

# LOUISIANA SPOTTED SEATROUT Fishery Management Plan

**Louisiana Department of Wildlife & Fisheries**  
***Office of Fisheries***

Authors: David M. Norris, Jason Adriance, Joe West, and Jack Isaacs

Editors/Point of Contact: Jason Adriance, [jadriance@wlf.la.gov](mailto:jadriance@wlf.la.gov)



# Contents

<b>List of Tables &amp; Figures</b> .....	<b>V</b>
<b>Executive Summary</b> .....	<b>1</b>
<b>Introduction</b> .....	<b>2</b>
Definition of Management Unit.....	2
Management Authority and Process.....	2
Management Goals and Objectives.....	2
<b>Description of the Stock</b> .....	<b>3</b>
Biological Profile.....	3
Physical Description.....	3
Distribution.....	4
Habitat.....	4
Reproduction.....	4
Age and Growth.....	5
Predator-Prey Relationships.....	5
Stock Status and Assessment Methodology.....	6
Stock Unit Definition.....	6
Assessment Frequency, Reference Points and Control Rules.....	6
Stock Status.....	6
Assessment Methods.....	6
Regional Assessment Efforts.....	8
Stock Resilience.....	8
<b>Description of the Fishery</b> .....	<b>9</b>
Data Collection and Analyses.....	9
Commercial Fishery.....	9
Volume and Value of Landings.....	9
Commercial Spotted Seatrout Fishermen and Fishing Effort.....	12
Domestic and Foreign Market.....	13
Recreational Fishery.....	13
Interactions with Other Fisheries or User Groups.....	16

<b>Ecosystem Considerations and Environmental Factors.....</b>	<b>17</b>
Ecosystem Considerations.....	17
<i>Habitat.....</i>	<i>17</i>
<i>Bycatch and Discards.....</i>	<i>17</i>
<b>Environmental Factors.....</b>	<b>18</b>
<i>Hydrological Conditions (Salinity, Water Temperature, Dissolved Oxygen and Turbidity)....</i>	<i>18</i>
<i>Diseases and Parasites.....</i>	<i>19</i>
<i>Predation.....</i>	<i>20</i>
<i>Competition from Other Species.....</i>	<i>20</i>
<i>Invasive Species.....</i>	<i>21</i>
<i>Incidental Catch of Spotted Seatrout in Other Fisheries.....</i>	<i>21</i>
<i>Habitat Loss and Restoration.....</i>	<i>21</i>
<i>2010 Deepwater Horizon Oil Spill.....</i>	<i>21</i>
<b>Fishery Management Program.....</b>	<b>23</b>
Management Framework.....	23
Authorities.....	24
<i>Louisiana.....</i>	<i>24</i>
<i>Regional.....</i>	<i>25</i>
Existing Management Measures.....	26
<i>Plans.....</i>	<i>26</i>
<i>Policies.....</i>	<i>26</i>
<i>Statutes and Rules.....</i>	<i>26</i>
<b>Compliance.....</b>	<b>29</b>
<i>Reporting Methods and Requirements.....</i>	<i>29</i>
<i>Recordkeeping Requirements.....</i>	<i>30</i>
<i>Enforcement.....</i>	<i>30</i>
<i>Penalties.....</i>	<i>30</i>
<b>Current Issues and Management Options.....</b>	<b>31</b>
Stock Overfished.....	31
Options.....	31
<b>Future Research and Data Needs.....</b>	<b>32</b>
Research Priorities, Funding and Publication.....	32
<b>Acknowledgments.....</b>	<b>33</b>
<b>Literature Cited.....</b>	<b>34</b>

