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10051 5th Street N., Suite 105
St. Petersburg, Florida 33702-2211
Tel: (727) 563-9070
Fax: (727) 563-0207
Email:
MRAG.Americas@mragamericas.com

President: Andrew A. Rosenberg, Ph.D.

Pre-Assessment of the Louisiana Shrimp Fishery

Prepared for

Louisiana Department of Wildlife and Fisheries

Prepared by

MRAG Americas, Inc.
Robert J. Trumble

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1. Introduction

1.1. Aims/scope of pre-assessment

The Marine Stewardship Council (MSC) is an independent, global, non-profit organisation. It works to enhance responsible management of seafood resources, to ensure the sustainability of global fish stocks and the health of the marine ecosystem. It is supported by a broad coalition of those with a stake in the future of the global seafood supply. The MSC harnesses consumer power by identifying sustainable seafood products through an eco-label. The MSC has identified the following mission statement:
To safeguard the world's seafood supply by promoting the best environmental choice.

This report sets out the results of a pre-assessment of the Louisiana Shrimp fishery for two species of shrimp (brown shrimp (*Farfantepenaeus aztecus*) and white shrimp (*Litopenaeus setiferus*) in relation to the Marine Stewardship Councils (MSC) Principles and Criteria for Sustainable Fishing (the 'MSC standard'). It must be stressed that this report can provide guidance only, and the outcome of a main assessment will be the subject of deliberation by an assessment team and would be independent this pre-assessment.

The Louisiana Department of Wildlife and Fisheries (LDWF) contracted MRAG Americas Inc. (MRAG) to conduct an MSC pre-assessment of the Louisiana Shrimp fishery. To date, almost all fisheries that have successfully completed an MSC Full Assessment have been recommended for certification but with conditions set for continuing certification. These conditions may relate to operational and management functions. The client is then responsible for ensuring that these conditions are met within the required timescale. The client should therefore have authority, or have secured agreement with the relevant organizations, to enact potential conditions should certification be successful. For this fishery, this is likely to require some degree of cooperation from the Gulf of Mexico Fishery Management Council, National Marine Fisheries Service, and the state agencies of Florida, Alabama, Mississippi, and Texas.

The MSC recommends pre-assessments of fisheries interested in certification to help the client get a clear picture of whether the fishery is a good candidate for a Full Assessment, to see what potential issues may arise as part of a Full Assessment. However, a pre-assessment of a fishery does not attempt to duplicate a full assessment against the MSC standard. A full assessment involves expert team members and public consultation stages that are not included in a pre-assessment. A pre-assessment provides a provisional assessment of a fishery based on a limited set of information provided by the client. The client must provide evidence that 1) the policies, environmental impacts, management principals, and enforcement programs of the responsible fishery management bodies and fishing fleets can be expected to meet the MSC Standard; and 2) that the status of the entire biological stock or stocks of brown and white shrimp utilized by the fishery is healthy, even if the fishery fishes only a small portion of the entire stock(s). This is necessary because the MSC's Standards Council has determined that the biological stock of the species fished must be demonstrated as healthy for a fishery or fisheries to be fully certified. These pieces of information are designed to help a fishery make more informed decisions regarding its ability to move forward with full certification. However, no verification of information occurs during a pre-assessment.

1.2 Constraints to the pre-assessment of the fishery

No unusual constraints were noted for the pre-assessment. However, no information was received for butterfly trawls, so they are not scored.

1.3. Unit(s) of Assessment

Species: White Shrimp (*Litopenaeus setiferus)* and Brown Shrimp (*Farfantepenaeus aztecus)*

Geographical range of fishing operations: State waters of Louisiana

Method of capture: Butterfly Net, Skimmer, and Otter Trawl Fishery

Stocks: US Gulf of Mexico

Management: State of Louisiana, with participation by NMFS and GMFMC

Client group: Louisiana Department of Wildlife and Fisheries

These units of assessment cover the commercial fishery of Louisiana state waters. All fishermen participating in the state fishery are considered eligible fishermen. As a result of the pre-assessment, the clients or subsequent clients may select portions of this unit of assessment for a fisheries improvement project or a full MSC assessment.

1.4 Total Allowable Catch (TAC) and Catch Data

Table 2.4 TAC and Catch Data

Otter trawl, brown shrimp

TAC	**Year**	**No TAC**	**Amount**	**No TAC**
UoA share of TAC	**Year**	**No TAC**	**Amount**	**No TAC**
UoC share of TAC	**Year**	**No TAC**	**Amount**	**No TAC**
Total green weight catch by UoC	**Year (most recent)**	**2014**	**Amount**	**15,995,385 lbs**
	Year (second most recent)	**2013**	**Amount**	**18,229,439 lbs**

Skimmer trawl, brown shrimp

TAC	**Year**	**No TAC**	**Amount**	**No TAC**
UoA share of TAC	**Year**	**No TAC**	**Amount**	**No TAC**
UoC share of TAC	**Year**	**No TAC**	**Amount**	**No TAC**
Total green weight catch by UoC	**Year (most recent)**	**2014**	**Amount**	**26,400,550 lbs**
	Year (second most recent)	**2013**	**Amount**	**20,650,997 lbs**

Otter trawl, white shrimp

TAC	**Year**	**No TAC**	**Amount**	**No TAC**
UoA share of TAC	**Year**	**No TAC**	**Amount**	**No TAC**
UoC share of TAC	**Year**	**No TAC**	**Amount**	**No TAC**
Total green weight catch by UoC	**Year (most recent)**	**2014**	**Amount**	**28,602,412 lbs**
	Year (second most recent)	**2013**	**Amount**	**28,007,960 lbs**

Skimmer trawl, white shrimp

TAC	**Year**	No TAC	**Amount**	No TAC
UoA share of TAC	**Year**	No TAC	**Amount**	No TAC
UoC share of TAC	**Year**	No TAC	**Amount**	No TAC
Total green weight catch by UoC	**Year (most recent)**	2014	**Amount**	40,076,794 lbs
	Year (second most recent)	2013	**Amount**	27,638,368 lbs

2. Description of the fishery

2.1. Scope of the fishery in relation to the MSC programme

The fishery is within scope of the MSC, without use of poisons or explosives, and without unilateral exemptions. It does not target out of scope species, is not enhanced, and not subject to forced labor investigations or convictions.

2.2. Overview of the fishery

The panaeid shrimp fishery in the Gulf of Mexico Region (Florida (west coast), Alabama, Mississippi, Louisiana and Texas) operates as an open access fishery in federal and state waters, and operates under the jurisdiction of both federal and state regulators; state waters extend 0-9 miles for Florida (west coast) and Texas, and 0-3 mile for the other states. Federal waters extend from the state boundary to 200 miles. The fishery dates back many years, as shrimp are accessible to artisanal and small scale gears. More recently, the fishery is conducted primarily with otter trawls. The fishery has experienced a number of economic problems over the past couple of decades. Hurricanes periodically cause problems with vessels and infrastructure. The shrimp are annual crops, with abundance largely environmentally driven. Competition from imported shrimp has reduced demand for wild South Atlantic shrimp and has depressed prices. Louisiana and Texas dominate the Gulf State catch of brown and white shrimp (Table 1), with Texas leading in brown shrimp and Louisiana leading in white shrimp. The federal government sets overarching regulations for federal through the Gulf of Mexico Fishery Management Council, and the states manage their waters. The primary environmental issue for the shrimp fisheries involves interactions with sea turtles. The Gulf of Mexico shrimp fishery has substantial interactions with sea turtles and is a cause of sea turtle mortality (SERO 2014). NMFS has stated in a Biological Opinion that the shrimp fisheries do not cause jeopardy for the distinct population units that occur in the Gulf of Mexico Region (SERO 2014). Numerous NGOs protest the impacts of the shrimp fisheries on sea turtles.

