Gulf Sturgeon Consultation Framework
NOAA Fisheries Southeast Regional Office

Revised August 2022

Purpose and Scope

In order to inform the Region's consultation activities regarding the Gulf sturgeon, this document consolidates and interprets information obtained through the recent listing process and collected through collaboration with state, federal, and university partners. This collection of information provides Section 7 assistance, and identifies early conservation/recovery concepts to be considered during consultation. The content is intended to summarize best available information as well as facilitate integration of conservation/recovery considerations into our routine consultation practices. A large quantity of data was synthesized in the production of this document and as such it should be considered a job aid and used as general guidance only.

Description

- Weight: Up to 175 kilograms (385 pounds)
- Length: Up to 275 centimeters (9 feet); females grow larger than males
- Age: Long-lived (50 years), late-maturing (7-21 years old); age at maturity varies between sexes
- Anadromous: Spawn in freshwater, then migrate to feed and grow in estuarine/marine (brackish/salt) environments
- Diet: Generalist benthic suction feeders that eat amphipods, lancelets, polychaetes, gastropods, ghost shrimp, isopods, mollusks, and/or crustaceans.
- Distinctive characteristics (Image 1): A teleost (bony fish) with a heterocercal caudal fin (top lobe of tail fin larger than bottom lobe of tail fin) similar to that of sharks, and an elongated spindle-like body that is smooth-skinned, scale-less and armored with 5 lateral rows of bony plates called scutes. They have 4 barbels (sensory organs) that precede their wide, toothless, and ventral-facing (bottom-facing) mouths. The Gulf sturgeon is almost impossible to visually differentiate from the Atlantic sturgeon. DNA analysis is the most

Image 1. A Gulf sturgeon (sturgeon caught in accordance with state and Federal permits)

reliable method to distinguish between these species when the capture site is unknown.

- See Table 1. For life history, ecology, and habitat use of life stages under NMFS purview.

Range and Distribution

Gulf sturgeon can be found from the mouth of the Mississippi River to Tampa Bay, but the core of their range is from Lake Pontchartrain in Louisiana to the Suwanee River in Florida. In the Gulf of Mexico (GOM), Gulf sturgeons inhabit the nearshore marine waters around barrier islands. Use of deeper waters beyond the barrier islands (e.g., depths greater than 25 meters) is not well studied or understood but no Gulf sturgeon have been documented beyond the 50 meter isobath highlighted in green in Figure 2 . Biologists should consider whether Gulf sturgeon may be affected when conducting Section 7 consultations on projects occurring in yellow, orange, and green highlighted areas in
Figure 1.