# Appendices

<b>Appendix I: Assessment of Spotted Seatrout (<i>Cynoscion nebulosus</i>) in Louisiana Waters 2019 Report.....</b>	<b>40</b>
<b>Appendix II: LA R.S. 56:638.1-5. Fish Conservation, Management and Sustainability: Legislative Intent, Findings, Purposes, Policy and Fishery Standards.....</b>	<b>114</b>
<b>Appendix III: Louisiana Legislative Process.....</b>	<b>115</b>
<b>Appendix IV: Authorities and Duties of the Louisiana Wildlife and Fisheries Commission.....</b>	<b>116</b>
<b>Appendix V: Authorities and Duties of the Secretary and the Louisiana Department of Wildlife and Fisheries.....</b>	<b>118</b>
<b>Appendix VI: Other States’ Commercial Spotted Trout Fishing Regulation.....</b>	<b>119</b>
<b>Appendix VII: Other States’ Recreational Spotted Trout Fishing Regulations.....</b>	<b>120</b>
<b>Appendix VIII: Federal Management Institutions.....</b>	<b>121</b>
<b>Appendix IX: Federal Laws, Regulations and Policies.....</b>	<b>123</b>
<b>Appendix X: Commercial and Recreational Spotted Seatrout Fishery Regulations - Detailed Text.....</b>	<b>125</b>
<b>Appendix XI: Chronology of Major Changes to Louisiana’s Spotted Seatrout Fisheries Regulations.....</b>	<b>137</b>
<b>Appendix XII. Penalties for Regulatory Violations.....</b>	<b>139</b>

# List of Tables & Figures

## TABLES

1. FAO proposed guideline for indices of productivity for exploited aquatic species. ....	8
2. Pounds and value of Louisiana landings of Spotted Seatrout, 2000-2019. ....	10
3. Pounds of commercial landings of Spotted Seatrout, by state, 2000-2019. ....	10
4. Average pounds of Louisiana commercial Spotted Seatrout landings by month, 2000-2019. ....	11
5. Number of seafood dealers handling Spotted Seatrout, 2000-2019. ....	11
6. Landings of Spotted Seatrout by gear type, 2000-2019. ....	11
7. Number of vessels with Spotted Seatrout landings and landings by vessel length, 2000-2019. ....	11
8. Landings of spotted seatrout by area, 2000-2019. ....	12
9. Commercial fishermen with landings of Spotted Seatrout, 2000-2019. ....	14
10. Fishing effort: commercial trips with Spotted Seatrout landings, 2000-2019. ....	14
11. Commercial landings of Spotted Seatrout, Sand Seatrout, and Silver Seatrout, 2000-2019. ....	14
12. Annual recreational landings of Spotted Seatrout in Louisiana, 2000-2013. Source: NMFS MRIP, Harvest (Type A + B1). ....	14
13. Statewide effort of private recreational and for-hire saltwater fishing trips, 2014-2019. ....	15
14. Annual percentage of surveyed private recreational and for-hire saltwater fishing trips that landed Spotted Seatrout, 2014-2019. ....	15
15. Protected sea turtles in Louisiana and Gulf waters. ....	9

## FIGURES

1. Map of Louisiana’s coastal study areas (CSAs). ....	7
2. Annual private recreational and for-hire landings of Spotted Seatrout in Louisiana in number of fish, 2014-2019. ....	14
3. Annual private recreational landings of Spotted Seatrout in Louisiana by area in number of fish, 2014-2019. ....	15
4. Annual for-hire landings of Spotted Seatrout in Louisiana by area in number of fish, 2014-2019. ....	15
5. Age composition of annual female Spotted Seatrout recreational landings in Louisiana, 2014-2019. ....	15

# Executive Summary



Spotted Seatrout (*Cynoscion nebulosus*) is one of the nation's top recreational finfish fisheries and the number one targeted salt-water fish in Louisiana. Anglers have harvested Spotted Seatrout in Louisiana waters for more than a century. Historically, Spotted Seatrout were harvested commercially using gillnets and other entangling nets, however changes in demand and policy have caused commercial harvest to wane. Spotted Seatrout commercial harvest peaked in the 1970s at 2.5 million pounds and was near 1 million pounds when entangling nets became illegal. Currently, the only legal gear in the commercial Spotted Seatrout fishery is rod and reel gear used by a few harvesters in a very limited access fishery. Despite a 1 million pound commercial quota, in recent decades, the commercial harvest of Spotted Seatrout is a fraction of what it was historically and typically averages below 10,000 pounds annually. Today the Spotted Seatrout fishery is dominated by recreational hook and line fishing. Recent recreational harvests of Spotted Seatrout have averaged just over 4 million fish per year.