Table 1 Catch of brown and white shrimp by Gulf of Mexico state, metric tons. Source http://www.st.nmfs.noaa.gov/pls/webpls/FT_HELP.SPECIES

	Florida		Alabama		Mississippi		Louisiana		Texas	
Year	Brown	White	Brown	White	Brown	White	Brown	White	Brown	White
2010	470	217	2,078	2,030	721	1,154	7,830	25,959	21,873	12,302
2011	498	185	4,810	3,111	3,186	1,372	17,814	23,973	27,136	12,196
2012	460	135	6,050	1,838	4,173	1,727	8,945	29,486	23,586	11,443
2013	609	282	5,030	1,937	2,525	1,511	18,235	26,063	22,205	9,929
2014	375	59	5,729	1,990	1,615	746	18,531	30,052	19,539	8,042

2.3. Principle One: Target species background

Juvenile and adult penaeid shrimp are omnivorous (eating both plants and animals) bottom feeders with most feeding activity occurring at night although daytime feeding may occur in

turbid waters. Food items may consist of polychaetes, amphipods, nematodes, caridean shrimp, mysids, copepods, isopods, amphipods, ostracods, mollusks, foraminiferans, chironomid larvae and various types of organic debris. Shrimp are preyed on by a wide variety of species at virtually all stages in their life history. A wide variety of finfish are known to prey heavily on juvenile and adult penaeid shrimp.

Population size of brown and white shrimp is believed to be primarily regulated by environmental conditions and available habitat. Brown and white shrimp have an annual life cycle, where adults spawn offshore and the larvae are transported to coastal estuaries. Recruitment to the estuaries and eventually to the fishing grounds is extremely dependent on fluctuations of environmental conditions within estuaries. Poor recruitment to the fishery may occur because of environmental conditions such as heavy rains that reduce salinities and cause high mortality of post-larvae. Conversely, high recruitment to the fishery may occur when environmental conditions are favorable for postlarval development.

Fishing effort plays a more significant role in controlling spawning stock size than recruitment. Natural mortality rates are very high, and coupled with fishing mortality, most of the year class may be removed by the end of a season. Because annual variation in catch is presumed to be due to a combination of prevailing environmental conditions, fishing effort, price, and relative abundance of shrimp, fishing is not believed to have any impact on subsequent year class strength unless the spawning stock has been reduced below a minimum threshold level by environmental conditions. Nevertheless, due to high fecundity and migratory behavior, the brown and white shrimp are capable of rebounding from very low population sizes in one year to large population sizes in the next, provided environmental conditions are favorable.

2.4. Principle Two: Ecosystem background

Otter trawl

State waters. No current information on species composition of shrimp fisheries in state waters is available. However, the Department has conducted bycatch surveys of the shrimp fleet in the past, and has maintained fishery-independent sampling using trawl gear for a long period of time. The last bycatch monitoring occurred in 1989. Under the MSC Certification Requirements, Main species are those that make up ≥5% of the catch, or ≥2% if vulnerable, unless the assessment team identifies other considerations. The table below provides catch composition of the bycatch monitoring for species greater than 1% of the total catch with the rank of those species in the fishery independent survey for 1989. The fishery independent survey uses a 16 foot trawl without TED or BRD, so likely samples more species than caught in a commercial shrimp trawl. The catch composition of the 2013 to 2015 fishery independent surveys was similar to the 1989 survey, especially for the top 10-20 species. The fishery independent surveys found nearly 50% of the catch composed of bay anchovies, a notable difference from the bycatch with about 12% bay anchovies.

Gulf menhaden are within biological limits, well above the point of recruitment impairment and fluctuating around the target reference point. Blue crab in Louisiana are MSC certified, and well above the point of recruitment impairment and fluctuating around the target reference point. Menhaden and blue crab are the only Primary species from this data set; bay anchovy are considered Main species and blue crab are considered Minor. Of the remaining species, bay anchovy are considered Main secondary species. Of the remaining species, sea trout, Atlantic croaker, and sea catfish make up the highest proportion (>2%) and are considered Minor species. Bay anchovies, sea trout, Atlantic croaker, and sea catfish are considered low risk under a preliminary PSA (Appendix 1). Red snapper, a key

bycatch species in federal waters, is not identified in bycatch monitoring or in fishery independent surveys from state waters.

Although the species found in bycatch monitoring and fishery independent surveys do not identify any at-risk species, the lack of bycatch surveys since 1998 and the difference in fishery independent survey gear from commercial fishing gear leaves some uncertainty that the information is currently applicable to commercial shrimp trawling in state waters.

Comparison of bycatch survey results for species making up ≥ 0.3% of total catch (data from Table 1 of Adkins 1993) to fishery-independent (FI) trawl survey rank. LDWF unpublished).

			Rank in	
	Percent	Number	Bycatch	FI trawls
Brown shrimp (Penaeus aztecus)	31.6%	46,772	1	2
white shrimp (Penaeus setiferus)	28.3%	41,819	2	4
Bay anchovy (Anchoa mitchilli)	12.2%	18,046	3	1
Gulf menhaden (Brevoortia patronus)	5.9%	8,705	4	8
Sand seatrout (Cynoscion arenarius)	3.9%	5,745	5	5
At. croaker (Micropogonias undulatus)	3.5%	5,188	6	3
Blue crab (Callinectes sapidus)	2.4%	3,615	7	6
Sea catfish (Arius felis)	2.3%	3,433	8	9
spot (Leiostomus xanthurus)	1.0%	1,440	9	7
Seabob (Xiphopenaeus kroyeri)	1.0%	1,418	10	13
At. bumper (Chloroscombrus chrysurus)	0.8%	1,143	11	20
Gaff topsail catfish (Bagre marinus)	0.6%	908	12	15
Thumbstall squid (Lolliguncula brevis)	0.6%	831	13	14
Bay whiff (Citharichthys spilopterus)	0.5%	771	14	24
Threadfin shad (Dorosoma petenense)	0.4%	648	15	35
At. threadfin (polydactylus octonemus)	0.4%	572	16	16
Fringed flounder (Etropus crossotus)	0.4%	536	17	19
silver perch (Bairdiella chrysoura)	0.3%	510	18	23
Atlantic cutlassfish (Trichiurus lepturus)	0.3%	486	19	43
Least puffer (Sphoeroides parvus)	0.3%	424	20	10
Gizzard shad (Dorosoma cepedianum)	0.3%	379	21	59

Federal waters. For comparison, the following table presents the species composition for species making up ≥0.3% of the catch from observer coverage in the federal fishery across the Gulf of Mexico from 2007-2010. Of the species listed other than brown and white shrimp, only red snapper and pink shrimp are considered primary species – managed under reference points. Sea trout are managed under a quota, but the basis of the quota is unclear, so sea trout is not considered a Primary species. Under the MSC Certification Requirements, Main species are those that make up ≥5% of the catch, or ≥2% if vulnerable, unless the assessment team identifies other considerations. Red snapper and pink shrimp are not considered vulnerable. Red snapper is substantially below the threshold for Main, but is considered here as a potential Main because management of shrimp has an objective of maintaining low catch of red snapper such that the fishery does not jeopardize the red snapper as it did in past years. Since the initiation of red snapper Annual Catch Limits and Accountability Measures, and the requirement for limiting shrimp fishing effort, red snapper abundance has increased to the point that red snapper quotas have increased. Therefore, red snapper is considered as well above the point of recruitment impairment. Brown and

white shrimp are considered not overfished, and not undergoing overfishing, so are also well above the point of recruitment impairment. Pink shrimp occur predominantly in Florida waters, so the proportion of pink shrimp is Louisiana waters should be lower than the Gulf-wide average.

