figure 20). NMFS determined that the habitat features essential to the conservation of the species are red mangroves and shallow euryhaline habitats characterized by water depths between the Mean High Water line and 3 ft (0.9 m) measured at Mean Lower Low Water (MLLW).

Figure 20. Designated critical habitat for Smalltooth sawfish shown in the orange polygon.

Fishes and Critical Habitat Effects Determinations

<u>Collection and Monitoring/Establishment of Small Structures</u>

Activities associated with collection and monitoring and establishment of temporary or permanent structures would have no effect on ESA-listed fish species as these activities either occur in the terrestrial environment and/or are localized, non-invasive activities conducted in

shallow subtidal areas near marsh restoration sites (but see vessel operations component below). Activities would have no adverse effects to Gulf sturgeon critical habitat (Figure 19) or Smalltooth sawfish critical habitat (Figure 20), because there is no potential to affect the substrate type, salinity, depth, temperature or access of fishes to the habitat.

Bathymetric surveying using single beam or multibeam sonar may be conducted as part of project activities. The functional hearing ranges of ESA-listed Gulf and shortnose sturgeon are not well understood, but available information on lake sturgeon indicates they can hear sounds from 100-800 Hz (Meyer et al. 2010). Smalltooth sawfish, scalloped hammerhead, manta rays, and the oceanic whitetip shark are elasmobranchs, and although there is no known information on the hearing ability of sawfish, other species of elasmobranchs have been studied. Hearing ranges of lemon sharks and horn sharks are between 20 and 1,000 Hz (Casper and Man 2006). The operating frequencies of all proposed sonar devices are likely outside the functional hearing range of ESA-listed fishes, meaning that operation of these devices will have no effect on ESA-listed fishes.

Vessel Operations

Vessel operations including transit of personnel and equipment, towed camera seagrass transects, towed oyster dredge surveys and/or sample collections from a stationary vessel. Transit operations would primarily occur from the closest boat launch to the project site and stay within well-marked channels. Vessel transit operations would not adversely affect fishes by limiting migratory corridors or through water quality impacts. Small vessels are highly maneuverable and researchers would maintain 100 percent protected species observer coverage, maintain minimum approach distances from fishes (50 yards) while underway and reduce speeds when protected species are observed (BMPs Section 7). Towed transects (video, oyster dredge) would occur at slow speed (~ 5 knots) from small shallow draft vessels and be of short duration (2 to 15 minutes). Both the video and oyster dredge are small and would be towed within 100ft of the vessel, while operators maintain visual contact at all times. Oyster dredge tows are of very short duration (~ 2 minutes) and have never been observed to capture any of the ESA listed species (pers. comm. Dennis Apeti – NCCOS). Vessel operations will only occur during daylight hours, are routine and do not represent an increase in vessel traffic, noise or pollution potential above baseline levels as vessels are routinely used for other research purposes within the area. There is no potential for vessel operations to adversely affect the physical and biological features of the critical habitat (e.g. salinity, depth, substrate, temperature or accessibility).

UAS Operations

The UAS is small, lightweight and operated from a terrestrial or mobile (small vessel) base of operations at altitudes from 30 to 400 m for the purposes of photographic mapping. Therefore, there would be no overlap with the aquatic environment and no potential for adverse effects to ESA-listed fishes or their critical habitat.

Corals

There are seven (7) species of coral that may occur within the Gulf of Mexico region. In this region these species distributions are limited to southern Florida, namely the Florida Keys and shallow water banks within the northern Gulf of Mexico such as Flower Gardens Banks National Marine Sanctuary (Table 6).

Table 6. ESA-listed species of coral that occur within Gulf of Mexico region off the coast of southern Florida or on shallow water banks within the northern Gulf of Mexico. E – indicates endangered status, T – indicates threatened status.

Corals	ESA Status	Jurisdiction	Critical Habitat
Elkhorn Coral (*Acropora palmata*)	T – 79 FR 53851	NMFS	73 FR 72210
Staghorn Coral (*Acropora cervicornis*)	T – 79 FR 53851	NMFS	73 FR 72210
Pillar coral (*Dendrogyra cylindrus*)	T – 79 FR 53851	NMFS	N/A
Lobed Star Coral (*Orbicella annularis*)	T – 79 FR 53851	NMFS	N/A
Boulder Star Coral (*Orbicella franksi*)	T – 79 FR 53851	NMFS	N/A
Rough Cactus Coral (*Mycetophyllia ferox*)	T – 79 FR 53851	NMFS	N/A
Mountainous Star Coral (*Orbicella faveolata*)	T – 79 FR 53851	NMFS	N/A

Coral Critical Habitat

Critical habitat is designated in the Florida Keys for elkhorn and staghorn coral (Figure 21). NMFS determined the feature essential to the conservation of the species which supports the identified conservation objective, was substrate of suitable quality and availability, in water depths from the mean high water (MHW) line to 30 m, to support successful larval settlement, recruitment, and reattachment of fragments (from 73 FR 72210).

Figure 21. Critical habitat for elkhorn and staghorn coral off the coast of Florida

Corals Effects Determinations

Collection and Monitoring/Establishment of Small Structures

Activities associated with collection and monitoring and establishment of temporary or permanent structures would have no effect on ESA-listed coral species as these activities either occur in the terrestrial environment and/or are localized, non-invasive activities conducted in shallow subtidal areas near marsh restoration sites (but see vessel operations component below).

Vessel Operations

Vessel operations including transit of personnel and equipment, towed camera seagrass transects, towed oyster dredge surveys and/or sample collections from a stationary vessel. Transit operations would primarily occur from the closest boat launch to the project site and stay within well-marked channels. Vessel transit operations would not adversely affect corals by anchoring on them or through water quality impacts. Towed transects (video, oyster dredge) would occur at slow speed (~ 5 knots) from small shallow draft vessels and be of short duration (2 to 15 minutes). Both the video and oyster dredge are small and would be towed within 100ft of the vessel, while operators maintain visual contact at all times. Oyster dredge tows are of very short duration (~ 2 minutes) and will not be used if there is any ESA-listed species of coral present within reach of the dredge. Vessel operations will only occur during daylight hours, are routine and do not represent an increase in vessel traffic, noise or pollution potential above baseline levels as vessels are routinely used for other research purposes within the area.

UAS Operations

The UAS is small, lightweight and operated from a terrestrial or mobile (small vessel) base of operations at altitudes from 30 to 400 m for the purposes of photographic mapping. Therefore there would be no overlap with the aquatic environment and no potential for adverse effects to ESA-listed corals.