As Louisiana's spotted seatrout fishery developed, managers implemented a number of measures to prevent overharvesting and maintain the Spotted Seatrout population at sustainable levels. Biologists regularly monitor and assess the condition of this valuable resource to ensure these measures are effective and to inform future management decisions, all in an effort to protect the viability of the Spotted Seatrout resource for future generations.

This fishery management plan creates a centralized document that summarizes current information about the biology and status of Louisiana Spotted Seatrout, Louisiana's commercial and recreational fisheries for Spotted Seatrout, effects of Louisiana's Spotted Seatrout fisheries on the ecosystem, and environmental influences on Louisiana's Spotted Seatrout resource. In addition, this plan describes management approaches within the state and regional framework, defines long-term management goals and objectives, identifies management issues, recommends options to address these issues, and outlines future research needs.

# Introduction

## DEFINITION OF MANAGEMENT UNIT

The management unit consists of the population of Spotted Seatrout *Cynoscion nebulosus* residing in the coastal and estuarine waters of Louisiana.

## MANAGEMENT AUTHORITY AND PROCESS

The Louisiana State Legislature (Legislature), the Louisiana Wildlife and Fisheries Commission (Commission), and the Louisiana Department of Wildlife and Fisheries (LDWF) are responsible for managing fisheries for Spotted Seatrout in Louisiana's state waters, which include inland waters and extend seaward from the shoreline to three nautical miles.

Louisiana Revised Statutes (LA R.S.) Title 56, provide for the preparation and implementation of fishery management plans that will prevent overfishing and will achieve and maintain plentiful fish populations to ensure, on a continuing basis, the optimum yield from each fishery. Louisiana's fishery management plans are developed according to applicable principles and standards of the Food and Agriculture Organization of the United Nations' (FAO) Code of Conduct for Responsible Fisheries.

Responsible fisheries management requires an ongoing process of continual improvement, with active monitoring of fisheries resources and fisheries and timely response to any observed changes. Fishery management plans are flexible and can be improved with collection and analyses of relevant data. Plan work groups will continuously review new research and monitoring information every year, document progress toward fishery management goals and objectives, and fully review and revise management plans as managers and stakeholders prioritize issues and identify and refine options.

## MANAGEMENT GOALS AND OBJECTIVES

The goal of the Louisiana Spotted Seatrout Fishery Management Plan is to ensure long-term conservation and sustainable use of the Spotted Seatrout resource for the maximum environmental, social, and economic benefit to the state of Louisiana, its citizens, and visitors.

LDWF will use the following objectives to achieve this goal:

1. Prevent overfishing and ensure Spotted Seatrout are able to successfully reproduce and maintain the population.
2. Achieve a level of fishing capacity that provides for a sustainable harvest and allows for a profitable fishery.
3. Minimize conflicts among user groups.
4. Minimize fishery impacts on undersized Spotted Seatrout and other species while maintaining a sustainable adult spawning population.
5. Continue to produce stock assessments that establish acceptable biological reference points for fishing mortality and population abundance.
6. Promote research to better understand the impacts of environmental factors on both the Spotted Seatrout population and fisheries as well as the impacts of Spotted Seatrout fisheries on the ecosystem.
7. Promote research to improve knowledge of the commercial and recreational fisheries for Spotted Seatrout, including harvest data and socioeconomic information to enhance social and economic benefits derived from the use of the resource.



# Description of the Stock



## Spotted Seatrout Resilience

Productivity is a function of fecundity, growth rates, natural mortality, age of maturity, and longevity and can be a reasonable proxy for resilience.

Spotted Seatrout are considered highly productive, and therefore highly resilient. Despite these qualities the stock is currently overfished and undergoing overfishing. Management measures are required to ensure future resilience.

## BIOLOGICAL PROFILE

Blanchet et al. (2001) provides a review of Spotted Seatrout biology and ecology throughout the Gulf of Mexico (Gulf). Bortone (2003) further reviews multiple aspects of Spotted Seatrout biology, including one section specific to Louisiana waters (Baltz et al. 2003), while Bourgeois et al. (1996) is a biological profile of Spotted Seatrout in Louisiana. Numerous other texts have investigated specific aspects of Spotted Seatrout biology in recent years and are summarized in this report.