Species	Percent 2007-2010
Fish	27.3
Brown shrimp	14.1
Atl croaker	15.9
White shrimp	10.7
Crustaceans	6.9
Sea Trout (genus)	5.8
Invertebrates	5.3
Longspine Porgy	4.0
Pink shrimp	3.9
Pinfish	0.5
Red snapper	0.3

Light blue = main. Grey = minor. **Bold** = Primary

The federal observer data apply to the entire Gulf of Mexico, so it is not surprising that somewhat different species composition occurs in the state waters of Louisiana. The large categories of unidentified fish and crustaceans in federal data may also lead to the difference from species composition in state waters.

Skimmer Trawl

Mandatory federal observer coverage in the skimmer trawl fishery, which occurs mostly in Louisiana state waters, occurred in 2012, 2013, and 2014, and the species composition for species making up ≥0.3% of the catch is shown in the table below. No species managed with reference points are on the list. As a precaution, given the large amount of unidentified fish in the catch, the assessment team considers that this indicator is unlikely to achieve an unconditional pass without some knowledge of the species in the unidentified category.

Species	Percent		
	2012	2013	2014
Fish	38.3	25.9	41.0
Brown shrimp	35.8	30.5	25.8
Atl croaker	8.1	9.1	20.1
White shrimp	6.3	13.5	8.1
Crustaceans	6.5	3.0	1.6
Penaeid shrimp		8.0	
Sea Trout (genus)	1.3	1.6	1.5
Cownose ray		3.6	
Smooth flounder	0.2	0.1	0.6
Spanish mackerel	0.3	0.3	0.3

Light blue = main. Grey = minor. **Bold** = Secondary

The shrimp fishery catches a wide range of species, but mostly in fairly low amounts. Brown and white shrimp make up about 40% for skimmer trawls. Unidentified fish make up the largest non-shrimp component. Unidentified crustaceans make up a substantial amount. Atlantic croaker, sea trout, porgies, and cownose ray are the most commonly caught of the fish identified to species or species group. All but cownose ray are low risk according to a preliminary PSA; cownose ray are medium risk (Appendix 1).

Sea turtles are the key ETP species identified as potentially at risk from the shrimp fishery. A NMFS Biological Opinion (BiOp) describes out the proxy indices for monitoring sea turtle status, and summarizes the indices. The BiOp describes the management strategy, and concludes the fishery does not cause jeopardy for the sea turtle species. However, a lawsuit by Oceana has challenged this conclusion, and the resolution of the lawsuit may change the no jeopardy finding.

The Gulf of Mexico Fishery Management Council has conducted habitat impact evaluations through consideration of essential fish habitat (EFH), and has established management measures for the shrimp fishery in federal waters. Louisiana has not established similar management for state waters, and sea grass is a potential habitat consistent with vulnerable marine ecosystem.

A substantial amount of ecosystem information is available for the Gulf of Mexico, but it has not been consolidated into analyses that assess the status of the overall ecosystem structure and function. Management measures have not been established to explicitly protect the overall ecosystem.

2.5. Principle Three: Management system background

The federal management system for the Gulf of Mexico is generally robust and well developed through the Magnuson-Stevens Fishery Conservation and Management Act. The Louisiana management system is generally robust and well developed through state laws and regulations.

Both systems invite and consider stakeholder participation, and make decisions in an open and transparent manner. It is not clear if Louisiana explicitly requires the precautionary approach, but does require using best available science for decisions. Effective enforcement generally occurs within the shrimp fishery; however, skimmer trawl fishermen consistently exceed required tow time limits.

3. Evaluation Procedure

3.1. Assessment methodologies used

This pre-assessment is conducted using CR V2.0 and MSC Reporting Template V2.0

3.2. Summary of site visits and meetings held during pre-assessment

This report was conducted as a desk study using materials provided by the client. No stakeholder engagement occurred. The MRAG assessment team provided and received from the client information concerning the fishery, the intent of the pre-assessment report by phone calls and email; no site visit occurred.

3.3. Stakeholders to be consulted during a full assessment

The identification of potential stakeholders in the fishery is specifically undertaken in the pre-assessment due to the requirements for MSC certification. As part of the MSC certification methodology, a thorough stakeholder consultation process must be conducted by a certification team. This means that stakeholders must be identified, contacted, and their opinions on the certification of the fishery solicited and reviewed by the certification team. This measure is considered part of the due diligence of the certification team to help ensure that no issue (large or small) is missed. It is also a measure included to try to build good will at the outset of the certification process.

The Louisiana shrimp fishery is primarily undertaken by otter trawl fishermen, with additional harvest by skimmer nets and butterfly nets. Stakeholder groups that are largely directly involved in the fishery are noted below. Additional stakeholders are likely to be identified during preparations for a full assessment or fishery improvement project.

- Wild American Shrimp, Inc.
- Southern Shrimp Alliance
- Southeast Fisheries Association
- Louisiana Shrimp Task Force
- Louisiana Seafood Promotion Board
- Louisiana Shrimp Association
- Texas Shrimp Association

Management and research agencies concerned with the South Atlantic shrimp fishery include:

- National Marine Fisheries Service
- South Atlantic Fishery Management Council
- Gulf States Marine Fisheries Commission
- State fishery agencies of Florida, Alabama, Mississippi, and Texas
- Florida Sea Grant
- Gulf And South Atlantic Fishery Foundation

Conservation and academic oriented groups that have a direct interest in the South Atlantic shrimp fishery include:

- The Sustainable Fisheries Partnership

- WWF-US
- The Ocean Conservancy
- The Environmental Defense Fund
- The Gulf and South Atlantic Fishery Foundation
- Oceana
- The Sea Turtle Conservancy
- Turtle Island Restoration Network
- Environmental Defense Fund
- Oceans Trust
- Louisiana State University
- University Of Florida
- Texas Sea Grant
- Texas A&M

Additional stakeholders are likely to be identified during preparations for a full assessment or fishery improvement project.
Caribbean Conservation Corps

The issues of bycatch and interactions with ETP species will likely result in a high level of controversy if the fishery moves to full assessment. Habitat impacts, even though not thought to be extreme, will likely contribute to the controversy. This controversy will likely lead to a high level of stakeholder involvement. The clients and other participants would benefit from having all necessary information on these issues clearly laid out; the more the available information demonstrates compliance with the MSC standard, the more likely the fishery could pass an assessment.

3.4. Harmonisation with any overlapping MSC certified fisheries

No shrimp fisheries in the Gulf of Mexico are currently certified or in assessment. No harmonization is necessary for P1. No other fisheries in the Gulf of Mexico are currently certified or in assessment. No harmonization is necessary for P2 or P3.

4. Traceability (issues relevant to Chain of Custody certification)

4.1. Eligibility of fishery products to enter further Chains of Custody

Shrimp landings occur at many sites in Louisiana, and may include shrimp caught in federal waters and in waters of other states. Vessels of one state may land at ports in another state, but must provide landing information required by federal regulations and by the state in which the landing occurs. For the purposes of this pre-assessment, all Louisiana-licensed vessels may participate it the certification. Many shrimp vessels are privately owned, so the first point of sale occurs with landing of the product at a buying station or processing plant. Shrimp fishermen often fish off one state or more states, and land in another; some shrimp caught in the South Atlantic Region may be landed in the Gulf of Mexico Region or the Mid-Atlantic Region, and vice versa. Chain of custody would be required by all buying stations and processing plants that would receive product from the certified fishery. Chain of custody holders receiving shrimp must be aware that vessels may land white and brown shrimp from the South Atlantic, from other Gulf of Mexico states, and from federal waters off Louisiana at ports Louisiana, and assure segregation. Vessels that fish both inside and outside of Louisiana state waters must have some mechanism to separate catch in Louisiana waters from catch in other waters on a set by set basis. Vessels that fish only in state waters do not

need set by set separation, but must have some mechanism to demonstrate that the vessel did not go into waters beyond Louisiana state waters.

5. Preliminary evaluation of the fishery

5.1. Applicability of the default assessment tree

The default assessment tree seems appropriate for this fishery.