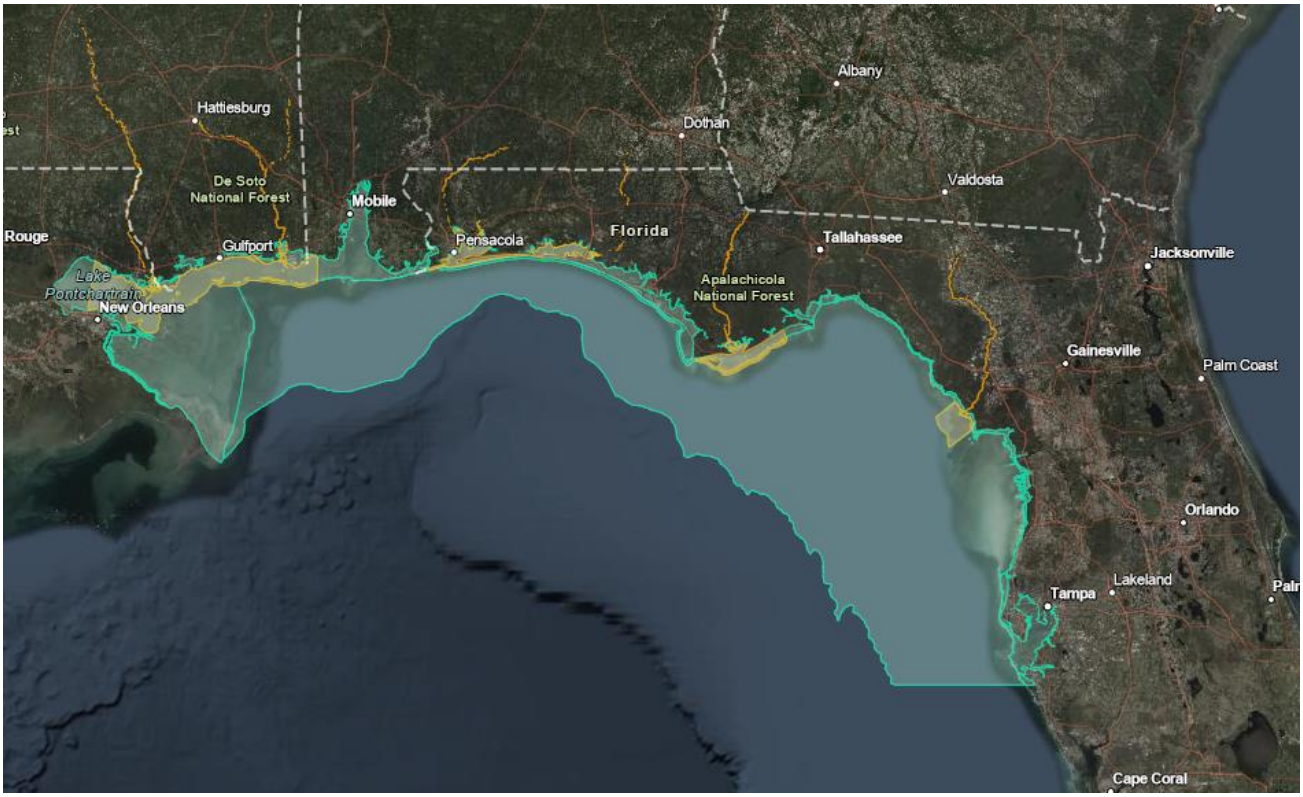

Figure 1. Gulf sturgeon range and distribution. Areas highlighted in yellow are estuarine and marine designated critical habitat units, areas highlighted in orange are riverine designated critical habitat units, and areas highlighted in green include estuarine and marine areas Gulf sturgeon may be found outside of their critical habitat.

Table 1. Life History/Ecology/Habitat Use of Life Stages under NMFS Purview.

Life stage	Size (Parauka et al. 2011)	Habitat
Juveniles	30.5 – 89.0 cm FL	1. River systems, including the lower portion near river mouths and upper estuaries 2. In the fall, move from the rivers to upper estuaries where they feed.
Subadult	89.1 – 125.0 cm FL	3. May occupy all habitats (i.e. rivers, estuaries, bays, waters surrounding barrier islands, and GOM) 4. In the spring, move from estuary/marine environment into rivers later than adults. 5. In the fall, move from rivers to estuaries/marine environments with adults. 6. Do not feed while in rivers. Feed in estuary/marine environment.
Adults	> 125.0 cm FL	7. Approximately March-October in rivers; Spawning adults migrate up rivers to hard-bottom areas to spawn and then move back down river to holding areas that provide thermal refuge; Research indicates that Gulf sturgeon do not forage while in rivers. 8. Approximately October-March in estuary/marine environments where they feed.

NOTE: At least one life stage of Gulf sturgeon may be present in all habitats year round. Abbreviations are: cm = centimeters, FL = fork length

Eastern Gulf of Mexico vs. Western Gulf of Mexico (GOM) Habitat Use

- Eastern GOM: Fox et al. (2002) found that Gulf sturgeon in Choctawhatchee Bay, Florida, primarily occupied shoreline depths 2-4 meters (7-13 feet) characterized by low relief sand substrate.
- Western GOM: Peterson et al. (2013) determined that sediment characteristics in Mississippi Sound appear to influence forage composition and, thus, juvenile and sub-adult Gulf sturgeon habitat use.

Bottom line: Sandy substrate and depth is important for determining Gulf sturgeon habitat use in the eastern GOM; Gulf sturgeon forage in silt areas and tend to stay near the shore or around barrier islands and the passes between those islands in the western GOM; Gulf sturgeon are not known to forage on hard-bottom in either region.

Listing Status and Jurisdiction

- Gulf sturgeon were listed as threatened on September 30, 1991 (56 FR 49653), which became effective on October 30, 1991.

- Jointly managed by the U.S. Fish and Wildlife Service (USFWS) and the National Marine Fisheries Service (NMFS).
  - NMFS has jurisdiction in the estuarine and marine environments; USFWS has jurisdiction in riverine environments, starting at river kilometer 0 (0 RKM).
    - Based on consultation history, the following areas are marine environments: Mississippi Sound (Unit 8), Nearshore Gulf of Mexico (Unit 11), and Suwannee Sound (Unit 14).
    - Based on consultation history, the following areas are estuarine environments: Lake Pontchartrain (Unit 8), Pensacola Bay (Unit 9), Santa Rosa Sound (Unit 10), Choctawhatchee Bay (Unit 12), and Apalachicola Bay (Unit 13).
  - In estuarine units, we divide consultation responsibility based on the action agency involved.
    - The USFWS is responsible for all consultations regarding Gulf sturgeon and its critical habitat with the Department of Transportation (DOT), the Environmental Protection Agency (EPA), the U.S. Coast Guard (USGC), and the Federal Emergency Management Agency (FEMA).
    - NMFS is responsible for consultation on Gulf sturgeon and its critical habitat with the Department of Defense (DOD), U.S. Army Corps of Engineers (USACE), Minerals Management Service (MMS; now known as Bureau of Ocean Energy Management (BOEM) and any other federal agencies not mentioned here explicitly (50 CFR 226.214).
- The Recovery/Management Plan became effective September 1995. Examples of recovery action Tasks are provided below in Tables 2 and 3. Citation: USFWS and GSMFC. 1995. Gulf sturgeon (*Acipenser oxyrinchus desotoi*) recovery/management plan. U.S. Department of the Interior, Fish and Wildlife Service and Gulf States Marine Fisheries Commission, Atlanta, GA.