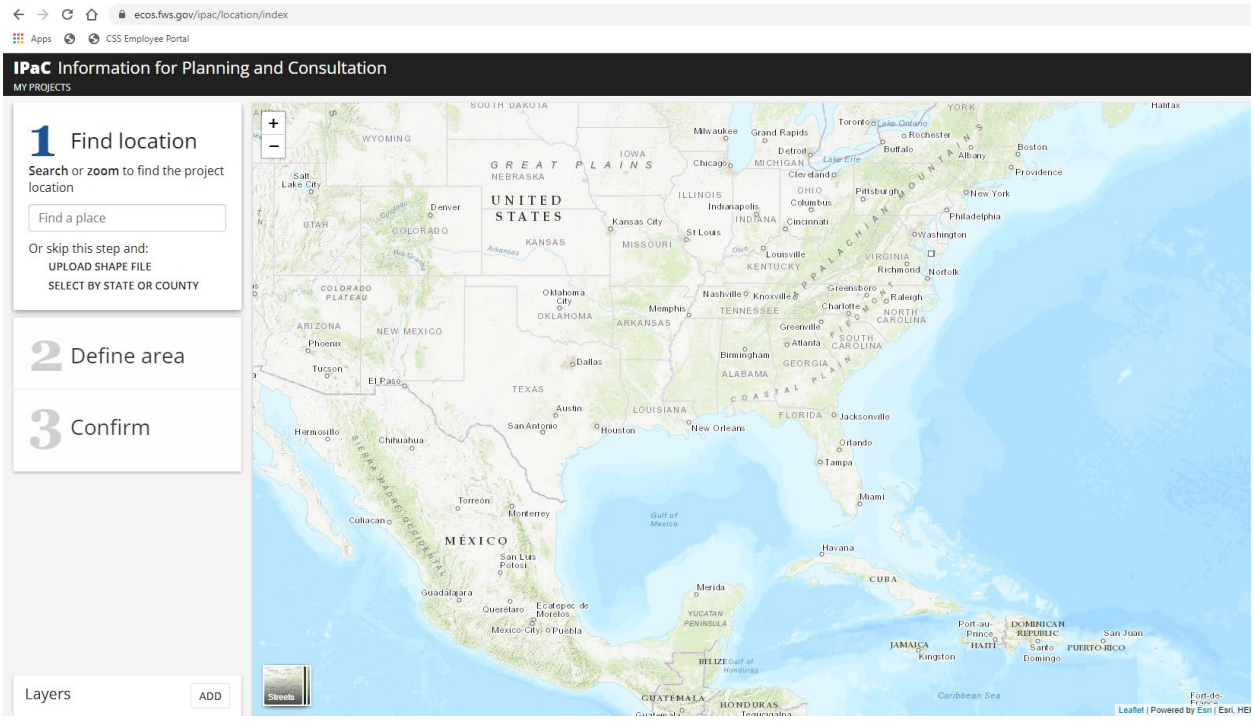
4.1.2 USFWS Protected Species

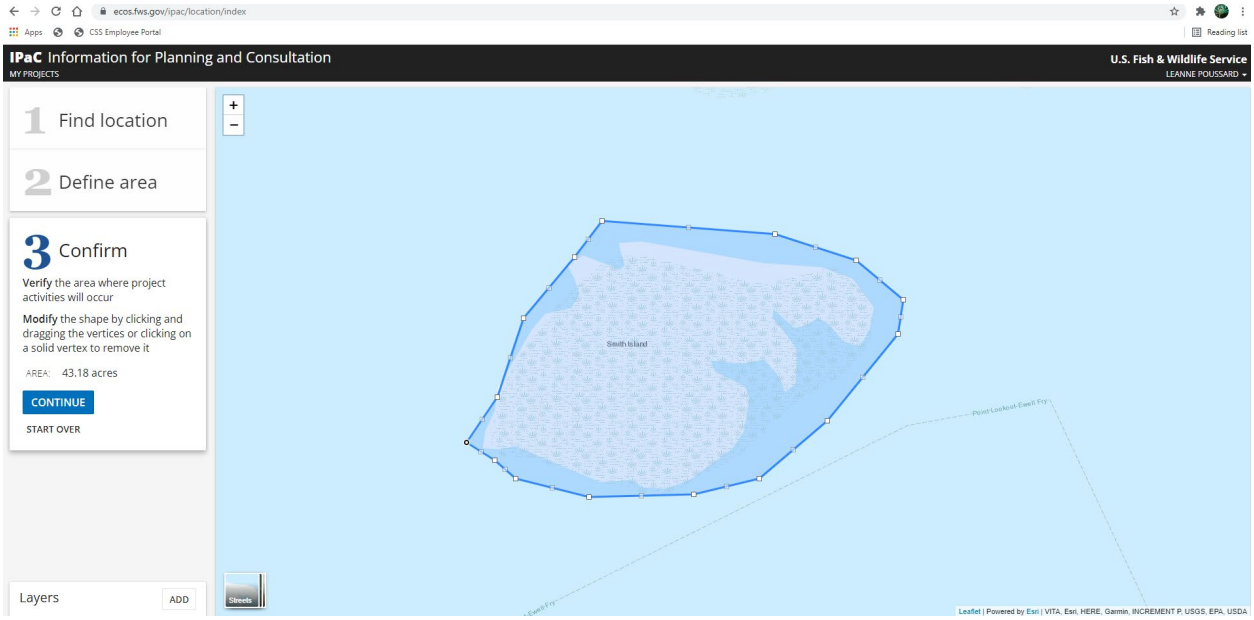
IPaC Instructions

Data from the USFWS IPaC (Information for Planning and Consultation) will be used in the project-specific checklist that accompanies this memo. This section will provide instructions for project PIs to get an endangered species list from IPaC as well as an effects determination. Links to helpful video tutorials:

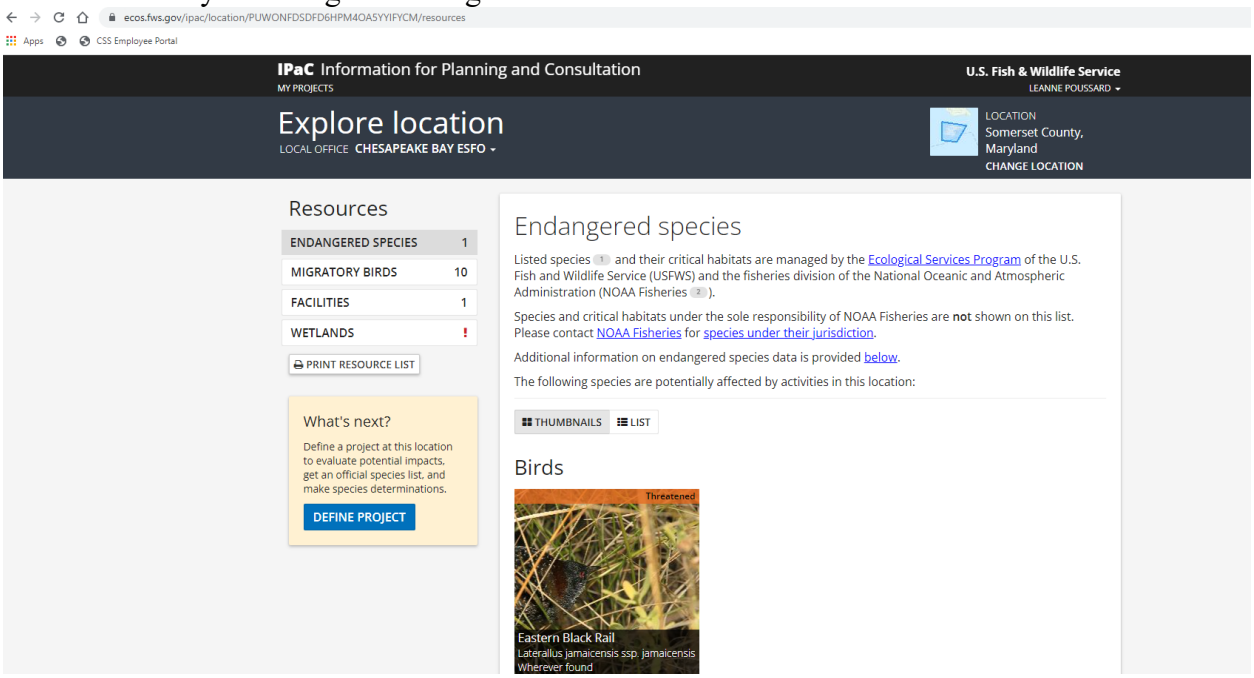
- IPaC brief: https://www.youtube.com/watch?v=kQ_qBmbJKIA
- IPaC workflow: https://www.youtube.com/watch?v=nGQAsbVWjmE
- Obtaining an official species list: https://www.youtube.com/watch?v=ylgS_UeNws4
- Determination Key demo: https://www.youtube.com/watch?v=QkamFZK8EfU
- Consultation Package Builder demo: https://www.youtube.com/watch?v=sKdUZR7zuJs&t=0s

Go to https://ecos.fws.gov/ipac/ and log in using your login.gov credentials, CAC/PIV, or create an account.
Click ‘Get Started’ button
Define your location: zoom in on your project area and draw a polygon or upload a file, and click Continue.