5.2. Expectations regarding use of the Risk-Based Framework (RBF)

The RBF will likely be needed for unidentified finfish, Bay anchovy, Atlantic croaker, unidentified crustaceans, sea trout, and possibly longspine porgy, sea catfish, and cownose ray. If more detailed information reveals other main primary or secondary species, they may require RBF.

5.3. Evaluation of the fishery

List of PIs scoring <60

PI 2.1.2 Primary Species Management. There is no suggestion that the Louisiana management system has done a review of the potential effectiveness and practicality of alternative measures to minimise UoA-related mortality of unwanted catch of primary species for otter trawl or skimmer trawl. The state has allowed enforcement of federal TED regulations, and has proposed a regulation to require TEDs on otter trawls.

PI 2.2.2 Secondary Species Management. There is no suggestion that the Louisiana management system has done a review of the potential effectiveness and practicality of alternative measures to minimise UoA-related mortality of unwanted catch of secondary species for otter trawl or skimmer trawl. The state has allowed enforcement of federal TED regulations, and has proposed a regulation to require TEDs on otter trawls.

List of PIs scoring <80

PI 1.2.2. Harvest Control Rules. It is not clear what tools the management system would use should the abundance drop to levels near PRI. Therefore, there is a generally understood harvest control rule, but it is not well-defined.

PI 2.1.1. Primary Species Outcome - Skimmer trawl. Given the large amount of unidentified fish in the catch, the assessment team considers that this indicator is unlikely to achieve an unconditional pass without some knowledge of the species in the unidentified category.

PI 2.1.3. Primary Species Information – Information on species composition of catches in otter trawls in state waters is available, but from old bycatch monitoring and fishery independent surveys that may not be representative. Federal observer reports present large categories of unidentified finfish and crustaceans for both otter trawl and skimmer trawl.

PI 2.2.1. Secondary Species Outcome - Skimmer trawl. Information on species composition of catches in state waters from federal observers has a large category of unidentified finfish. Cownose rays were identified as medium risk by PSA.

PI 2.3.2. ETP Management - Skimmer. The proportion of skimmer trawl tows that exceed the tow time limit demonstrate that the management system is not fully implemented.

PI 2.4.2. Habitat Management. No specific state management occurs for habitat. Seagrasses may be determined as a vulnerable marine ecosystem.

PI 2.5.1 Ecosystem Status. it not clear whether the GMFMC has identified key features most crucial to maintaining the integrity of ecosystem structure and functions and ensuring that ecosystem resilience and productivity is not adversely impacted. While information, including some ecosystem models, is available, it has not been gathered and consolidated to draw conclusion about the status of the ecosystem for the overall Gulf of Mexico or Louisiana waters.

PI 2.5.2 Ecosystem Management. There is no explicit partial strategy for management of activities that could affect structure and function of the overall ecosystem, but measures do exist.

PI 2.5.3. Ecosystem Information. Consolidation of information to understand the impacts of the fishery on species diversity and on ecological services provided by the ecosystem components is not generally available.

PI 3.1.3 Long Term Objectives. Title 56 contains many examples of objectives to practice fishery management to assure good conservation and use best available science. These objectives do not address uncertainty in science and management. As such, it is not clear that the objectives are consistent with the use of the precautionary approach.

PI 3.2.3. Enforcement. While shrimp fishermen generally comply with regulations, skimmer trawl fishermen appear to systematically exceed the tow time limits.

5.4. Summary of likely PI scoring levels

Key to likely scoring level in Table 6.3

Definition of scoring ranges for PI outcome estimates	Shading to be used	Instructions for filling 'Likely Scoring Level' cell
Information suggests fishery is not likely to meet the SG60 scoring issues.	Fail (<60)	Add either text (pass/pass with condition/fail) or the numerical range (<60/60-79/≥80) appropriate to the estimated outcome to the cell. Shade the cell of each PI evaluation table with the colour which represents the estimated PI score.
Information suggests fishery will reach SG60 but may not meet all of the scoring issues at SG80. A condition may therefore be needed.	Pass with Condition (60-79)	
Information suggests fishery is likely to exceed SG80 resulting in an unconditional pass for this PI. Fishery may meet one or more scoring issues at SG100 level.	Pass (≥80)	

Table 6.3 Simplified Scoring sheet

<table>
<tr><th>Principle</th><th>Component</th><th>PI</th><th>Performance Indicator</th><th>RBF required? (y/n)</th><th>Likely scoring level</th><th>Rationale/ Key points</th></tr>
<tr><td rowspan="4">1</td><td rowspan="2">Outcome</td><td>1.1.1</td><td>Stock status</td><td>N</td><td></td><td>The current stock assessment produced the following values:
<table>
<tr><th>Species</th><th>MSY (tail wt lbs)</th><th>Lower biomass limit (tail wt lbs)</th><th>Current biomass (tail wt lbs)</th><th>Fmsy</th><th>Fcur</th></tr>
<tr><td>brown</td><td>146,923,100</td><td>6,098,824</td><td>100-140 million lbs</td><td>9.12</td><td><1.0</td></tr>
<tr><td>white</td><td>89,436,907</td><td>365,715,146</td><td>0.9-1.3 billion</td><td>3.48</td><td><0.4</td></tr>
</table>
The current biomass of brown and white shrimp far exceeds the lower biomass limit so it exceeds the point of recruitment impairment (PRI). The current fishing mortality is far below the fishing mortality at Bmsy and is at a historically low level, so the biomass is substantially above BMSY.</td></tr>
<tr><td>1.1.2</td><td>Stock rebuilding</td><td></td><td></td><td>NA</td></tr>
<tr><td rowspan="2">Management</td><td>1.2.1</td><td>Harvest Strategy</td><td></td><td></td><td>The federal management system has a partial harvest strategy consisting of monitoring, a moratorium on effort, and stock assessment. The moratorium keeps effort far below Fmsy, and this is unlikely to change in the foreseeable future. Trends such as effort and fishing mortality have decreased over time and the number of permit renewals has been decreasing since the institution of the permit moratorium, and it is unlikely that effort will resume to historical levels. The federal system has set a requirement to maintain shrimp fishing effort at a sufficiently low lever that it does not result in high catches of red snapper. The measures of the harvest strategy were designed to maintain high stock biomass, and evidence of record high abundance demonstrates that it has achieved its objective. Unwanted shrimp catch is not an issue except for avoiding small shrimp with no market value. The management system has set a minimum size for white shrimp, and a closed season to allow growth. However, the system does not have a well-defined harvest control rule. Shark is not a target species, so shark finning is not applicable.</td></tr>
<tr><td>1.2.2</td><td>Harvest control rules and tools</td><td></td><td></td><td>Well-defined HCR require well-defined and pre-approved actions to reduce exploitation as PRI is approached and to keep the abundance fluctuating around</td></tr>
</table>

Principle	Component	PI	Performance Indicator	RBF required? (y/n)	Likely scoring level	Rationale/ Key points
						the target reference point. The federal management system has determined that if the MFMT is exceeded for two consecutive years, the appropriate committees and/or panels (e.g. stock assessment panels, advisory panels, SSCs) would convene to review changes in apparent stock size, changes in fishing effort, potential alterations in habitat or other environmental conditions, fishing mortality and other factors that may have contributed to the decline. It is not clear what tools the management system would use should the abundance drop to levels near PRI. Therefore, there is a generally understood harvest control rule, but it is not well-defined. These shrimp species are not restricted to Louisiana's waters; therefore, the Louisiana management authorities do not compute Louisiana-specific overfishing and overfished thresholds or require specific response if these thresholds are exceeded, as these considerations are regional in nature.
		1.2.3	Information and monitoring			Shrimp fisheries are well monitored for catch and effort. Information related to stock structure, stock productivity, fleet composition, and environmental effects are well known from federal and state research. White and brown shrimp have a wide distribution, from the mid-Atlantic region on the east coast to the Gulf of Mexico. These shrimp species are highly productive, with high fecundity and annual life cycles. The fleets are well known in all states through licensing and through federal permitting in federal waters. Economic factors have reduced the fleets in all states substantially below higher levels of the past. To date, the fishery has not reduced abundance sufficiently to impair recruitment, and environmental fluctuations are the main driver of recruitment variability. The landings are reported by individual vessels to states, and states report catches to NMFS, which consolidates the landings by region. LDWF monitors commercial landings and fishing effort on a trip basis from licensed wholesale/retail seafood dealers and commercial fishermen holding fresh products licenses through a trip ticket program implemented in 1999. LDWF requires that dealers purchasing shrimp from commercial fishermen and commercial fishermen who sell their catch directly to consumers submit trip tickets to capture information about their catch. LDWF also monitors abundance of shrimp in state waters through trawl surveys.