Table 2. Selected recovery action 'Task #' descriptions: Implementation Schedule for Gulf Sturgeon Recovery Actions in USFWS and GSMFC (1995)

Task #	Task Description
1.1.2	Characterize riverine, estuarine, and neritic areas that provide essential habitat
1.2	Conduct life history studies on the biological and ecological requirements of little known or inadequately sampled life stages
1.3.1	Develop and implement standardized population sampling and monitoring techniques
1.3.2	Develop population models
1.5.1	Conduct a Gulf-wide genetic assessment to determine geographically distinct management units
2.1.1	Increase effectiveness and enforcement of state and federal take prohibitions

Task #	Task Description
2.1.2	Reduce or eliminate incidental mortality
2.2.1	Identify potentially harmful chemical contaminants and water quality and quantity changes associated with surface water restrictions
2.2.2	Identify and eliminate potentially harmful point and non-point sources of chemical contaminants
2.2.4	Identify and eliminate known and potential impacts to water quantity and quality associated with existing and proposed developments, agricultural uses, and water diversions in management units
2.4.4	Identify potential modifications to specific navigation projects to minimize impacts which alter riverine habitats or modify thermal or substrate characteristics of those habitats

Critical Habitat

- Critical habitat was designated on March 19, 2003 (68 FR 13370), and become effective April 18, 2003 (Figure 2).
- 14 units of critical habitat:
  - 7 riverine - Pearl, Pascagoula, Escambia, Yellow/Blackwater, Choctawhatchee, Apalachicola, and Suwannee rivers; managed by USFWS.
  - 7 estuarine/marine - Lake Borgne to Mississippi Sound, Pensacola Bay, Santa Rosa Sound, Nearshore Gulf of Mexico, Choctawhatchee Bay, Apalachicola Bay, and Suwannee Sound.
  - NMFS has jurisdiction in the estuarine and marine environments to RKM 0.
  - NMFS and USFWS split jurisdiction based on the action agency (see species “Listing Status and Jurisdiction” above).
- The primary constituent elements (PCEs) essential for the conservation of Gulf sturgeon are those habitat components that support feeding, resting, and sheltering, reproduction, migration, and physical features necessary for maintaining the natural processes that support these habitat components. The PCEs relevant to estuarine and marine areas are:
  1. Abundant prey items within estuarine and marine habitats and substrates for juvenile, subadult, and adult life stages;
  2. Water quality, including temperature, salinity, pH, hardness, turbidity, oxygen content, and other chemical characteristics, necessary for normal behavior, growth, and viability of all life stages;
  3. Sediment quality, including texture and other chemical characteristics, necessary for normal behavior, growth, and viability of all life stages; and

4. Safe and unobstructed migratory pathways necessary for passage within and between riverine, estuarine, and marine habitats (e.g., a river unobstructed by any permanent structure, or a dammed river that still allows for passage).