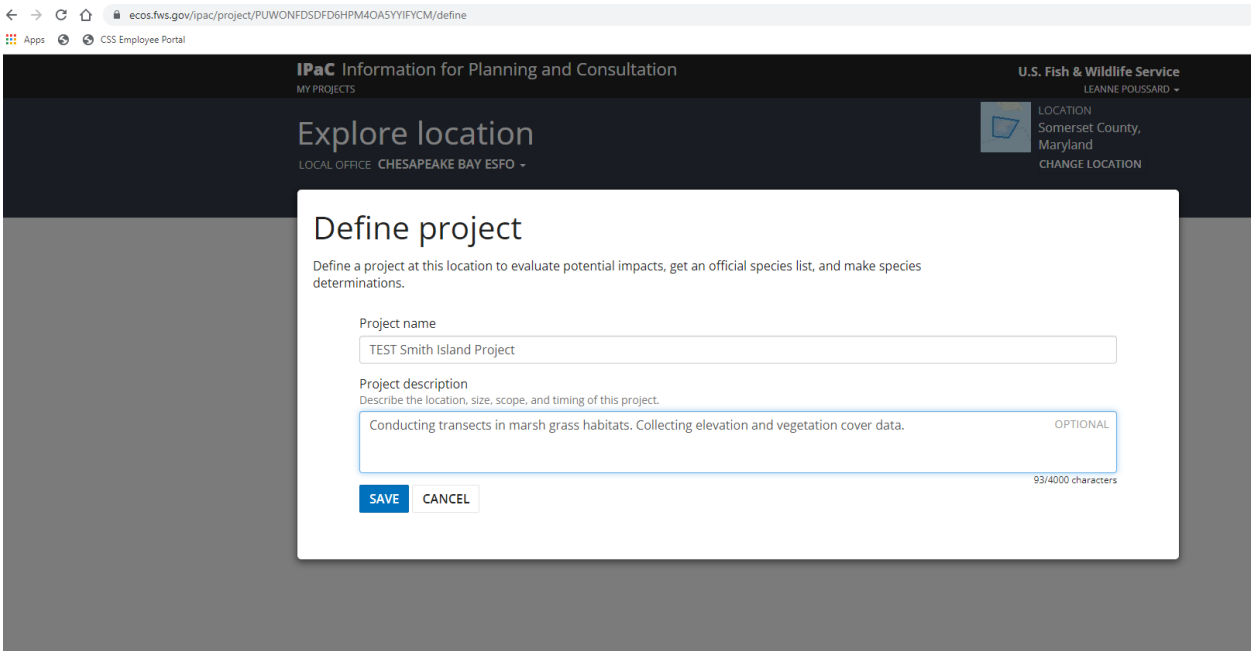




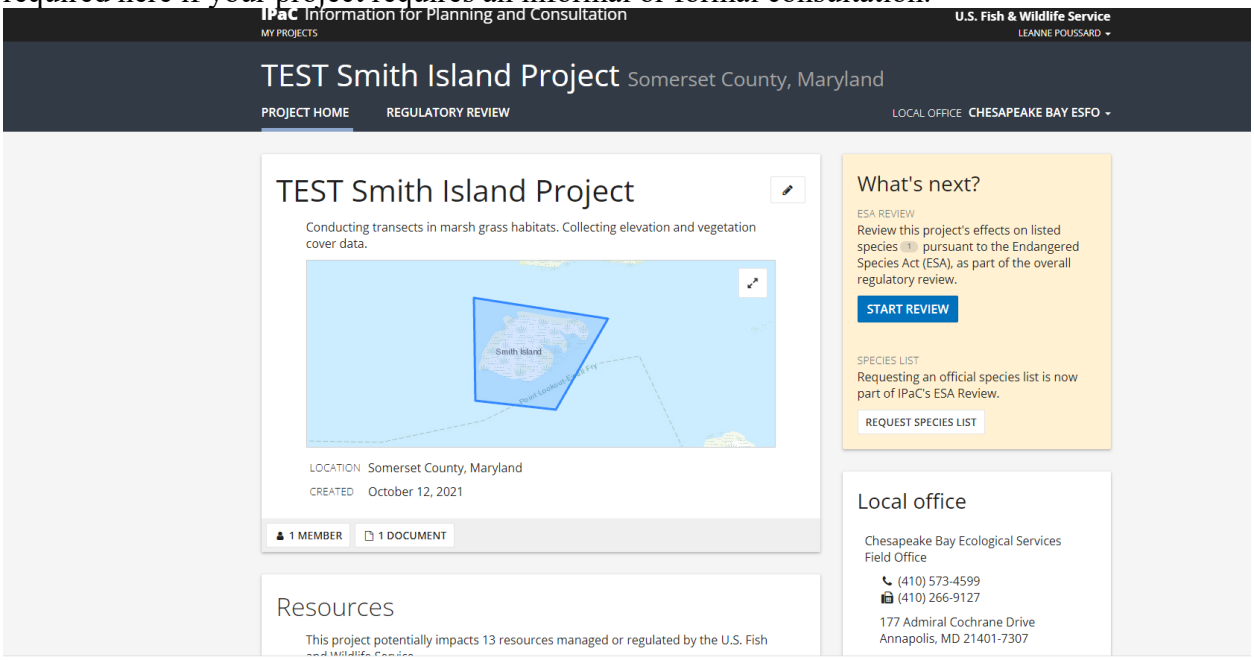
You can add layers at the bottom left to see boundaries of management areas, USFWS regions, and other survey or biological/ecological data.



Based on the location, IPaC will give you the field office and a list of ESA-listed species. Click Define Project.



Give the project a name and define the project activities if appropriate. Project activities are only required here if your project requires an informal or formal consultation.



Now you have the project page. Click Start Review.
Continue through the steps of the ESA Review, including requesting an official species list. Attach official Endangered Species list, effects determinations, and other documentation to the accompanying project-specific checklist.

Example Effects Determination Language

The effects determinations for USFWS ESA-list species will be included in the site-specific analysis after a list of species is obtained from the IPAC website. Below are some examples of effects determinations that may be helpful for the project activities described below.

Birds

IPaC will provide a list of endangered birds that may occur in the project area, such as Piping plovers, red knots, red-cockaded woodpeckers, wood stork and roseate tern. Piping plovers have critical habitat along the gulf coast of the U.S, and can be found there from July through March. There may be a number of bird species protected by the Migratory Bird Treaty Act and/or the Bald and Golden Eagle Protection Act that may occur in the project area.