## PHYSICAL DESCRIPTION

The Spotted Seatrout is elongate and moderately compressed (streamlined) with a nearly straight profile and an oblique mouth. The lower jaw projects past the upper jaw, which contains one or two enlarged canines. Spotted Seatrout have one dorsal fin which is separated into two sections by a deep notch; the anterior section consists of bony spines and the posterior section contains only one spine followed by cartilaginous rays. The lateral line begins at the dorsal edge of the operculum (gill cover), angles ventrally to the midline after the pectoral fin, and extends onto the tail. The caudal fin is spear-shaped in younger fish but can become truncate or slightly concave with age. Coloration can vary with water conditions. In general, Spotted Seatrout are silvery gray or green on the dorsum, fading to white on the ventral side. Dark spots are present on the upper portion of the sides, dorsal fin, and caudal fin; occasionally, spots are only present on the fins. The dorsal and caudal fins are dusky; the other fins are pale or yellowish. The edges and interior of the mouth are often bright yellow. Meristics used to describe the species from Johnson (1978) include:

Dorsal fin rays X (rarely IX or XI) - I, 24-28; anal fin rays II, 9-12 (typically 10-11); caudal fin rays 9+8, procurrent rays 6-9 + 5-7; ventral fin rays I, 5; lateral line scales 90-102, scales between anal fin origin and lateral line 11-12; vertebrae 13+12; gill rakers 6-9 on lower limb; branchiostegals 7; a pair of large canine-like teeth at tip of upper jaw; remaining teeth small conical, set in narrow bands with outer row slightly enlarged

in upper jaw and inner row distinctly enlarged in jaw; no teeth on vomer, palatines, or tongue. Head 2.9-3.5, depth 3.4-4.5 in SL; snout 3.7-4.2, eye 4.4-5.3, interorbital 4.5-5.9, maxillary 2.2-2.3, pelvic fin 1.8-2.2 in head.

## DISTRIBUTION

Spotted Seatrout occur along the Atlantic and Gulf coasts of the United States from Massachusetts to Carmen Island in the lower Gulf of Campeche, Mexico (Welsh and Breder 1924; Mather 1952; Tabb 1966). They are increasingly abundant from the eastern seaboard of Virginia southward to Florida (Merriner 1980), and most numerous along the northern Gulf from the west coast of Florida to Texas (Iversen and Moffett 1962; Tabb 1966; Merriner 1980).

## HABITAT

Spotted Seatrout are generally considered non-migratory (Gold and Richardson 1998; Callihan 2011). Their entire life-history is spent in the estuarine habitat, principally in non-tidal areas where seasonal fluctuations in temperature and salinity are the controlling factors (Tabb 1961; Wagner 1973; Bramer 2015). Spotted Seatrout are able to tolerate a wide range of salinities; they are found in salinity ranges of 0.2 to 75 parts per thousand (ppt); (Simmons 1957; Perret et al. 1971;). Small individuals are found year-round in upper portions of the estuary, while larger individuals are generally found in lower, more saline bays. Baer (2019) found that smaller Spotted Seatrout were associated with low salinities more often than larger ones in Lake Pontchartrain, with larger Spotted Seatrout more often occurring at salinities greater than 15 ppt. Bramer (2015) noted that increased salinities were associated with increased likelihood of detecting Spotted Seatrout in Lake Pontchartrain. In the Terrebonne Bay system, Czaplá et al. (1991) reported that abundance of adult Spotted Seatrout was higher at salinities greater than 25 ppt. Similarly, Boswell et al. (2010) found that total fish biomass within Barataria Bay was greater at salinities between 18 and 30 ppt. Callihan (2011) observed responses to salinity changes due to freshwater inputs differed between sexes, with female Spotted Seatrout moving to higher salinity areas while males remained in low salinity areas. Similarly, de Mutsert et al. (2017) predicted long-term redistribution of Spotted Seatrout populations in Barataria Bay and Breton Sound as a direct response to changes in salinity.