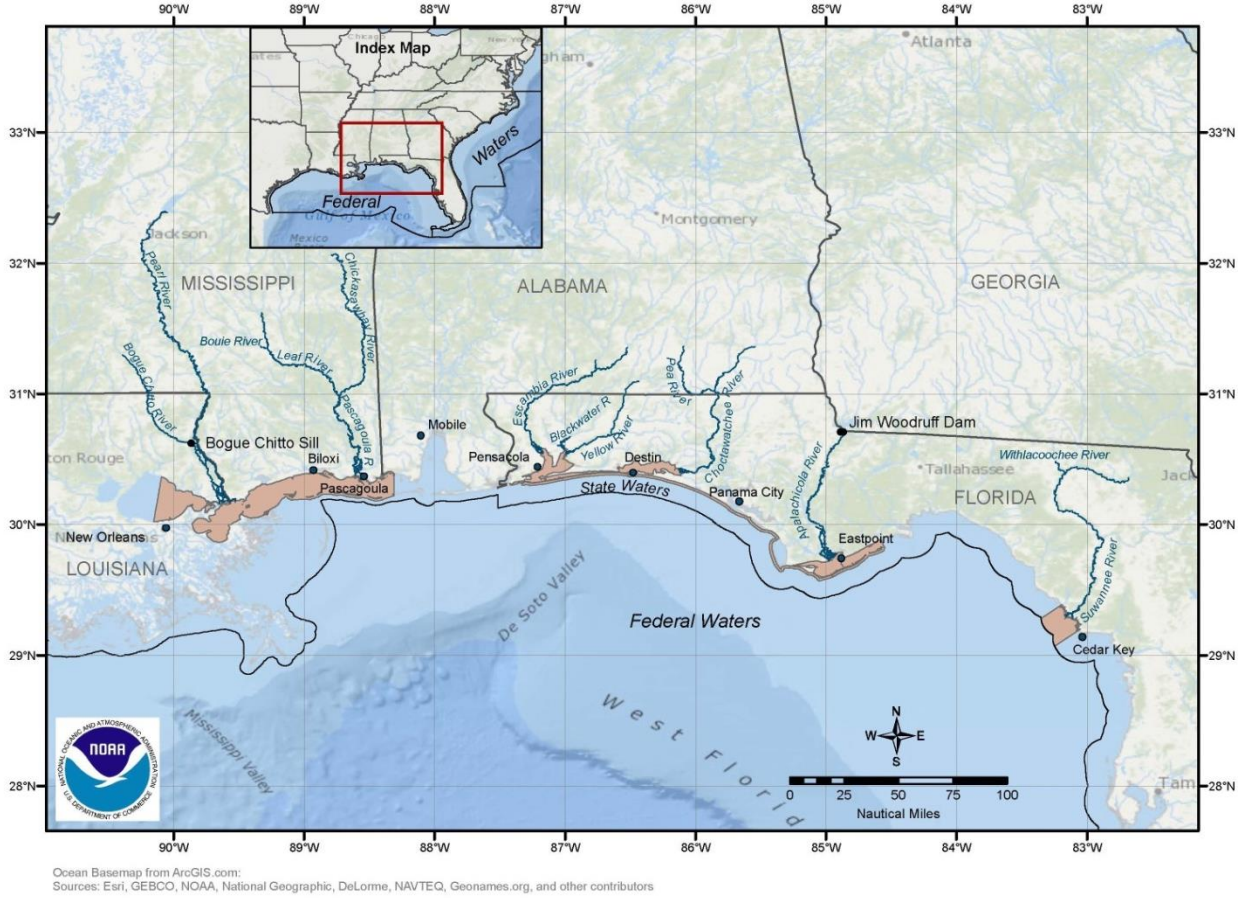

Figure 2. Map of Gulf sturgeon critical habitat

Potential Project Minimization Measures for Gulf Sturgeon

- Construction Windows
  - Projects should take into consideration the location of adult Gulf sturgeon and the time of year when the action will occur: March-October is the period when adult Gulf sturgeon are in rivers (spawning and resting) and October-March is the period when adult Gulf sturgeon are in estuarine/marine environments (feeding).
- "Pinch Points"
  - Projects should be designed to allow Gulf sturgeon to enter and exit areas with restricted access ("pinch points"), including, but not limited to, narrow passes between barrier islands, spawning river mouths, or other migratory pathways.

- Observers
  - NMFS-approved protected species observers are required on hopper dredging vessels and during relocation trawling. These observers are sometimes tasked with measuring, tagging, and/or collecting genetic samples (e.g., fin clips). Additionally, construction crews are required to watch for evidence of listed-species and cease work if sighted.
- Relocation Trawling
  - Closed net (capture) relocation trawling employs a capture-relocation technique and is generally targeted at an active hopper dredging site.
  - This minimization measure creates non-lethal take.

Section 7 and Recovery Integration

Due to the rarity of most listed species and limited resources available for their study, data gaps often exist in both individual and population impacts of Federal actions. Closing these data gaps is a major recovery priority, and can also result in more timely and accurate consultations. Our understanding of the probability and magnitude of stressors in a Federal action can influence the project implementation timeline in several ways: prompt determination of formal vs. informal consultation requirements; identification of environmental windows to avoid/minimize adverse effects; and development of effective project design criteria. Through integrating recovery into their proposed action, Action Agencies can contribute to closing these data gaps and to the recovery of listed species, while minimizing their adverse effects and improving consultation quality and efficiency for their proposed action and future actions.

Anthropogenic impacts to an individual ("take") can be estimated as the product of the following: probability of an activity occurring in an area; probability of an individual being in an activity area (e.g., distribution model); duration of exposure of the individual to the activity; and probability of the activity impacting the individual (e.g., dose-response curve). For example, when considering sturgeon injury or mortality associated with a Federal dredging activity, the geographic and temporal distribution of Gulf sturgeon in a dredge area is fundamental for predicting take. If available, Gulf sturgeon movement records or distribution models are used to resolve any uncertainties or data gaps, and identify the most appropriate next step (e.g., selection of minimization measures, informal vs. formal consultation). If Gulf sturgeon distribution information is lacking, the project could be delayed as formal consultation is initiated and take estimates are developed. Formal consultation may be an unnecessary time commitment if take does not occur. Alternatively, if there is an informal consultation and take occurs, the project could be delayed as construction is halted while a formal consultation is completed.

Monitoring and research studies (e.g., sturgeon telemetry) that are implemented in advance of or during larger dredging projects can accomplish multiple consultation and recovery objectives– species avoidance, refinement of work windows, reduced planning time, implementation of recovery actions, etc. Demographic information (e.g., abundance, mortality rate) may also be necessary to evaluate population consequences of larger dredging projects in the context of population status and recovery. In this regard, resolving gaps in species demographic information can improve the accuracy of jeopardy analyses and our overall understanding of recovery. The same principles described above apply to improve consultation efficiency and recovery in multiple project types (e.g., commercial fisheries, barrier removal, aquaculture leases, shoreline protection).