Collection and Monitoring/Establishment of Small Structures

Activities associated with collection and monitoring and establishment of temporary or permanent structures would have no effect on ESA-listed birds or those protected by the MBTA. Researchers will observe the site prior to work beginning to ensure that no ESA-listed birds are disturbed as a result of project activities. If an ESA-listed bird occurs in the project area work will not begin until the bird has voluntarily left the site. Most of the ESA-listed bird species do not nest in the project action area (e.g. piping plovers, red knots) or they nest in other habitats like trees (e.g. Wood stork, red cockaded woodpecker). If a nest were to be observed of the roseate tern or other bird species it would be avoided, and work would not commence in this area. Further USFWS would be notified of the location of the nest.

Winter piping plover critical habitat may be designated within a potential project area on the gulf coast of the U.S. However, NCCOS does not usually conduct any habitat restoration work within this habitat. The primary constituent elements for the piping plover wintering habitat are those habitat components that are essential for the primary biological needs of foraging, sheltering, and roosting, and only those areas containing these primary constituent elements within the designated boundaries are considered critical habitat. If work were to occur in these areas care would be taken not to disturb piping plovers from carrying out their primary biological needs of foraging, sheltering and roosting. The installation sites for temporary elevation benchmarks would be carefully chosen to avoid birds and not be placed near any nests. Further the elevation is low and would not be attractive to predators.

Vessel Operations

Vessel operations including transit of personnel and equipment, towed camera seagrass transects, towed oyster dredge surveys and/or sample collections from a stationary vessel would not have any adverse impacts to ESA-listed birds or bird species protected by the MBTA as they would be avoided. Vessel operations are routine and used for other research purposes, and do not represent an increase in vessel traffic, noise or pollution potential above the baseline.

UAS Operations

The UAS is small and lightweight (Figure 13), equipped with an obstacle avoidance system and will be used for the purposes of photographic mapping. It will be flown by a licensed PIC from 30 to 400 feet altitude within 500m or visual line of sight. Pilot will employ BMPs to avoid disturbing birds especially nesting birds during all UAS operations. Upon reaching the project site, observers will confirm that no ESA-listed or MBTA protected birds are in the area that could be potentially disturbed. Observers will also maintain 100% observer coverage and cease operations if birds are within the flight operations area. Site specific project review will ensure that all required permits, permissions or consultations are completed prior to UAS operations commencing.

Based on this analysis NCCOS determines that habitat monitoring activities (Table 1) would not have any effects on ESA-listed birds or their critical habitat or the marsh substrate, in fact the UAS operations are the environmentally preferred option for monitoring the project area. However, a site specific review will be conducted to confirm this determination.

Flowering Plants

IPaC will provide a list of ESA-listed plant species that may occur in the project area. Note effects determinations will be documented in the site-specific analysis. Below is some example effects determination language for some of the activities in this Programmatic.

Examples may include: Avon Park Harebells, Beautiful Pawpaw, Black Lace Cactus, and American chaffseed.

Collection and Monitoring/Establishment of Small Structures – Activities associated with Collection and Monitoring and Establishment of small structures may occur in areas where ESA-listed plant species are present. However, due to the habitat characteristics of a number of plants, such as Cooley's meadowrue, pondberry, rough-leaved loosestrife and American chaffseed, it is unlikely that project activities will directly overlap with their occurrence. Many plant species are not found in tidally influenced intertidal areas but are found in freshwater ecosystems where habitat restoration work conducted and funded by NCCOS would not occur. However, as part of routine practices for this work, NCCOS staff will be able to identify and avoid disturbance to all ESA-listed plant species.

Vessel Operations

Vessel operations have no potential to adversely affect any ESA-listed plant species as there is no overlap between these activities and where ESA-listed plants occur.

UAS Operations

ESA-listed plants would not be impacted during UAS operations as access to the project sites would either be by vessel or on established roads and footpaths. NCCOS staff members also would be able to identify and avoid any of the ESA-listed plant species to ensure no impact from shore-based operations and/or placement of the targets. To be effective targets must be placed in sandy areas. The UAS are flown at elevations that would not impact any plant species.

Reptiles

It is possible the reptiles may be in the project area. If so, effects determinations will be documented in the project-specific analysis.

Collection and Monitoring/Establishment of Small Structures – Activities associated with Collection and Monitoring and Establishment of small structures are unlikely to occur in tidal areas where NCCOS conducts and funds research. However, NCCOS staff will be able to identify and avoid disturbance to ESA-listed reptile species.

Vessel Operations

Reptiles would not be exposed to vessel operations activities as these occur in locations where reptiles do not occur, thus terrestrial reptiles would not be exposed to this activity. Therefore, NCCOS determines there would be no adverse effects to ESA-listed reptiles

UAS Operations

ESA-listed reptiles would not be impacted during UAS operations as access to the project sites would either be by vessel or on established roads and footpaths. NCCOS staff members also would be able to identify and avoid any of the ESA-listed reptile species to ensure no impact from shore-based operations and/or placement of the targets. The UAS are flown at elevations that would not impact any terrestrial reptile species.

Mammals

In some areas, ESA-listed species of bats, such as the Indiana Bat or the Northern Long-eared Bat, could be included in the IPaC endangered species list. Bats primarily roost and forage in forest settings, rather than in coastal settings. Activities would not affect bat species or essential features of critical habitat as they would be avoided.

4.2 Essential Fish Habitat and Managed Species

Essential fish habitat (EFH) describes all waters and substrate necessary for fish for spawning, breeding, feeding, or growth to maturity (16 U.S.C. 1802 sec. 3(10)). EFH includes all types of aquatic habitat where fish spawn, breed, feed or grow to maturity, such as wetlands, coral reefs, seagrasses and rivers (https://www.fisheries.noaa.gov/national/habitat-conservation/essential-fish-habitat). EFH applies to federally managed species in both state and federal jurisdictional waters throughout the range of the species within U.S. waters. The designation of EFH by itself does not confer any protection of the areas from non-fishing or fishing impacts. Instead, it is a tool used by managers to reduce impacts and improve fisheries management. It is described and identified in Fishery Management Plans (FMP) that are developed by regional fisheries management councils. NMFS regional offices implement FMPs to facilitate long-term protection of EFH through conservation and management measures.

The EFH for a managed species is designated separately for each life stage: eggs, larvae (normally pelagic), juveniles, and adults (pelagic and/or demersal). For certain species EFH is also designated for spawning adults. Many species require different habitats for different life stages, which means that the EFH for a single species may cover a large geographic area. As a result, when taken over all species and all life stages, EFH occurs almost everywhere in the project action of vessel operations.

According to the NOAA Habitat Conservation EFH mapper, the action area have been identified as including EFH for more than forty five (45) species or groups of species that are covered by five (5) different FMPs (Table 7). These species include those under the jurisdiction of the Mid-Atlantic Fishery Management Council (MAFMC), the South Atlantic Fishery Management Council (SAFMC), the Gulf of Mexico Fishery Management Council (GMFMC), including highly migratory species (HMS) that are managed by the NMFS headquarters Office of Sustainable Fisheries HMS Division. Some of these species may be prohibited to retain unless authorized by applicable law.