Spotted Seatrout occupy a wide range of physical habitats but show some preference to reefs and seagrasses. Bramer (2015) found no physical habitat preferences of Spotted Seatrout within Lake Pontchartrain; however, within Barataria Bay, MacRae and Cowan (2010) and Boswell et al. (2010) found more Spotted Seatrout and higher total fish biomass associated with oyster habitat, respectively. Callihan (2011) observed that Spotted Seatrout in Calcasieu Lake associated with artificial and oyster reefs in the warmer months and used deeper holes and channels within the estuaries as refuge during adverse weather events. Neahr et al. (2010), Moulton et al. (2017), and Livernois et al. (2020) all found Spotted Seatrout associated with seagrasses or emergent marsh. Recent studies suggest that juvenile Spotted Seatrout prefer vegetative habitats (MacRae and Cowan 2010; Neahr et al. 2010; Powers 2012; Hendon 2013; Flaherty-Walia et al. 2015) while larger individuals are more common in reef habitat (TinHan et al. 2018).

Spotted Seatrout are aggregate spawners and will spawn in a wide range of salinities, though spawning activity most often occurs in salinities between 17 and 35 ppt (Tabb 1966; Benson 1982; Tucker and Faulkner 1987; Brown-Peterson et al. 1988; McMichael and Peters 1989; Saucier et al. 1992; Saucier and Baltz 1993). Gravid Spotted Seatrout have been collected in various habitats within Barataria Bay, including shallow water along sandy beaches, turbulent passes, and natural sand and shell reefs (Hein and Shepard 1979b). Juveniles use seagrass and shell beds as nursery habitat where they forage and find shelter (MacRae and Cowan 2010; Neahr et al. 2010; Powers 2012; Hendon 2013; Flaherty-Walia et al. 2015).

## REPRODUCTION

Spotted Seatrout generally reach sexual maturity by age 2, though some evidence suggests Spotted Seatrout may begin spawning their first year (Nieland et al. 2002). Cooper et al. (2013) found that the probability of spawning peaked in early June and late August in Florida. In Louisiana, spawning activity generally occurs from April to September in the higher salinity waters of lower bays and the nearshore Gulf (Sabins and Truesdale 1975; Allshouse 1983; Herke et al. 1984; Helser et al. 1993; Nieland et al. 2002) with two spawning peaks typically around May and August (Hein and Shepard 1979a; Tucker and Faulkner 1987; Wieting 1989). However, various peaks of spawning activity have been recorded throughout Louisiana from July and August in Lake Borgne, May through August in the Biloxi Marsh, May in southeast Louisiana, and July in Lake Calcasieu (Sundararaj and Suttikus 1962; Fontenot and Rogillio 1970; Rogillio 1975; Arnoldi 1982). Several studies have indicated that spawning may occur farther offshore (Stewart 1961; Tabb and Manning 1961; Jannke 1971; King 1971; LDWF unpublished data) but likely occurs at depths of 9.8 feet to 15.1 feet (3.0 to 4.6 meters; Pattillo et al. 1997).

Spawning activity begins when water temperatures reach 68°F (20°C) and end when temperatures exceed 86°F (30°C; Rogillio 1975) and tends to occur at night (Baltz 2003). Many studies have reported spawning in or near grass beds (Holt et al. 1985; Brown-Peterson et al. 1988; McMichael and Peters 1989). Adkins et al. (1979) reported that most ripe females in Terrebonne Bay were taken from sample locations that were close to the Gulf. Lowerre-Barbieri et al. (2013) found that Spotted Seatrout exhibited spawning site fidelity. Alshuth and Gilmore (1993) noted that sound production associated with spawning activity stopped in salinities lower than 14 ppt, and that spawning activity shifted to areas of higher salinity. In Louisiana, Saucier and Baltz (1993) found spawning activity in salinities as low as 7 ppt, though most of the activity observed occurred in salinities between 15 and 18 ppt.