The flow chart in Figure 3 below outlines how to use Table 3*: Recovery action implementation key for projects by general activity type*, and highlights potential benefits of Section 7 and recovery integration for both the action agency and species.

Figure 3. How to use the recovery action implementation key (Table 3) and potential benefits.

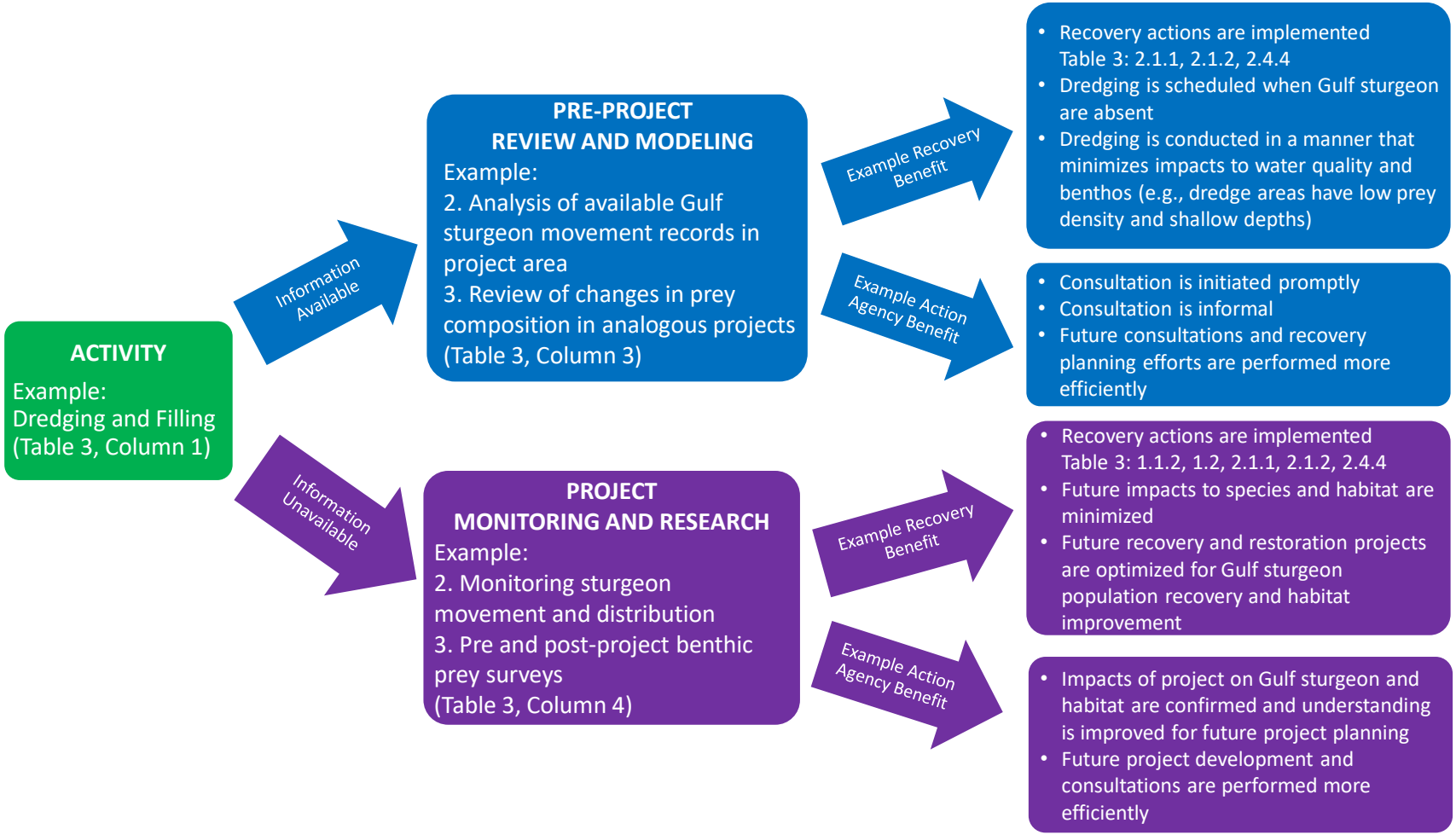

Table 3. Recovery action implementation key for projects by general activity type. Recovery action Task #s and PCEs defined in Table 2 above and Table 5 below