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		1.2.4	Assessment of stock status			NMFS scientists determined that the previous shrimp VPA stock assessment model incorrectly determined stock status. The stock assessment analysts concluded that the Stock Synthesis model was the best choice for modeling Gulf shrimp. The Stock Synthesis model outputs parent stock size in terms of spawning biomass and also calculates a fishing mortality rate. The GMFMC's Scientific and Statistical Committee (SSC) accepted this new model. SSC approval demonstrates that the model is appropriate, and it estimates reference points (MSY, Fmsy, and a limit reference point). Stock synthesis evaluates uncertainty. The SSC contains scientists external to NMFS and GMFMC, so serves as a peer review body. Louisiana recognizes that white and brown shrimp are Gulf-wide species, and does not conduct stock assessments for state waters.
	Number of PIs less than 60					0

Principle	Component	PI	Performance Indicator	RBF required? (y/n)	Likely scoring level	Rationale/ Key points
2	Primary Species	2.1.1	Outcome	N	Otter trawl	Gulf menhaden and blue crab are identified as Primary species in the otter trawl fishery in state waters based on state bycatch monitoring from 1989 and from fishery independent surveys. The species found in bycatch monitoring and fishery independent surveys do not identify any at-risk Primary species (see Section 2.4 for details). The species composition from federal observer reports is somewhat different from state data, as it contains large amounts of unidentified fish and crustaceans. Of the species listed in the federal reports, only red snapper and pink shrimp are considered Primary species – managed under reference points. Red snapper is substantially below the threshold for Main, but is considered here as a potential Main because management of shrimp has an objective of maintaining low catch of red snapper such that the fishery does not jeopardize the red snapper as it did in past years. Pink shrimp are considered as Minor. The lack of bycatch surveys since 1998 and the difference in fishery independent survey gear from commercial fishing gear leaves some uncertainty that the information is currently applicable to commercial shrimp trawling in state waters, but the available information indicates that all main species are above PRI.
					Skimmer trawl	Mandatory federal observer coverage in the skimmer trawl fishery, which takes place mostly in Louisiana state waters, occurred in 2012, 2013, and 2014 (see section 2.4 for more details). No species managed with reference points are on the list, so no Primary species are preliminarily identified.As a precaution, given the large amount of unidentified fish in the catch, the assessment team considers that this indicator is unlikely to achieve an unconditional pass without some knowledge of the species in the unidentified category.
		2.1.2	Management			The Louisiana Shrimp Management Plan characterizes the otter trawl species composition from federal observers and the management of bycatch in federal waters. The Plan also characterizes the skimmer trawl species composition from federal observers in state waters. But the Plan does not address management of primary species occurs for state waters. It seems likely that red snapper and pink shrimp, potential Primary species if using federal data, occur in state

Principle	Component	PI	Performance Indicator	RBF required? (y/n)	Likely scoring level	Rationale/ Key points
						waters. State data suggest that menhaden and blue crabs are the primary species. The plan notes that bycatch reduction devices are not mandatory but many fishermen voluntarily use them in both otter and skimmer trawls. There is no suggestion that the Louisiana management system has done a review of the potential effectiveness and practicality of alternative measures to minimise UoA-related mortality of unwanted catch of main primary species for otter trawl or skimmer trawl. Red snapper and pink shrimp are well managed in federal waters.
		2.1.3	Information			The low level of federal observer coverage and the lack of recent observer data from state bycatch monitoring (none since 1989) will likely draw serious criticisms from reviewers, who will likely conclude that the observer effect (fishermen changing behavior with observers onboard) and low coverage render the data unrepresentative of the actual fishery. While NMFS analysts consider the federal observer coverage adequate, independent reviewers may disagree. It is unclear that the observer coverage has the statistical power to provide robust estimates, and a review of the statistical properties of the observer program could address this. The status of fish and crustaceans in the unidentified categories cannot be determined. The 1-2% federal observer coverage rate of the otter trawl fishery will unlikely have statistical power to provide robust estimates. Even though the state fishery independent surveys are similar in species composition to the 1989 bycatch monitoring, the difference in gear for sampling from the commercial gear leaves some questions. The lack of bycatch surveys since 1998 and the difference in fishery independent survey gear from commercial fishing gear leaves some uncertainty that the information is currently applicable to commercial shrimp trawling in state waters. Mandatory observer data of skimmer trawls was collected was collected in 2012, 2013, and 2014. These data may not be representative of the fishery, as a substantial amount of potential fishing effort could not be sampled. For the 277 state permit holders selected for observer coverage in 2014, 15 carried an observer, 18 contacted the program stating they would carry an observer if they fished but never called back, 60 stated the vessel was sold, inactive, or not using skimmer trawl gear, and 182 permit holders selected did not contact the program. Two permit holders refused to carry observers.

Principle	Component	PI	Performance Indicator	RBF required? (y/n)	Likely scoring level	Rationale/ Key points
						A review of the statistical properties of the state and federal observer programs data would help determine the power of the estimates, and help plan for state observer sampling should that occur in the future.
	Secondary species	2.2.1	Outcome	Y	Otter trawl	Otter trawl Bay anchovy are considered Main secondary species based on state bycatch monitoring and fishery independent surveys. Of the remaining species, sea trout, Atlantic croaker, and sea catfish make up the highest proportion (>2%) and are considered Minor species. As no status determination has occurred for these species, RBF will be required. Bay anchovies, sea trout, Atlantic croaker, and sea catfish are considered low risk under a preliminary PSA (Appendix 1). See Section 2.4 for more details. The species composition from federal observer reports is somewhat different from state data, but contains large amounts of unidentified fish and crustaceans. Finfish, Atlantic croaker, crustaceans, and sea trout (genus) consistently make up >5% of the total catch from federal observer reports, and are considered potential Main species. Longspine porgy made up ~4%, and could reach 5% with more data, but is not considered Main at this point. As no status determination has occurred for these species, RBF will be required. A preliminary PSA (Appendix 1) demonstrates that Atlantic croaker, sea trout, and longspine porgy have low risk. The generic finfish and crustacean categories cannot be evaluated as a group because to the likely diversity of species. The PSA does not identify any species found in bycatch monitoring and fishery independent surveys as at-risk Secondary species. The lack of bycatch surveys since 1998 and the difference in fishery independent survey gear from commercial fishing gear leaves some uncertainty that the information is currently applicable to commercial shrimp trawling in state waters, but the available