Spotted Seatrout may spawn multiple times in one season (Nieland et al. 2002; Baltz 2003; Lowerre-Barbieri et al. 2013). Lowerre-Barbieri et al. (2013) reported that males spawn more frequently during a season than females. Saucier and Baltz (1993) reported overall spawning activity at roughly 800 times per season in Louisiana, and Tucker and Faulkner (1987) and Wieting (1989) noted that individual Spotted Seatrout spawned about eight times per season. Brown-Peterson et al. (1988) developed an equation (batch fecundity = 459 x weight 56,066), which esti-

mates that a 2-pound (0.9-kilogram) Spotted Seatrout spawning eight times in one season would produce about 3 million eggs. Brown-Peterson and Warren (2001) developed an equation for the Mississippi coast (batch fecundity =  $(554.2 \times \text{length}) - 88,398$ ) which estimates an 18-inch (457-millimeter, or approximately 2-pound/0.9-kilogram) Spotted Seatrout produces 3.9 million eggs over 24 spawning events in one season. Nieland et al. (2002) reported that females in Barataria Bay weighing between 0.7 and 3.3 pounds (0.3 and 1.5 kilograms) may produce between 9 and 11 million eggs per season. A recent pilot study on fecundity in Louisiana suggests that egg production can be highly variable but generally increases with fish size. This study estimates an 18-inch (457-millimeter) Spotted Seatrout could produce over 15 million ( $\pm 11$  million) eggs per year (LDWF unpublished data). This study also suggests that Spotted Seatrout may produce 3 million eggs at age 1 and 10 million eggs at age 2. Similarly, Brown-Peterson and Warren (2001) found that batch fecundity increases with age, with individual fish producing almost 50% more eggs per batch at age 2 than at age 1. Cooper et al. (2013) found that older fish disproportionately contributed to a stock's reproductive potential.

Spawning salinity affects egg size - lower salinities result in larger eggs, with lab tests confirming this maintains egg buoyancy (Holt and Holt 2003). Lower salinities at the time of spawning can impact egg survival with freshets causing eggs to sink and not develop into larval fish. Major flooding in the Aransas Bay estuary in Texas affected egg survival, and larval trout were not detected until salinities returned to 20 ppt, roughly three months after larvae are normally observed (Holt and Holt 2003). Eggs hatch into larvae 18 hours after fertilization (Fable et al. 1978). Seatrout larvae (~0.06 inches or 1.5 millimeters) generally tolerate a wide range of salinities, though individual larval survival and development is closely related to the spawning salinities of the parent fish (Holt and Holt 2003). Larvae collected in Louisiana's Four League Bay were abundant at salinities above 5 ppt (Baltz et al. 2003). Postlarval Spotted Seatrout (less than 0.79 inches or 20 millimeters) are usually present in the northern Gulf from April through October (Warren 1995), with the highest abundance in Louisiana generally occurring in August (Baltz et al. 2003).

## AGE AND GROWTH

Spotted Seatrout can live up to 10 years; however, the oldest individual aged by LDWF was a 9-year-old male at 23.82 inches (605 millimeters), with the largest individuals being two 8-year-old males at 27.95 and 27.87 inches (699 and 708 millimeters). Growth of Spotted Seatrout can vary greatly by season and year. Growth also varies with sex and age (Guest and Gunter 1958; Tabb 1961; Overstreet 1983; Mercer 1984; Wieting 1989; Nieland et al. 2002; Dippold et al. 2016; Carrol and Lowerre-Barbieri 2019). Growth rates of Spotted Seatrout along the Louisiana coastline have been described by Arnoldi (1982), Wieting (1989), Nieland et al. (2002), and West et al. (2019). Female Spotted Seatrout in Louisiana exhibit similar growth patterns to other Gulf populations with females growing faster than males and females achieving a larger maximum size (Arnoldi 1982; Wieting 1989; Nieland et al. 2002; Carrol and Lowerre-Barbieri 2019).