Activity	Gap → *Stressor*	Reviews and Modeling (Task #)	Monitoring and Research (Task #)
DREDGING AND FILLING **(e.g., channel maintenance, marsh restoration, beach re-nourishment, relocation trawling)** **NEARSHORE CONSTRUCTION** **(e.g., docks, piers, bridges, seawalls, shoreline stabilization/protection, boat ramps, temporary placement of bottom structures)** **AQUACULTURE AND REEFS** **(e.g., aquaculture leases, artificial reefs, living shorelines)**	**Species** 1. Interaction with equipment → *Take/Physical injury* (e.g., struck by equipment or vessel) 2. Sturgeon distribution → *Disruption of movement* (e.g., physical and behavioral barriers- sheet piles, dewatering, construction noise, turbidity) **Critical Habitat** 3. Prey Composition (PCE1) → *Removal/burial of prey species* 4. Bathymetry and sediment composition (PCE3) → *Alteration of bathymetry, sediment composition, and hydrodynamics* 5. Water quality and sediment contaminants (PCE2 and PCE3) → *Reduction in water quality* (e.g., temperature, dissolved oxygen [DO], salinity) *and increase in contaminant loads* 6. Safe and unobstructed migratory pathways (PCE4)	1. Review of sturgeon records to dredging projects with analogous dredge types (2.1.1, 2.1.2) 2. Analysis of available Gulf sturgeon movement records in project area–also applies to 6 (2.1.1, 2.1.2) 3. Review of changes in prey composition in analogous projects (2.4.4) 5. Review of changes in water quality in analogous projects (2.4.4)	1. Monitoring of sturgeon interaction with equipment (e.g., DIDSON, eDNA) 2. (2.1.1, 2.1.2) 3. Monitoring sturgeon movement and distribution (e.g., acoustic telemetry)–also applies to Gap no. 6 (PCE4). (1.2, 2.1.1, 2.1.2) 4. Pre and post-project benthic prey surveys (1.1.2, 2.4.4) 5. Pre and post-project bathymetry and sediment surveys 6. (1.1.2, 2.4.4) 7. Pre and post-project water quality and sediment contaminants surveys 8. (1.1.2, 2.2.2, 2.4.4)
WATER WITHDRAWAL **(e.g., cooling water intake)** **WATER DISCHARGE** **(e.g., wastewater discharge)**	**Species** 1. Fish entrainment studies and distribution → *Impingement or entrainment* **Critical Habitat** 2. Effluent water quality (PCE2) → *Reduction in water quality and increase in contaminant loads* 3. Flow fields, hydrodynamics, and bathymetry (PCE3) → *Alteration of bathymetry and hydrodynamics*	1. Review of historical entrainment and distribution data, entrainment data from analogous facilities; analysis of available Gulf sturgeon movement data in project area (2.1.1, 2.1.2) 2. Review of historical water quality records and	1. Fish entrainment monitoring; monitoring sturgeon movement and distribution (1.2, 2.1.1, 2.1.2) 2. Effluent water quality and sediment contaminant monitoring (2.2.1, 2.2.2, 2.2.4) 3. Intake water velocity monitoring and water

Activity	Gap → *Stressor*	Reviews and Modeling (Task #)	Monitoring and Research (Task #)
		records from similar facilities (2.2.2, 2.2.4)	source bathymetry and hydrodynamic monitoring– also applies to 1 (2.1.1, 2.1.2)
LARGE-SCALE ACTIONS (e.g., regional general permits, fisheries management plans, programmatic restoration plans, batched individual activities– categories above)	**Species and Critical Habitat** 1. Gaps and stressors for individual activities described above **Population** 2. Range-wide or spawning population impact of take and/or changes in survival or production → *Relatively high levels of take or significant changes in survival or production* (e.g., take on a regional scale, fisheries bycatch, restoration of rearing habitat)	1. For individual activities review applicable information listed above 2. Review available population monitoring and modeling data, develop population modeling tools with existing data (1.3.2)	1. For individual activities review applicable information listed above 2. Contribute to standardized population sampling and monitoring techniques, and sampling and genetic analyses of geographic distinctness between management units (1.3.1, 1.5.1)

Section 7 Considerations for Gulf Sturgeon and Critical Habitat

During pre-consultation or technical assistance an action agency may engage in some scientific review or research to assess the impacts of their project on Gulf sturgeon and their designated critical habitat. As described above, integrating recovery actions into this process may aid in determining the type of consultation request, or if a consultation is necessary. The following sections further outline the process for assessing project impacts on Gulf sturgeon and their designated critical habitat.

Section 7 Considerations for Gulf Sturgeon

Potential Threats that Pose "No Effect" to Gulf Sturgeon

- Turbidity - Mobile species, such as Gulf sturgeon, are able to swim through or avoid any potential turbidity without harm. Additionally, this species is naturally exposed to turbidity or sedimentation throughout its environment in areas of naturally lower water clarity. Therefore, we believe any potential exposure to turbidity will have no effect on Gulf sturgeon. While no direct effect on Gulf sturgeon is expected from turbidity, the biologist must still consider whether any indirect effects to Gulf sturgeon will occur due to effects to its habitat from turbidity.
- Entanglement in construction materials - The presence of flexible materials in the water (e.g., turbidity curtains or in-water lines) could create an entanglement risk to Gulf sturgeon. There are no reports of any listed species that have been entangled in turbidity curtains or stiff, taut, non-looping in-water lines or flexible lines enclosed in the plastic or rubber sleeves. Therefore, if the following PDCs or BMPS are used, we believe there will be no effect to Gulf sturgeon from entanglement in construction materials:
  - All in-water lines (e.g., rope, chain, and cable, including the lines to secure the turbidity curtains) must be stiff, taut, properly secured, and non-looping to minimize excess line and the risk of entanglement.
  - If flexible lines are used, they must be enclosed in plastic or rubber sleeves/tubes that add rigidity and prevent the line from looping and tangling.
  - Turbidity curtains and in-water equipment must be placed in a manner that does not entrap species within the construction area or block access for them to navigate around the construction area.
- Noise - Pile installation by jetting, using an auger or drop punch to create a pilot hole, or installing I-beam boatlifts using a vibratory hammer will not result in physical injury (injury from exposure to peak pressure or cumulative sound exposure) or behavioral noise effects, because it will not create noise levels in excess of the respective thresholds for physical injury to or behavioral responses in Gulf sturgeon. Therefore, we believe any potential exposure to the limited increase in noise as a result of the pile driving methods described above will have no effect on Gulf sturgeon.