Table 7. EFH that is designated for a taxa or group, lifestage if applicable, the Fisheries Management Plan and Jurisdictional or Management Body governing the resources (GIS Data came from this website - https://www.habitat.noaa.gov/application/efhinventory/index.html)

Taxa or group	Life Stages	Fisheries Management Plan	Jurisdictional Body or Management Council
Tunas			
Albacore Tuna	all	Amendment 10 to the 2006 Consolidated HMS FMP: EFH	NMFS
Bigeye Tuna	all	Amendment 10 to the 2006 Consolidated HMS FMP: EFH	NMFS
Bluefin Tuna	all	Amendment 10 to the 2006 Consolidated HMS FMP: EFH	NMFS
Skipjack Tuna	all	Amendment 10 to the 2006 Consolidated HMS FMP: EFH	NMFS
Yellowfin Tuna	all	Amendment 10 to the 2006 Consolidated HMS FMP: EFH	NMFS
Sharks			
Atlantic angel shark	all	Amendment 10 to the 2006 Consolidated HMS FMP: EFH	NMFS
Bigeye Thresher Shark	all	Amendment 10 to the 2006 Consolidated HMS FMP: EFH	NMFS
Spinner Shark	all	Amendment 10 to the 2006 Consolidated HMS FMP: EFH	NMFS
Night Shark	all	Amendment 10 to the 2006 Consolidated HMS FMP: EFH	NMFS
Common Thresher	all	Amendment 10 to the 2006 Consolidated HMS FMP: EFH	NMFS
Dusky Shark	all	Amendment 10 to the 2006 Consolidated HMS FMP: EFH	NMFS
Silky Shark	all	Amendment 10 to the 2006 Consolidated HMS FMP: EFH	NMFS
Sandbar Shark	all	Amendment 10 to the 2006 Consolidated HMS FMP: EFH	NMFS
Shortfin Mako Shark	all	Amendment 10 to the 2006 Consolidated HMS FMP: EFH	NMFS
Scalloped Hammerhead Shark	all	Amendment 10 to the 2006 Consolidated HMS FMP: EFH	NMFS
Great Hammerhead Shark	all	Amendment 10 to the 2006 Consolidated HMS FMP: EFH	NMFS
Tiger Shark	neonate	Amendment 10 to the 2006 Consolidated HMS FMP: EFH	NMFS

Blacktip Shark	all	Amendment 10 to the 2006 Consolidated HMS FMP: EFH	NMFS
Blacknose Shark	all	Amendment 10 to the 2006 Consolidated HMS FMP: EFH	NMFS
Smoothhound Shark Complex	all	Amendment 10 to the 2006 Consolidated HMS FMP: EFH	NMFS
Atlantic Sharpnose Shark	all	Amendment 10 to the 2006 Consolidated HMS FMP: EFH	NMFS
Bonnethead Shark	juvenile,adult	Amendment 10 to the 2006 Consolidated HMS FMP: EFH	NMFS
Sand Tiger Shark	all	Amendment 10 to the 2006 Consolidated HMS FMP: EFH	NMFS
Billfish			
Blue Marlin	all	Amendment 10 to the 2006 Consolidated HMS FMP: EFH	NMFS
White Marlin	all	Amendment 10 to the 2006 Consolidated HMS FMP: EFH	NMFS
Roundscale Spearfish	all	Amendment 10 to the 2006 Consolidated HMS FMP: EFH	NMFS
Longbill Spearfish	all	Amendment 10 to the 2006 Consolidated HMS FMP: EFH	NMFS
White Marlin	all	Amendment 10 to the 2006 Consolidated HMS FMP: EFH	NMFS
Sailfish	All	Amendment 10 to the 2006 Consolidated HMS FMP: EFH	NMFS
Swordfish			
Swordfish	all	Swordfish	NMFS
Coastal Migratory Pelagics			
King Mackerel		Coastal Migratory Pelagic	SAFMC/GMFMC
Spanish Mackerel		Coastal Migratory Pelagic	SAFMC/GMFMC
Cobia		Coastal Migratory Pelagic	SAFMC/GMFMC
Other			
Bluefish	All	Bluefish	MAFMC
Summer flounder	all	Summer Flounder, Scup, Black Sea Bass	MAFMC
Scup	all	Summer Flounder, Scup, Black Sea Bass	MAFMC
Black Sea Bass	All	Summer Flounder, Scup, Black Sea Bass	MAFMC
Snapper-Grouper		Snapper Grouper	SAFMC
Dolphin-Wahoo		Dolphin and Wahoo Fishery of the Atlantic	South Atlantic FMC
Invertebrates			
Golden Crab	all	The Golden Crab	SAFMC

Corals	all	Coral, Coral Reef and Live/Hardbottom Habitat Plan	SAFMC
Shrimp (brown, pink, rock, white)		Shrimp	SAFMC
Spiny Lobster		Spiny lobster	SAFMC
Plants			
Sargassum		Pelagic Sargassum Habitat in the South Atlantic Region	SAFMC

In the Final Habitat Plan for the South Atlantic Region (Oct 1998), the SAFMC identified estuarine inshore habitats as well as offshore marine habitats. Marine offshore habitats include live/hard bottom, coral and coral reefs, artificial/manmade reefs, pelagic *Sargassum* and water column habitat. The marine offshore habitats are not present in the project area and will not be discussed further. Estuarine inshore habitats are described in Table 8 and include estuarine emergent vegetation (salt marsh and brackish marsh), estuarine shrub/scrub (mangroves), seagrass, oyster reefs and shell banks, intertidal flats, palustrine emergent and forested (freshwater wetlands), and the estuarine water column. The project action area does overlap with these habitats with the exception of palustrine emergent and forested (freshwater wetlands).

Table 8. Essential Fish Habitat identified in FMP Amendments of the South Atlantic FMC's. Most of these habitat types are present within the gulf coast of the U.S. From this http://safmc.net/habitat-protection/final-essential-habitat-plan/

Estuarine Areas	**Occurrence within the Action Area**	**Suite of activities to be conducted**
Estuarine Emergent vegetation (salt march/brackish marsh)	Present	Collection and Monitoring 1. marsh vegetation/elevation transects 2. localized plant collections 3. percent cover quadrats 4.sediment and porewater sample collections 5.SET reading 6. Planting native vegetation Establishment of Small Structures/Sensors 1.Fiberglass or wood boardwalks 2.Class B Benchmarks 3.Temporary Benchmarks Unmanned Aerial Systems 1.Transects 30 to 400 ft altitude
Estuarine Scrub/Shrub (Mangroves)	Not Present	Not Applicable
Seagrass/Submerged aquatic vegetation	Present	Collection and Monitoring 1. Localized plant collections 2. Percent cover quadrats 3.Seagrass monitoring surveys (walking/diving transects) Vessel operations 1. transit of personnel/equipment

		2. towed seagrass video transects
Oyster Reefs and Shell Banks	Present	Collection and Monitoring 1. Oyster population surveys (walking/diving) 2. Oyster collections (by hand, tongs) Vessel operations 1. transit of personnel/equipment 2. towed oyster dredge transects
Intertidal Flats	Present	Establishment of Small Structures/Sensors 1. Hester-Dendy Samplers 2. water level or other small sensors Vessel operations 1. transit of personnel/equipment
Estuarine Water Column	Present	Vessel operations 1. vessel transit of personnel/equipment

Habitat Areas of Particular Concern (HAPC) are subsets of designated EFH and are defined as rare, particularly susceptible to human-induced degradation, especially ecologically important or located in an environmentally stressed area. Eight regional fishery management councils and NMFS have designated HAPC areas to focus conservation priorities on specific habitat areas that play a particularly important role in the life cycles of federally managed fish species. HAPC may include high value intertidal and estuarine habitats, offshore areas of high habitat value or vertical relief, and habitats used for migration, spawning and rearing of fish and shellfish (NMFS, 2004). Primary Nursery Area and the Coastal Inlets HAPC for snapper/grouper are designated with the project area.