Spotted Seatrout eggs vary in size to maintain buoyancy at varying spawning salinities but are on average approximately 0.03 inches (0.75 millimeters) in diameter. They hatch into larvae in less than one day (Fable et al. 1978; Holt and Holt 2003). Within the first week of hatching, Spotted Seatrout larvae reach approximately 0.08 inches (2 millimeters; Fable et al. 1978). Larval growth varies with environmental conditions but is rapid, with larvae averaging 1.38 inches (35 millimeters) and closely resembling adults at just two months after hatching (Hildebrand and Cable 1934; McMichael and Peters 1989; Powell et al. 2004). Six-month-old juveniles average 5.5 to 6.9 inches (140 to 174 millimeters; McMichael and Peter 1989; Powell et al. 2004).

One-year-old female Spotted Seatrout average approximately 10 inches (254 millimeters); however, growth of Spotted Seatrout is highly variable across individuals, with females ranging from 5 to 17 inches (127 to 431.8 millimeters) by age 1 (West et al. 2019). Female growth rates typically slow after age 4 when their average size is approximately 21 inches (533.4 millimeters). Conversely, male Spotted Seatrout average approximately 8 inches (203.2 millimeters) at age 1, with male growth rates slowing at age 3 when male Spotted Seatrout average approximately 15 inches (381 millimeters) in length.

## PREDATOR-PREY RELATIONSHIPS

The Spotted Seatrout's diet has been thoroughly studied over the years. Spotted Seatrout are opportunistic carnivores (Perret et al. 1980) that feed primarily on crustaceans and fish (Pearson 1929; Gunter 1945; Miles 1950; Moody 1950; Klima and Tabb 1959; Tabb 1961; Lorio and Schafer 1966; Tabb 1966; Fontenot and Rogillio 1970; Rogillio 1975; Peeler et al. 1976; Adkins et al. 1979; Adkins and Bourgeois 1982; Hettler 1989). Larval and juvenile Spotted Seatrout feed primarily on invertebrates (Moody 1950; Springer and Woodburn 1960; Seagle 1969) such as copepods, gastropods, amphipods, and mysid and caridean shrimp (Moody 1950; Springer and Woodburn 1960; Tabb 1966; Dietz 1976; Houde and Lovdal 1984); however, Spotted Seatrout as small as 0.59 to 1.18 inches (15 to 30 millimeters) may also consume larval fishes (McMichael and Peters 1989).

As juveniles grow to adults, their diet shifts to larger fish and penaeid shrimp. Many studies have suggested that larger Spotted Seatrout tend to feed on fish such as Menhaden, Mullet, Croaker, Spot, and White Trout rather than shrimp (Moody 1950; Darnell 1958; Lorio and Schafer 1966; Tabb 1966; Seagle 1969; Fontenot and Rogillio 1970; Adkins et al. 1979; Lorio and Perret 1980; Overstreet 1983; McMichael and Peters 1989; Mason and Zengel 1996). LDWF sampling supports this shift in diet, with stomach contents from Spotted Seatrout under 12 inches (305 millimeters) containing roughly 7% more penaeid shrimp, while Spotted Seatrout over 12 inches (305 millimeters) contained more Menhaden, Croaker, and Mullet (LDWF unpublished data). Shaw et al. (2016) found that the Spotted Seatrout's diet significantly overlaps with that of Sandbar and Atlantic Sharpnose sharks.

The Spotted Seatrout's diet may change seasonally as different prey items become more or less prevalent throughout the year (Barnes 2014). Additionally, habitat types may affect the specific diets of Spotted Seatrout. Simonsen and Cowan (2013) doc-

umented slight diet differences between habitat types within Barataria Bay; Spotted Seatrout inhabiting mud bottoms consumed more shrimp and crabs while Spotted Seatrout at an artificial reef consumed more Menhaden and Anchovy. Additionally, Hall-Scharf et al. (2016) found that long-term dietary shifts within a population were associated with the loss and subsequent recovery of seagrass habitats. Gut contents taken from Spotted Seatrout by LDWF from 1985 to 2018 showed approximately 71% of Spotted Seatrout diet was comprised of fishes, 28% crustaceans, and the remaining 1% being miscellaneous items such as frogs or squids (LDWF unpublished data). Most fish remains found in Spotted Seatrout stomachs could not be further identified (52%), while clupeiformes (shad and anchovy-like fishes) made up 11%, sciaenids (drums) 2%, mullet 2%, and other fishes comprising the remaining 4%. (LDWF unpublished data). The majority of crustaceans found in Spotted Seatrout were penaeid shrimp (17%) followed by non-penaeid shrimp and amphipods (7%) and crabs (4%).