Potential threats that "May Affect" Gulf Sturgeon

- Biologists should analyze the potential threats that may affect Gulf sturgeon, the routes of effect associated with those threats, possible impacts to the species, and considerations for making an effects determination (Table 3).

Section 4d Considerations for Gulf Sturgeon

An exemption for the take of Gulf Sturgeon in connection with formal consultations is not needed because take of this species is not prohibited; NMFS has not promulgated a Section 4(d) rule for this species. However, one Federal circuit has held that non-prohibited incidental take must be included in the ITS–*Center for Biological Diversity v. Salazar*, 695 F.3d 893 (9th Cir. 2012). Though the *Salazar* case is not a binding precedent for this action, which occurs outside of the Ninth Circuit, we find the reasoning persuasive and are following the case out of an abundance of caution and in anticipation that the ruling will be more broadly followed in future cases.

Providing an exemption from Section 9 liability is not the only purpose of specifying take in an incidental take statement. Specifying incidental take ensures we have a metric against which we can measure whether or not reinitiation of consultation is required. It also ensures that we identify reasonable and prudent measures that we believe are necessary or appropriate to minimize the impact of such incidental take.

Table 4. Threats, Routes of Effect, and Potential Impacts that May Affect Gulf Sturgeon and Considerations for Effects Determinations

Threat	Route of Effects	Potential Impact to Species	Considerations
Dams	• Impede access to spawning, developmental, and foraging habitat; • Modify (diverting) free-flowing rivers to reservoirs, • Injure/kill fish on upstream and downstream migrations; • Alter water quality in the remaining downstream portions of spawning and nursery habitat	• Reduced/blocked access to potential spawning, developmental, and foraging habitat • Reduced water quality/quantity in spawning, developmental, and foraging habitat downstream • Physical injury/death	• Is there a possibility for adding fish passage to the project area? • Can flows be managed to maintain water quality and quantity downstream?
Dredging	• Direct physical injury to sturgeon (struck or taken by dredge) • Direct removal/burial of prey species, • Turbidity/siltation effects • Contaminant resuspension • Noise/disturbance • Alteration of river hydrodynamics and physical habitat • Impede access to spawning, development, or foraging habitat if it occurs at a pinch point.	• Loss of prey • Potential physiological/reproductive/ behavioral effects • Potential avoidance of developmental, and foraging habitat • Disturbance of potential prey; elimination of deep holes used for resting/refuge; and/or alteration rock spawning habitats. • Reduced/blocked access to potential spawning, developmental, and foraging habitat	• Can there be a construction window to reduce potential impacts? • Which dredging method is being used? • How deep is the dredging? • Does dredging change the sediment composition (e.g., from sand substrate to limestone)? • Will the dredging alter dissolved oxygen, temperature, or salinity? • Will dredging equipment and activities block migratory corridors or important foraging habitat?
Water Quality (e.g., dam releases, wastewater discharge, and dredging)	• Low DO • Water Temperature • Presence of contaminants • Change salinity	• Restricts the extent suitable habitat can be used for life functions; extended exposure (greater than 24 hrs.) can cause injury/death. Sturgeon are more highly sensitive to low DO than other fish species. Of particular concern is the frequent occurrence of low DO coupled with high temperatures. • Potential physiological / reproductive / behavioral effects	• Will the activity reduce water quality in a way to cause harm? • Will there be changes in temperature, dissolved oxygen, or salinity? • Is the project area a high-quality forage habitat?

Threat	Route of Effects	Potential Impact to Species	Considerations
Water Quantity (e.g., dam releases, hydro power, and municipal use)	• Alteration of natural water flows in both the originating and receiving basins • Does the new flow create scouring or shoaling around the discharge?	• Low DO, changes in temperature and salinity, resuspension or increase in contaminants	• Does water quantity affect water quality? • Are flows such that natural hydrology is not disrupted?
Nearshore Construction Projects (e.g., docks, seawalls, boat ramps, artificial reefs, etc.)	• Impeded access to habitat, refuge, or migratory pathways • Noise • Vessel/gear interactions • Removal/burial of prey items • Water quality changes	• Reduced/blocked access to potential spawning, developmental, and foraging habitat • Potential physiological/behavioral effects • Potential physical injury and reduced/blocked access to potential spawning, developmental, and foraging habitat • Loss of prey • Restricts the extent suitable habitat can be used for life functions; extended exposure (greater than 24 hrs.) can cause injury/death • Of particular concern is the frequent occurrence of low DO coupled with high temperatures.	• What is the timing of the project? • What construction equipment and materials are being used? • What are the noise levels being produced by pile-driving? (Note: No need to analyze effects to fish less than 2 grams because they will only be found in rivers, which is outside of our jurisdiction.) • Is the benthos being temporarily or permanently altered? • Is water quality or quantity being affected? • Are migratory pathways being restricted or cut-off (e.g., oyster reef creation near passes or river mouths)? • Is the project area a known high-use habitat (e.g., barrier island passes)? • What life-history stages may be present? • Are there potential vessel interaction? (Note: We are seeing some reports coming in lately of Gulf sturgeon being struck by vessels)