Collection and Monitoring

Activities associated with collection and monitoring would be conducted in the following estuarine areas designated as essential fish habitat; salt marsh/brackish marsh, seagrass/submerged aquatic vegetation, oyster reefs/oyster shell banks, intertidal flats and estuaries water column (Table 8). Table 1 provides the list of activities to be conducted in each habitat type.

Below we describe potential effects by habitat type.

Salt marsh/brackish marsh - activities such as marsh vegetation and elevation transects involve walking with an RTK antenna that is carried by a person or attached to a modified bicycle to glide over marsh topography collecting measurements. Marsh vegetation transects involve walking along a meter tape transect approximately 50 to 100 meters and randomly (or at set intervals) collecting percent cover quadrats, plant, sediment and porewater cores along the transect. The number of transects depends on the area of the site but usually does not exceed three (3). No more than 60 marsh plants, sediment and porewater cores will be collected from each site per year. Plant, sediment and porewater cores would have temporary and localized direct effects to the marsh surface. Sizes of the cores and the amount of material collected is

small and any holes left in the substrate fill in within hours to days. In addition, core collections are spaced at least 1 meter apart, but are usually more. The amount and type of marsh material collected would be determined by site specific analysis and the associated permits (if needed) for this work.

Quadrats and meter tapes on the marsh surface have no discernible effects on the marsh surface. SET reading takes no more than 10 minutes and involves temporarily placing a SET apparatus on a permanent benchmark to measure the contours of the sediment surface. Personnel doing the reading usually do so from a temporary or permanent boardwalk to avoid impacts to marsh surface. In some cases planting of native vegetation that matches the species of adjacent marsh may be required for restoration purposes. Practices generally involve installing plugs of nursery reared plants on 1-meter intervals according to established protocols. There may be temporary direct effects to sediment surface from planting activities that could last on the order of days. Long term beneficial impacts include increases in aerial cover of the marsh habitat.

Seagrass/submerged aquatic (SAV) vegetation – Seagrass/SAV (hereafter seagrass) transects involve walking or diving/snorkeling along a meter tape transect approximately 50 to 100 meters and randomly (or at set intervals) collecting percent cover quadrats and seagrass cores along the transect. The number of transects depends on the area of the site but usually does not exceed three (3). Approximately 30 plant cores may be collected from each site per year. Plant cores would have temporary and localized direct effects to the seagrass/SAV bed. However, the small size of the cores and the amount of material collected have only localized and temporary impacts and fill within hours to days. In addition, core collections are spaced at least 1 meter apart, if not more. Quadrats and meter tapes on the plant/sediment surface have no discernible effects on the seagrass substrate. The amount and type of seagrass/SAV collected would be determined by site specific analysis and the associated permits (if needed) for this work.

Oyster Reefs and Shell Banks – Oyster population surveys involve walking or snorkeling along a transect or predetermined area to survey percent cover and estimate abundance of oysters within a 0.5 to 1 m^2 quadrat. There are no indirect or direct effects to the integrity of oyster reefs and shell banks with this method. Localized collections of oysters may be conducted by hand, tong or by towing an oyster dredge. The oyster dredge is towed from the side and behind a small shallow draft vessel in a circular pattern or in a transect around the "site center" for a period of only 1 to 2 minutes in the bottom. This would only occur once annually at appropriate sites. Anecdotal evidence suggests that disturbance from a small-scale dredge may be beneficial for clams and oyster settling. The concept of “marine soil cultivation” using dredges, rakes, and tongs has long been advocated by the shellfish industry to loosen and oxygenate sediments and to remediate unoxygenated and heavily silted bottom devoid of shellfish. The anecdotal information suggest that the dredging (as harsh as the word may sound), may improve the oyster population and the reef. The hypothesis is that it breaks up of "the reef" allows the young oysters to grow to a larger size and provides hard substrate for the attachment of the next year's spat. Observations suggest that without the physical separation the reef may become congested, oysters will be confined in their size, the reef becomes a consolidated mass and no longer fishable. A NOAA NMFS report indicated that small scale dredging on oyster reefs may increase biodiversity (Mercaldo-Allen and Goldberg, 2011). Therefore direct and indirect impacts are temporary and localized using this method, especially as it would not be employed at all sites. Further, the amount and type of

oysters collected including the method used will be determined by site specific analysis and the associated permits (if needed) for this work.

Establishment of Small Structures

Establishment of small temporary or permanent structures may occur in salt marsh/brackish marsh or intertidal flats.

Salt marsh/brackish marsh - In marshes this may include installation of temporary boardwalks, class B or temporary benchmarks or SETs. There may be temporary and localized direct and indirect impacts to marsh vegetation from SETs, boardwalk and the elevated benchmark installation. However, permanent boardwalks are designed to allow light to penetrate to the marsh plants, not impede their growth and prevent long-term impacts to marshes by minimizing trampling of vegetation after repeated site visits (Figure 8, 9). Installing SETs has an even more localized footprint. Temporary boardwalks are installed at the start of the day and removed at the end to minimize impacts of human traffic on the marsh surface (Figure 6) Temporary localized direct and indirect impacts to marsh vegetation may occur with the installation of temporary and permanent benchmarks. However, it only takes 15 to 30 minutes to install and once in place the areal footprint (6 x 6 inches) and elevation profile are limited (< 6 inches) (Figure 8, 9).

Seagrass/submerged aquatic (SAV) vegetation – No benchmarks or other structures would be installed in seagrass habitats. Hesty-Dendy samplers and water level sensors would be located within a sandy area adjacent to seagrass beds and would not impact the seagrasses in this location.

Intertidal flat habitats – Hester-Dendy samplers may be placed within intertidal flat habitats in waters less than 3 feet deep, but possibly closer to 1-2 feet of water depth, in the nearshore environment adjacent to the marsh site. The footprint of these samplers is no larger than a cinder block and would be removed after 2-3 months deployment. Water level sensors may be installed within intertidal flat habitats. Direct effects would be limited to a 2 x 2 “area of disturbance where the PVC pipe is pushed into the sediment surface by hand. The sensor is approximately 6 inches long and 2 inches wide and would be attached via cable tie above the sediment surface to avoid interactions with the substrate. The deployment of these sampling devices would be temporary and their spatial footprint localized, thus having no discernible effect on intertidal habitats.

Vessel Operations

Vessel operations including transit of personnel and equipment, towed camera seagrass transects, towed oyster dredge surveys and/or sample collections from a stationary vessel.

Seagrass/SAV Habitat - Vessel operations include transit over the seagrass bed and towed video transects to estimate seagrass cover over a large area. Transit would not have any direct or indirect effects as no contact is made with the sediment surface. Video transects involve slowly towing a roller trawl outfitted with an underwater camera approximately 50 meters behind the boat or running slow transects with camera mounted near transducer or side of the shallow draft vessel. The roller trawl would have temporary direct and indirect effects to the seagrass bed through contact with the substrate. However, it is designed to roll smoothly over the seagrass

blades. This technique is routine and has been shown to have no discernible impact on the above or below ground part of the plants.

Oyster Reef and Shell Banks - Vessel operations may include transit over the oyster reefs and towing of an oyster dredge to collect a small amount of oysters. Transit would not have any direct or indirect effects as no contact is made with the oyster reefs. As described above oyster collections using a small oyster dredge towed behind the vessel would have only localized and temporary effects to the oyster substrate.