Principle	Component	PI	Performance Indicator	RBF required? (y/n)	Likely scoring level	Rationale/ Key points
					Skimmer	information indicates that all main species are above PRI. Skimmer trawl Mandatory federal observer coverage in the skimmer trawl fishery occurred in 2012, 2013, and 2014, and the species composition for species making up ≥0.3% of the catch is shown in the table in PI 2.1.1. All species on the list are considered secondary as none are managed with reference points. Unidentified fish, Atlantic croaker, and unidentified crustaceans meet the threshold as Main species. These species require RBF. All others are considered as minor. However, cownose ray reached 3.6% in one of the three years, and as a vulnerable species, could reach the 2% threshold with more data. A preliminary PSA for cownose ray determined this species is a medium risk. As a precaution, given the large amount of unidentified fish in the catch, the assessment team considers that this indicator is unlikely to achieve an unconditional pass without some knowledge of the species in the unidentified category.
		2.2.2	Management			The Louisiana Shrimp Management Plan characterizes the otter trawl species composition from federal observers and the management of bycatch in federal waters. The Plan also characterizes the skimmer trawl species composition from federal observers in state waters. But the Plan does not specify if management of secondary species occurs for state waters. The plan notes that bycatch reduction devices are not mandatory but many fishermen voluntarily use them in both otter and skimmer trawls. There is no suggestion that the Louisiana management system has done a review of the potential effectiveness and practicality of alternative measures to minimise UoA-related mortality of unwanted catch of main secondary species for otter trawl or skimmer trawl.
		2.2.3	Information			The RBF will be required for Main species: Finfish, bay anchovy, Atlantic croaker, crustaceans, and sea trout (genus), and possibly for longspine porgy. A PSA was conducted for these species plus sea catfish. Appendix 1 shows low risk for Atlantic croaker, sea trout, sea catfish, and longspine progy, and medium risk for cownose ray. The low level of federal observer coverage and the lack of recent observer data from state bycatch monitoring (none since 1989) will likely draw serious criticisms from reviewers, who will likely conclude that the observer effect

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						(fishermen changing behavior with observers onboard) and low coverage render the data unrepresentative of the actual fishery. While NMFS analysts consider the federal observer coverage adequate, independent reviewers may disagree. It is unclear that the observer coverage has the statistical power to provide robust estimates, and a review of the statistical properties of the observer program could address this. The status of fish and crustaceans in the unidentified categories cannot be determined. The 1-2% federal observer coverage rate of the otter trawl fishery will unlikely have statistical power to provide robust estimates. Even though the state fishery independent surveys are similar in species composition to the 1989 bycatch monitoring, the difference in gear for sampling from the commercial gear leaves some questions. The lack of bycatch surveys since 1998 and the difference in fishery independent survey gear from commercial fishing gear leaves some uncertainty that the information is currently applicable to commercial shrimp trawling in state waters, Mandatory observer data of skimmer trawls was collected was collected in 2012, 2013, and 2014. These data may not be representative of the fishery, as a substantial amount of potential fishing effort could not be sampled. For the 277 state permit holders selected for observer coverage in 2014, 15 carried an observer, 18 contacted the program stating they would carry an observer if they fished but never called back, 60 stated the vessel was sold, inactive, or not using skimmer trawl gear, and 182 permit holders selected did not contact the program. Two permit holders refused to carry observers. A review of the statistical properties of the state and federal observer programs data would help determine the power of the estimates, and help plan for state observer sampling should that occur in the future.
	ETP species	2.3.1	Outcome	N		Species in the Gulf protected under the Endangered Species Act (ESA) include: five marine mammal species (sei, fin, humpback, sperm whales, and manatees); five sea turtles (Kemp's ridley, loggerhead, green, leatherback, and hawksbill); two fish species (Gulf sturgeon and smalltooth sawfish); and four coral species (elkhorn coral, lobed star coral, boulder star coral, and mountainous star coral). NMFS has set proxy limits for sea turtle takes using upper limits on shrimp otter

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						trawling effort and minimum levels of TED compliance. The 2014 BiOp for sea turtles concluded that effort has continued below the limit and compliance has exceeded to limit, such that the fishery meet national limits, and the fishery does not have direct or indirect effects that hinder recovery. The BiOp also concluded that other MSC units of assessment (e.g., US and Canada swordfish) would not contribute cumulatively with the shrimp trawl fishery to cause jeopardy to the sea turtles. The BiOp demonstrates that the fishery meets the national and international requirements, and concludes that the fishery does not cause adverse impacts or hinder recovery. At this point, the fishery reaches a full pass. However, a lawsuit by Oceana challenging the methodology and conclusions of the BiOp alleges that NMFS cannot draw such conclusions. The issue of the need for ongoing observer coverage, and the appropriate level of coverage, is a key element to the lawsuit. Resolution of the lawsuit may change the scoring for this indicator. If Oceana prevails and NMFS must withdraw the shrimp Biological Opinion, it is likely that NMFS is not complying with legal requirements, and the direct effects are in question. In this case, the fishery likely fails this indicator. If NMFS prevails, the fishery likely passes this indicator. In the 2014 shrimp biological opinion, NMFS determined that the fishery is unlikely to jeopardize sawfish and Gulf sturgeon, and that the fishery complies with all management measures set for the fishery. The biological opinion did not report any jeopardy for marine mammals or corals.
		2.3.2	Management		Otter trawl	NMFS has set a strategy for the management of sea turtles, based around the use of TEDs maintain the abundance above thresholds. Under the strategy, fishing effort has remained below limits and TED compliance has remained above limits. This meets the requirements for a full pass. The Oceana lawsuit challenges the effectiveness of the strategy, and the resolution may affect the evidence for successful implementation. Biological opinions are revised periodically as new information becomes available.

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					Skimmer	Skimmer trawls do not require TEDs. NMFS proposed, but withdrew, regulatory action to require TEDs. The majority (58%) of the sea turtles captured during the 2012 observer coverage were small enough to pass through the maximum 4-inch TED bar spacing currently allowed. It was hypothesized that the elimination of tow time restrictions would likely increase tow times, thus potentially increasing mortality for any sea turtle passing through the TED grid into the cod end of the trawl. Even though tow time restrictions were exceeded on 65% of the tows observed in 2012, all sea turtles (24) captured were released alive. One sea turtle was comatose when captured, but active when released. However, the proportion of tows that exceed the tow time limit demonstrate that the management system is not fully implemented. The Oceana law suit points out the excessive tow times as evidence that the skimmer strategy does not work, and that TEDs should be required. If Oceana prevails and NMFS must withdraw the shrimp Biological Opinion, it is likely that NMFS is not complying with legal requirements, and the direct effects are in question. In this case, the fishery likely fails this indicator.
		2.3.3	Information			NMFS estimates the mortality of the sea turtle species in the shrimp and other fisheries. Observer coverage is low, and deemed inadequate by many stakeholders. NMFS uses proxy data, rather than observer data, to estimate the impacts on sea turtles. This information provides quantitative data for estimating the impacts of the fishery, tracks trends in impacts, and supports the strategy. Mandatory observer data of skimmer trawls was collected was collected in 2012, 2013, and 2014. These data may not be representative of the fishery, as a substantial amount of potential fishing effort could not be sampled. For the 277 state permit holders selected for observer coverage in 2014, 15 carried an observer, 18 contacted the program stating they would carry an observer if they fished but never called back, 60 stated the vessel was sold, inactive, or not using skimmer trawl gear, and 182 permit holders selected did not contact the program. Two permit holders refused to carry observers. The program provided estimates of sea turtle interactions, proportion of vessels carrying BRDs or TEDs, and tow duration.