Section 7 Considerations for Gulf Sturgeon Critical Habitat

Potential Threats that Pose "No Effect" to Gulf Sturgeon Critical Habitat

- The construction or placement of material and structures on hard bottom habitat will have no effect on the prey availability and sediment quality PCEs of Gulf sturgeon critical habitat. Gulf sturgeon do not forage over hard bottom because it does not support Gulf sturgeon prey.

Potential Threats that "May Affect" Gulf Sturgeon Critical Habitat

- Potential threats that may affect Gulf sturgeon critical habitat and considerations for making effects determination are listed in Table 2.
- If you determine that a project is NLAA (not likely to adversely affect) Gulf sturgeon critical habitat after examining the route of effects, look at the document "Standard Language for Effects to Gulf Sturgeon Critical Habitat."

Table 5. Threats and Considerations for the Primary Constituent Elements (PCEs) of Gulf Sturgeon Critical Habitat

PCE	Threats	Considerations
(1) Abundant prey items	• Burial • Removal • Access • Oyster reef construction • Living shorelines	Will prey items be buried or removed, or will a high quality forage area be inaccessible to the species? If so, how long before the prey species return to the area or how long before the area is accessible again?
(2) Water quality	• Low DO • Temperature changes • Salinity changes • Contaminants	Will a project appreciably alter any of these water quality parameters such that it puts a physiological strain on the species or could potentially cause mortality?
(3) Sediment quality	• Substrate type changes • Contaminants • Oyster Reef construction • Living shorelines	Does a project alter the benthos such that a previously suitable habitat has been transformed to a habitat not used by Gulf sturgeon (e.g., dredging a sandy bottom down to the limestone)? Will the activity introduce contaminants to the sediment?
(4) Unobstructed migratory pathways	• Dams • Pilings • Bridges • Construction equipment • Pass closures • Oyster reef construction • Living shorelines	Does the project involve the placement of a temporary or permanent object such that Gulf sturgeon nearshore, estuarine, and riverine movements are pinched or blocked and normal migratory behavior is interrupted (e.g., bridge piling are being driven in a narrow inlet while using turbidity curtains which effectively blocks the use of the inlet)?

Other Ways Your Project May be Covered

Gulf of Mexico Regional Biological Opinion (GRBO) (NMFS 2005; NMFS 2007)

GRBO is a regional biological opinion originally signed on November 19, 2003. GRBO addresses the USACE Civil Works and Regulatory maintenance dredging, sand mining areas ("borrow sites"), and beach nourishment in the Gulf of Mexico from the Mexico/Texas border to the Gulf-side of Key West, Florida; it also covers dredging up to one mile into rivers that flow into the Gulf of Mexico. GRBO was revised in 2005 and 2007.

Clamshell, pipeline, split hull, sidecast dredges, and bed-leveling were determined not likely to adversely affect (NLAA) Gulf sturgeon. Hopper dredges were determined likely to adversely affect (LAA) Gulf sturgeon and resulted in an incidental take statement (ITS). To reduce the likelihood of lethal take, GRBO may require relocation trawls to be used in some instances when using a hopper dredge.

USACE-permitted "new" dredging or placement of material within Gulf sturgeon critical habitat is not covered by GRBO; however:

- Maintenance dredging of navigational channels within Gulf sturgeon critical habitat is limited to maintaining the dimensions of channels (i.e. length, width, and depth) at the time of the original 2003 GRBO regardless of previous authorization.
- Major shipping channels and the Gulf Intracoastal Waterway (GICW) are excluded from Gulf sturgeon critical habitat (68 FR 13401). This means these areas may have Gulf sturgeon critical habitat surrounding them, but they themselves are not considered Gulf sturgeon critical habitat.

USACE's Jacksonville District Programmatic Biological Opinion (JAXBO)

JAXBO was signed on November 20, 2017 (NMFS 2017). It is designed to allow expedited permitting of 10 regularly permitted minor activities in the state of Florida. The minor activities that could have potential effects to Gulf sturgeon and Gulf sturgeon critical habitat are shoreline stabilization, pile-supported structures, maintenance and minor new dredging, and restoration activities. JAXBO has some key differences from SWPBO and replaces 5 previous Programmatic Biological Opinions.

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