Intertidal flat habitats - Vessel operations such as transit over intertidal flat habitats would have no direct or indirect effects as there would be no contact with the substrate.

UAS Operations

UAS operations would have no direct or indirect impacts to marsh, seagrass, oyster reef or intertidal flat habitats as they would be flown at altitudes of 30 to 400 feet above them and there would be no contact. Further target placement would only occur in sandy unvegetated areas and are removed at the end of flight operations each day. Targets are small (10 inch diameter) and pose no potential to impact EFH.

Therefore, NCCOS determines that due to the low-impact nature of UAS operations (no direct contact with EFH) there is no potential to adversely impact EFH, managed species or HAPCs. No managed species, with the exception of a small number of oysters may be collected as part of this research activities.

4.3 Managed and Protected Areas

Managed and protected areas, such as Marine Protected Areas (MPA), National Wildlife Reserves (NWRs) National Estuarine Research Reserves (NERR) may be within the action area of a project that occurs on the Gulf Coast. These areas may require researchers to receive permits prior to beginning work. Information about protected areas and permit requirements will be provided in the project-specific checklist. Site specific analysis of projects will ensure that appropriate permits and permissions for work conducted in these protected areas are obtained prior to work beginning.

4.4 National Marine Sanctuaries Act

Section 304(d) of the National Marine Sanctuaries Act requires interagency consultation between NOAA and federal agencies taking actions, including authorization of private activities, “likely to destroy, cause the loss of, or injure a sanctuary resource.” In addition, federal agencies are required to consult on proposed actions that “may affect” the resources within National Marine Sanctuaries.

The Florida Keys National Marine Sanctuary (FKNMS) (Figure 22) is in the Gulf of Mexico area where projects could occur. No prohibited activities will be conducted within the National Marine Sanctuary. Site-specific analysis will confirm that all permits and/or permissions will be obtained as needed. Sanctuary regulations can be found at https://floridakeys.noaa.gov/regs/.

Figure 22. Florida Keys National Marine Sanctuary boundary shown in purple polygon

4.5 National Historic Preservation Act

Section 106 of the National Historic Preservation Act of 1966 (NHPA) (54 U.S.C. § 300101 et seq.) requires federal agencies to take into account the effects of their undertakings on historic properties in accordance with regulations issued by the Advisory Council on Historic Preservation (ACHP) at 36 C.F.R. Part 800. The regulations require that federal agencies consult with states, tribes, and other interested parties (consulting parties) if project activities have any potential to impact cultural resources. The site-specific analysis will ensure that no cultural resources will be impacted by project activities. The National Park Service's cultural resources data layer will be consulted as will the State Historic Preservation Officer if there is any potential to adversely impact cultural resources (National Park Service website)

4.6 Section 404 Clean Water Act/Section 10 Rivers and Harbors Act

Any person or agency (including federal, state, and local government agencies) planning to work in jurisdictional waters of the United States, or discharge (dump, place, deposit) dredged or fill material in waters of the United States, including wetlands, must first obtain a permit from the U.S. Army Corps of Engineers (USACE), under section 404 of the Clean Water Act and section 10 of the Rivers and Harbors Act of 1899. A proposed project's impacts to these areas will determine what permit type is required. Site specific analysis will be conducted to ensure all required USACE permits are obtained prior to work starting.

A full listing of districts is found at http://www.usace.army.mil/Locations/
Summary list of Nationwide Permits can be found at:
https://usace.contentdm.oclc.org/utils/getfile/collection/p16021coll7/id/6711
Detailed description of Nationwide Permits can be found at:
https://usace.contentdm.oclc.org/utils/getfile/collection/p16021coll7/id/8593

4.7 Coastal Zone Management Act

The federal consistency provision of the Coastal Zone Management Act (CZMA, 16 U.S.C. § 1451) requires federal actions (inside or outside a state's coastal zone) that affect any land or water use or natural resource of a state's coastal zone, to be consistent with the enforceable policies of the state coastal management program (CMP).

This action falls within subpart C (Federal agency activities) and subpart F (Federal Financial Assistance).

Subpart C covers activities and development projects performed by a federal agency, or a contractor for the benefit of a federal agency.

Subpart F is when a state agency or local government applies for federal financial assistance. States list in their CMPs the federal assistance activities subject to federal consistency review. If an applicant is required to submit a Consistency Certification to a state, then the federal agency cannot issue the federal assistance unless and until the state has concurred with the applicant's Consistency Certification or concurrence is presumed.

Based on the analysis of project activities and the employment of BMPs described in Section 7, NCCOS determines that this action will not have reasonably foreseeable effects on coastal use or resources. In the accompanying project-specific checklist, the Federal Consistency activities by state, will be examined to determine if proposed activities are the lists. (https://coast.noaa.gov/czm/consistency/states/).

5.0 Permitting and Site-Specific Analyses

Depending on the regulatory authority overseeing the jurisdiction. various permits may be required when conducting habitat monitoring activities in subtidal and intertidal habitats and/or working in managed and protected areas, and conducting UAS operations. Site specific analysis of each project will ensure that all appropriate consultations, permits and permissions are obtained, if needed.

6.0 Extraordinary Circumstances

Project activities described above are temporally and spatially limited within tidally influenced wetlands and adjacent subtidal waters on the gulf coast of the U.S. Most projects will conduct a subset of the activities described above, in a single project or site visit. The suite of activities described here represent the broadest possible actions to be conducted as part of NCCOS's Habitat Monitoring activities. Based on the limited temporal and spatial extent of the activities, incorporation of best management practices and the analysis in the Project specific checklist, project activities would have negligible or beneficial effects on areas with unique environmental characteristics, on geographically or ecologically critical areas, (sanctuaries, wetlands, watersheds), and National Historic Sites. We also determine no adverse impacts to marine mammals, essential fish habitat (marsh, wetlands, seagrasses), ESA-listed and MBTA protected birds that are not negligible or discountable.

Further, Vessel operators have decades of experience working in the field locations and will employ Best Management Practices (BMPs, Section 7) to avoid interactions with protected species; such as 100% observer coverage (operator may double as observer), minimum approach distances and reducing speed if protected species (e.g. sea turtles, marine mammals) are observed. In addition, there is no potential to contribute to the introduction, continued existence or spread of non-native species as only native species would be used in planting activities and gear used would be local to the area or rinsed thoroughly between water bodies as appropriate. Project activities would not result in a disproportionately high and adverse effect on the health or the environment of minority or low-income communities, compared to the impacts on other communities (EO 12898).

There would be no adverse effects on human health or safety that are not negligible or discountable. No chemicals would be transported as a result of this work and laboratory activities abide by the appropriate SOPs, as applicable to the activity and the facilities abide by all safety and disposal regulations such as; waste chemicals are disposed of through a licensed hazardous waste Treatment, Storage, and Disposal (TSD) facility and transported by a licensed transportation contractor. Therefore, there is no potential to generate, use, store, transport, or dispose of hazardous or toxic substances in a manner that may have a significant effect on the environment.

Finally, there are no uncertain environmental impacts or unknown risks as project activities and methods are routinely used for the purposes of research. Therefore these actions are not uncertain, unique or unknown, have no potential to establish a precedent for future action or to be controversial or to have cumulative impacts when combined with other past, present or reasonably foreseeable future actions. There is no potential to violate Federal State or local laws or requirements imposed for the protection of the environment.

Thus as confirmed by the project-specific checklist, there are no extraordinary circumstances present that may require further analysis in an Environmental Assessment (EA) or Environmental Impact Statement (EIS).