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						The Department of Wildlife and Fisheries has proposed a number of monitoring and research projects that, if successfully implemented, would add to the information available for sea turtle protection and management 1. Create a Sea Turtle Information Hub—a digital data source for all information regarding sea turtles in the Gulf of Mexico. 2. Implement beach patrol surveys to monitor for nesting activity and strandings 3. Implement observer survey in state waters 4. Conduct aerial surveys for nesting and stranded sea turtles 5. Research TED compliance 6. Implement Sea Turtle Reporting and Response Program 7. Conduct satellite tagging study 8. Research the feasibility of using trawl sampling gear to monitor sea turtle populations in Louisiana and Gulf of Mexico waters A more detailed review during a full assessment could determine that that catch information of primary species is inadequate due to low observer coverage, leading to a conditional pass. A review of the statistical properties of the observer program data would help determine the power of the estimates. The Oceana lawsuit challenges whether the information is adequate to estimate the interactions and mortalities with sufficient accuracy to assess the effects of the fishery on the populations. The resolution of the lawsuit may affect the conclusions whether Information is adequate to support management measures.
	Habitats	2.4.1	Outcome	N		Otter trawl Trawling is recognized for its impacts to benthic environments because the heavy doors drag along the bottom and the tickler chains scrape along the sea floor. The shrimp fishery is prosecuted primarily over soft substrates such as mud or silt that are more resilient to disturbance than other bottom types. Currents and storms may have more effects on the physical characteristics of an area. In the Gulf of Mexico, shrimp are harvested almost entirely over soft bottoms, such as mud or silt, which are more resilient to impacts from fishing gear than other bottom types. Studies in other areas have indicated that shrimp

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						trawling has few, if any, long-term impacts on organisms that dwell on soft bottoms. Skimmer trawl In North Carolina, based on underwater observations, skimmer nets are less damaging than otter trawls; this conclusion should also apply to skimmer trawls in Louisiana.
		2.4.2	Management			The GMFMC has a long history of evaluating habitats and determining the impacts of fishing. It has identified essential fish habitat and habitat areas of particular concern; EFH extend to the shore and include state waters. Given the distribution of the habitats, little active management of the fishery is required, and management review focuses more on avoiding adverse anthropogenic impacts. No specific state management occurs for habitat. Seagrasses may be determined as a vulnerable marine ecosystem.
		2.4.3	Information			Direct observation demonstrates that the primary habitat, sand and mud, undergoes substantial natural disturbance. Fishery evaluations during the development of EFH designations have identified the impacts of shrimp trawling, and determined that the fishery does not do serious or irreversible harm to structure and function of the habitat.
	Ecosystem	2.5.1	Outcome			The GMFMC and NMFS have a long history of interest in ecosystem-based fishery management. The GMFMC has focussed on habitat issues, and it not clear whether the GMFMC has identified key features most crucial to maintaining the integrity of ecosystem structure and functions and ensuring that ecosystem resilience and productivity is not adversely impacted. While information, including some ecosystem models, is available, it has not been gathered and consolidated to draw conclusion about the status of the ecosystem for the overall Gulf of Mexico or Louisiana waters.
		2.5.2	Management			There is no explicit partial strategy for management of activities that could affect structure and function of the overall ecosystem, but measures do exist. The GMFMC management activities focus on minimizing incidental catches through use of BRDs, minimizing impacts on sea turtles through use of TEDs, and minimizing impacts on habitats with identification of EFH and HAPC. Other than

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						impacts on sea turtles, based on the Oceana lawsuit, the measures seem appropriate and effective.
		2.5.3	Information			The role in the ecosystem of the white and brown shrimp, the incidental and ETP species, and the habitats are generally known and understood. However, consolidation of information to understand the impacts of the fishery on species diversity and on ecological services provided by the ecosystem components is not generally available.
	Number of PIs less than 60:					2
3	Governance & policy	3.1.1	Legal and customary framework			The federal fisheries operate primarily under the MSA. The Magnuson-Stevens Act claims sovereign rights and exclusive fishery management authority over most fishery resources within the EEZ, an area extending 200 nautical miles from the seaward boundary of each of the coastal states. Responsibility for federal fishery management decision-making is divided between the Secretary of Commerce (Secretary) and eight regional fishery management councils that represent the expertise and interests of constituent states. Regional councils are responsible for preparing, monitoring, and revising management plans for fisheries needing management within their jurisdiction. The Secretary is responsible for promulgating regulations to implement proposed plans and amendments after ensuring that management measures are consistent with the Magnuson-Stevens Act and with other applicable laws summarized in Appendix A. In most cases, the Secretary has delegated this authority to NMFS. The Council is responsible for fishery resources in federal waters of the Gulf. These waters extend to 200 nautical miles offshore from the nine-mile seaward boundary of the states of Florida and Texas, and the three-mile seaward boundary of the states of Alabama, Mississippi, and Louisiana. The purpose of state representation at the Council level is to ensure state participation in federal fishery management decision-making and to promote the development of compatible regulations in state and federal waters. The state governments have the authority to manage their respective Shrimp state fisheries including enforcement of fishing regulations. Each of the five states exercises legislative and regulatory authority over their state's natural resources

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						through discrete administrative units. In addition, the Endangered Species Act, the Marine Mammal Act, the Migratory Bird Treaty Act, the Coastal Zone Management Act, and the Clean Water Act apply to or provide protection for the shrimp and shrimp fishery. The states also have clear legal jurisdiction over state fishermen and fishing in state waters. The Council, the ASMFC, and NMFS participation constitute a system that fosters cooperation among the states and federal management Disputes are resolved in an open and transparent manner through deliberations and recommendations by Council advisory bodies, by debate within the Council which votes in public, and access to the courts by aggrieved parties. The states also have dispute resolution through the state management systems and state courts. The majority of shrimp are harvested by the commercial fishery using otter trawls. State and federal regulations allow other gears that small scale commercial fishermen may use, and allow for recreational (personal use) fishermen. The Louisiana Constitution establishes the basic premise for natural resources management: “The natural resources of the state, including air and water, and the healthful, scenic, historic, and esthetic quality of the environment shall be protected, conserved, and replenished insofar as possible and consistent with the health, safety, and welfare of the people. The legislature shall enact laws to implement this policy.” The Constitution also established the Louisiana Wildlife and Fisheries Commission, and vested control and supervision of the wildlife of the state, including all aquatic life, to the Commission. The Commission is a policy-making and budgetary-control board, with no administrative functions. The Commission shall have sole authority to establish definite management programs and. It shall formulate the policies and shall determine the wisdom and efficacy of the policies, plans, rules, regulations and proceedings of the commission. The Louisiana Department of Wildlife and Fisheries implements the policies of the Commission. The secretary of the Department of Wildlife and

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						Fisheries shall have the power to perform any and all acts, and to prescribe, issue, make, amend, and rescind such orders, rules, and regulations as are deemed necessary and proper.
		3.1.2	Consultation, roles and responsibilities			Federal waters: The Federal system has an effective and transparent consultation process. The roles of the Council, NMFS, GSMFC and states are clearly defined. Federal management actions begin with a scoping process that allows stakeholder involvement in defining the goals and potential solutions for identified problems. Stakeholder advisory panels and a scientific panel provide input through the development of planning for management actions at both federal and state levels. Multiple public hearings before the Council, the GSMFC, and state agencies receive recommended final actions. NMFS has a rulemaking procedure for implementing the management actions that allows for additional public comment. The division of responsibilities among the Council, NMFS, and the states is clear and understood. State waters: The role of the State legislature, the Wildlife and Fisheries Commission, and the Department of Wildlife and Fishery are well defined. Law and regulation making require on open and transparent process involving opportunities for stakeholders to participate. All meetings of the Natural Resources Committees of the Legislature, Commission, and the Shrimp Task Force are open to the public, according to Louisiana's Open Meetings Law (Louisiana Revised Statutes 42:12–42:28). This law ensures that government decisions are made in an open forum. Decisions of the Commission are recorded in minutes that describe the discussions and the rationale for decisions. While Louisiana's fisheries management requires opportunity for public participation throughout the management process, they need give only 24 hours notice of meetings. In practice, the LDWF, through the Shrimp Task Force and other meetings, extends to stakeholders opportunities for consultation.
		3.1.3	Long term objectives			The MSA has established fisheries-management objectives in the form of the 10 National Standard Guidelines. The NSG are implemented by NMFS under 50 CFR Part 600 subpart D. The NSGs have been interpreted as being consistent