7.0 Best Management Practices

The following BMPs should be employed where applicable, incorporated into project instructions and communicated to the vessel operator and field party.

1. During transit a vessel operator and crew will maintain a look out for protected species and reduce speed as necessary to avoid protected species.

2. Upon sighting, vessel operator will maintain minimum approach distances for:
    a. Cetaceans:
        i. 200 yards from large whales,
        ii. 100 yards from all other species.
    b. iii. Sea turtles: 50 yards
    c. Sawfishes: 50 yards
    d. Sturgeon: 50 yards

e. Manatees: 50 yards

3. Minimize vessel disturbance and ship strike potential
    a. Reduced speeds (<13 knots) when ESA-listed cetaceans are sighted (unless otherwise required, e.g., NOAA Sanctuaries);
    b. Reduced speeds (<13 knots) while transiting through designated critical habitat (unless slower speeds are required, e.g., < 10 knots in right whale critical habitat and management areas);
    c. Trained observers aboard all vessels; 100% observer coverage; and
    d. Species identification keys (for marine mammals, sea turtles, corals, abalone, and seagrasses) available on all vessels.

4. Minimize impacts to seagrasses and other Essential Fish Habitat (EFH) by:
    a. Anchoring in mud or sand (avoid seagrass or other EFH)
    b. Minimizing anchor drag (i.e. provide adequate scope)
    c. Avoid grounding by raising prop or reducing speed as necessary

5. Avoid disturbance of birds especially nesting birds. Know how to identify the species of threatened and endangered birds in the area and avoid them. Also, as applicable consult the Nationwide Standard Conservation Measures for activities.
    a. Avoid disturbance of Piping Plovers and all nesting birds
    b. Give birds plenty of space, let them feed and rest
    c. Respect posted areas. Disturbances to nesting birds can cause entire colonies to fail.
    d. Don't feed gulls or other wildlife
    e. Do not disturb wrack line areas where birds are roosting

6. Avoid disturbance of Sea Turtles on land, (from USFWS)
    a. avoidance of known or marked nesting sites
    b. avoid creation of deep ruts on the beach during stranding/rescue actions;
    c. avoid any night time work (if night time work is necessary then use minimal lighting and do not disturb nesting turtles or hatchlings if encountered)
    d. remove all material from beach when work is complete

7. Avoid disturbance of endangered plant species during all activities
    a. Be able to identify endangered plants species that may occur in the project area and avoid trampling or disturbing them during monitoring activities.

8. If conducting activities within protected or managed areas such as US National Wildlife Refuges, Federal/State Parks or National Estuarine Research Reserves ensure activities are permissible and all appropriate permits are in place prior to starting field work.

9. Injured or Dead Protected Species Reporting.
    a. In the unlikely event of an animal death or injury, vessel operators should immediately contact USFWS staff or NMFS staff, as applicable.

b. If the NOAA vessel is responsible for the injury or death, the responsible parties will remain available to assist, as needed. Vessel operators must report the following information to the NMFS Regional Office immediately:
    i. the time, date, and location (latitude/longitude) of the incident;
    ii. the name and type of the vessel involved;
    iii. the vessel's speed during the incident;
    iv. a description of the incident;
    v. water depth;
    vi. environmental conditions (e.g., wind speed and direction, sea state, cloud cover, and visibility);
    vii. species identification or description of the animal, if possible; and the fate of the animal.

10. Uncrewed Aerial Vehicles (UAV)
    a. Conduct a pre-flight check for birds and sea turtles in the flight area prior to UAV take-off. If these animals are observed in your flight airspace, wait until they depart before initiating take-off.
    b. Provide a 100ft buffer from areas where birds are present. This includes on land, nearshore, or on the water.
    c. If one or more migratory birds or non-migratory birds or other wildlife is suspected of being disturbed in the air during airborne operations, wait until this wildlife clear the flight area. Attempt operations again using more conservative parameters such as different approach angle, different time of day, etc. If a second incident occurs, conduct no further UAV operations for this day.
    d. If one of more threatened or endangered bird(s) or sea turtles are suspected of being disturbed in/around its nest, and/or if disturbance occurs during nesting season, conduct no further UAS operations.
    e. Flight Operations Roles/Responsibilities/Qualifications
        i. Clear roles and responsibilities, as outlined below, will be maintained for all UAS operations. At a minimum, there must be two individuals at all times present during operations to fulfill specified ground control system (GCS) operation of the UAS and "see and avoid" roles/responsibilities.
            1. PM: The project manager (PM) will be focused on managing and coordinating the work of the project team, including the PIC, VO, and TA
            2. PIC: The pilot-in-command (PIC) functions as the "internal pilot" and will be present during any and all UAS and ASV operations. The PIC will have responsibility for aircraft system preparation, launch, airborne operations, landing, and preventative maintenance. The PIC is the individual responsible for the remote control of the aircraft. When at survey altitude, the operator may cede control of the aircraft to the autopilot, which will be programmed to follow a predetermined survey path.
                a. The PIC is also tasked with overall responsibility for safe execution of the mission. It is the PIC's responsibility to ensure that all participants understand and can properly perform their specific roles for the flight. The PIC is

additionally responsible for ensuring all documentation, including pre-and post-flight briefs are conducted. The PIC is charged with ensuring adherence to all SOP and checklist requirements.

3. VO: The visual observer (VO) is an external observer for "see and avoid" purposes. The VO is tasked with supporting the PIC as appropriate, including coordinating with local partners on logistics, and mobilizing and demobilizing gear.
4. TA: The role of the technical advisor (TA) is to review and comment on the project objectives and instructions, and to help execute these instructions as appropriate.

ii. Communications

1. No flight or survey operations shall commence until the proper procedures communication has been established
2. PIC shall announce when the UAS is about to takeoff or land to alert personnel
3. PIC shall announce when the UAS is about to be launched or recovered to alert personnel
4. PIC will have access to an aviation band radio and be able to monitor aviation guard (121.5) during all operations.

iii. Flight restrictions and conditions

1. Operations will not be conducted if:
    a. Ceiling less than 800m
    b. Visibility less than 1.5km
    c. Windspeed greater than 15kts
    d. Light rain
    e. Presence of people in UAS operational area
    f. Marine mammals, sea turtles, or bird activity detected in the operational areas
2. PIC will brief all participants on safe zones for launch and landing.
3. Minimum/Maximum Flight Altitudes in airspace shall be defined as "minimum flight altitude of 30ft, maximum flight altitude of 400ft."
4. . Max distance from GCS will be line of site (estimated at 500m), weather permitting.
5. Any non-participating aircraft encountered will be avoided as much as possible. Operations are limited to ensure proper separation from manned aircraft.
6. Routine maintenance checks must be performed before and after each flight.
7. Batteries must be charged or replaced as needed.
8. Flight data from the ground control station must be reviewed after each flight as necessary to ensure safe operation for subsequent flights.
9. PIC to maintain safe flight or terminate flight if unable

iv. Mission Plans

1. Prior to a flight, a mission briefing shall be developed by the PIC with input and review from the participants. The PIC will conduct a briefing to include:
    a. Marine mammal and bird activity
    b. Weather
    c. Safety
    d. Status of equipment and personnel
    e. Communications plan
    f. Objectives
    g. Other relevant information as necessary
2. The survey will typically consist of launch, flight to altitude, perform survey/data collection, approach for landing, and landing/recovery. Expected individual flight duration will vary with what is being observed. Maximum flight or survey time is approximately 30 minutes.

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