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						with international agreements and criteria for precautionary approaches. Guidelines for implementing the legislation have been translated into scientific and technical guidance for developing limit and target control reference points for assessing stock abundance reference points, with some suggestions for defaults. The fishery management agencies of the states have goals and objectives set in the missions of the agencies. The Louisiana Revised Statutes (Title 56) set the objective of all rules and regulations as the sound conservation, preservation, replenishment, and management of that species for maximum continuing social and economic benefit to the state without overfishing that causes short-term or long-term biological damage to any species, and regarding all species of fish, without overfishing that leads to such damage. Title 56 contains many examples of objectives to practice fishery management to assure good conservation and use best available science. These objectives do not address uncertainty in science and management. As such, it is not clear that the objectives are consistent with the use of the precautionary approach.
	Fishery specific management system	3.2.1	Fishery specific objectives			In addition to the National Standard Guidelines that provide objectives for federally managed fisheries, the GMFMC has established explicit objectives consistent for achieving P1 and P2 for the shrimp fisheries in the US southeast: • Optimize the yield from shrimp recruited to the fishery. • Encourage habitat protection measures to prevent undue loss of shrimp habitat. • Coordinate the development of shrimp management measures by the Gulf of Mexico Fishery Management Council (GMFMC) with the shrimp management programs of the several states, when feasible. • Promote consistency with the Endangered Species Act and the Marine Mammal Protection Act. • Minimize the incidental capture of finfish by shrimpers, when appropriate. • Minimize conflict between shrimp and stone crab fishermen. • Minimize adverse effects of obstructions to shrimp trawling. • Provide for a statistical reporting system.

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						In addition to overarching objectives of the state management system, the Department of Wildlife and Fisheries has set explicit objectives consistent with P1 and P2: • Enhance economic value of the shrimp resource by promoting more effective and efficient harvesting strategies and practices. • Achieve a level of fishing capacity that provides for a sustainable harvest and allows for a profitable fishery. • Minimize incidental harvest of finfish, crustaceans, and protected species. • Promote the protection, restoration, and enhancement of habitat and environmental quality necessary for sustaining the shrimp resource. • Reduce conflicts among and within user groups, including non-shrimping user groups and activities. • Minimize adverse effects of underwater obstructions to shrimp trawling. • Reduce to the maximum extent possible waste of the resource by discouraging operations that result in culling to increase size of retained harvest. • Promote research, surveys, and outreach efforts that contribute to achieving management goals and objectives.
		3.2.2	Decision making processes			Overarching decision-making framework for the shrimp fisheries occurs primarily within the Gulf of Mexico Fishery Management Council process. However, National Marine Fisheries Service (NMFS), the states, and numerous industry, academic, and NGO stakeholders participate in the process. Federal waters: Through its planning and consultation process, the Council develops a series of alternatives for solving identified management problems. The Council decides in public with justification which alternative to select. The decisions must meet the standards of the MSA, which requires that the decisions comply with fishery-specific and national objectives. NMFS approves, partially approves, or disapproves Council actions, and subsequently implements them as regulations if approved. State fisheries operate within the framework of the Council management, except that federal fishery management does not extend to state waters other than for endangered species management. Louisiana has an established decision

Principle	Component	PI	Performance Indicator	RBF required? (y/n)	Likely scoring level	Rationale/ Key points
						making through analysis by LDWF staff, consultations with stakeholders, and decisions by the Fisheries Commission. The Louisiana Open Meetings Law (Louisiana Revised Statutes 42:12–42:28) ensures that government decisions are made in an open forum. Louisiana demonstrated recognition of important issues when it passed a law allowing enforcement of federal regulations requiring TEDs. The decision making may use the precautionary approach, but it is not clear that the precautionary approach is mandatory.
		3.2.3	Compliance and enforcement			TEDs, BRDs, license limitation, and closed areas comprise the main management measure for the shrimp fisheries. TED implementation, one of the key compliance issues, has improved over the past several years according to the 2014 shrimp BiOp. The NMFS Office of Law Enforcement, the US Coast Guard, and state enforcement agencies have a joint operating agreement for consistent enforcement activities. The states all actively participate in the JOA. Through events, outreach materials, and other resources, LDWF informs commercial and recreational fishermen about programs, projects, and most importantly, relevant rules and regulations to prevent illegal activities. LDWF's Law Enforcement Division is responsible for ensuring compliance with all commercial and recreational licensing and harvesting regulations through regular patrols and investigations. Commissioned law enforcement officers of the United States Department of the Interior and the National Marine Fisheries Service have the same powers and duties as are provided for regularly commissioned officers of the enforcement division of the Louisiana Department of Wildlife and Fisheries to enforce any and all saltwater fisheries laws and regulations under the jurisdiction of the department, to make arrests, and to conduct searches and seizures. The US Coast Guard conducts at-sea boardings. A Louisiana enforcement report for Oct 2011 to Jan 2013 reported 147 inspections of otter trawl vessels and found 41 violations for TED use. Of the 41 violations, 31 received warnings and 10 received notices of violation. The US Coast Guard conducted 310 boardings of Louisiana shrimp otter trawl vessels from 2009-2014, and found 184 with no violations. Fifteen vessels had TED violations. Federal observer coverage of the skimmer trawl fishery in 2012-2014

Principle	Component	PI	Performance Indicator	RBF required? (y/n)	Likely scoring level	Rationale/ Key points
						found roughly half of the tows exceeded time requirements implemented to protect sea turtles in place of requirements for TEDs. Sanctions for state violations range from small fines to large fines ($7000), up to a year in jail, and violators must forfeit any shrimp in connection with the violation, may have their license revoked, and have illegal or improperly tagged fishing gear confiscated. While shrimp fishermen generally comply with regulations, skimmer trawl fishermen appear to systematically exceed the tow time limits.
		3.2.4	Management performance evaluation			No explicit review of the federal management system for shrimp occurs. However, the 15 fishery management plan amendments for shrimp demonstrate that the management system internally evaluates its performance and undertakes corrections as necessary. Management plan amendments undergo rigorous internal and external review. The Office of Law Enforcement is accredited by the International Commission on Accreditation for Law Enforcement Agencies, and undergoes periodic re-accreditation. The development of a new shrimp management plan demonstrates that the Louisiana shrimp management system undergoes at least some internal review. A fishery improvement project, first with Sustainable Fisheries Partnership and then with Louisiana Audubon, has conducted an external review of the shrimp management system; the FIP is ongoing.
	Number of PIs less than 60:					0

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Appendix 1 PSA scores

		Productivity Scores [1-3]								Susceptibility Scores [1-3]					PSA scores (automatic)			
COMMON_NAME	GEAR_TYPE (1.1.1)	Average age at maturity	Average max age	Fecundity	Average max size	Average size at Maturity	Reproductive strategy	Trophic level (fishbase)	Total Productivity (average)	Availability	Encounterability	Selectivity	Post-capture mortality	Total (multiplicative)	PSA Score	MSC Score	Risk Category Name	MSC scoring guidepost
Atl croaker	shrimp trawl	1	1	1	1	1	1	3	1.29	1	3	3	3	1.65	2.09	93.4	Low	>80
Sea trout	shrimp trawl	1	2	1	2	1	1	3	1.57	1	3	3	3	1.65	2.28	89.7	Low	>80
Longspine porgy	shrimp trawl	1	1	1	1	1	1	3	1.29	1	3	3	3	1.65	2.09	93.4	Low	>80
Cownose ray	shrimp trawl	2	3	3	2	2	3	2	2.43	1	3	3	3	1.65	2.94	69.9	Med	60-80
Bay anchovy	shrimp trawl	1	1	1	1	1	1	3	1.29	1	2	2	3	1.28	1.81	97.5	Low	>80
Sea catfish	shrimp trawl	1	1	3	1	1	3	2	1.71	1	3	3	3	1.65	2.38	87.3	Low	>80