## STOCK STATUS AND ASSESSMENT METHODOLOGY

### STOCK UNIT DEFINITION

Analysis of Spotted Seatrout DNA confirmed the presence of sub-structuring among Gulf Spotted Seatrout populations (Gold and Richardson 1998). Gold et al. (1999) compared Spotted Seatrout across the Gulf and parts of the Atlantic and determined that there is some isolation by distance. For the purposes of this fishery management plan, the management unit is defined as Spotted Seatrout in coastal and estuarine waters of Louisiana.

### ASSESSMENT FREQUENCY, REFERENCE POINTS AND CONTROL RULES

LDWF's most recent Spotted Seatrout stock assessment was conducted in 2019 using data through 2018. While there is no legislative or regulatory timeline for conducting an assessment of the Spotted Seatrout stock in Louisiana waters, the stock is typically assessed every five years or when needed based upon current monitoring data. If that report indicates the Spotted Seatrout stock is in such a condition as to jeopardize its sustainability (overfished or overfishing), LDWF is obligated to provide management options that recover the stock to sustainable levels to the Commission for its consideration.

While no formal biomass or fishing mortality targets are established for Spotted Seatrout by the Legislature or in the Louisiana Administrative Code (LAC), such as those established for Black Drum *Pogonias cromis*, Southern Flounder *Paralichthys lethostigma*, and Sheepshead *Archosargus probatocephalus*, the stock is monitored in relation to its historical status similar to those three species. Earlier assessments of Louisiana's Spotted Seatrout stock (West et al. 2011, 2014) proposed targets and limits to ensure the sustainability of the stock. The limits proposed in those earlier assessments were based upon the history of the stock by requiring that female spawning stock biomass (SSB) not fall below the lowest level observed earlier in the fishery in which the stock demonstrated sustainability. Using those criteria, LDWF monitors the Spotted Seatrout stock using guidelines similar to the targets established for the above mentioned species as promulgated in LAC 76.VII.385.

Both biomass and fishing mortality targets for the stock are based upon a historical time series from the beginning of the assessed period where the stock has demonstrated sustainability. Biomass targets are based upon the average (geometric mean) SSB from the stock's historical time series. The current biomass target and threshold for Spotted Seatrout are 6.2 million pounds and 4.7 million pounds (2.8 million kilograms and 2.1 million kilograms), respectively. Fishing mortality rate targets are based upon the fishing mortality rate that corresponds to the stock's SSB targets at equilibrium. The current annual fishing mortality rate target and threshold for Spotted Seatrout are 0.63 and 0.76, respectively.

### STOCK STATUS

LDWF's most recent assessment of Spotted Seatrout in Louisiana waters estimated that the stock is currently overfished, with an estimated spawning potential ratio (SPR) of 8.5 %, and has been overfished since 2014. The stock has been undergoing overfishing since 2012 with the exception of 2014 and the terminal year of the assessment (West et al. 2019). The estimate of overfishing for the terminal year of the assessment is extremely close to the overfishing limit (West et al. 2019).

Average fishing mortality rates have varied over the history of stock but had remained relatively stable with a slight decline from 1991 until 2005. Beginning in 2005, average fishing mortality began steadily increasing until peaking in 2017 at 1.25. The current estimate (geometric mean of the last three years) of the ratio of current fishing mortality to the fishing mortality limit is 0.99, which is just below the threshold of 1.0, indicating overfishing is not currently occurring. Despite the current estimate being below the overfishing threshold, the stock has been undergoing overfishing in six of the 10 most recent years, leading to the current overfished state.

SSB estimates have varied considerably over time. After decreasing in the early portion of the time series of the assessment from 1982 to 1989, SSB steadily increased until reaching a high of 9.1 million pounds (4.1 million kilograms) in 2008. After 2008, SSB generally decreased. The 2017 and 2018 SSB estimates are the lowest on record at 3.4 million pounds and 4.0 million pounds (1.5 million kilograms and 1.8 million kilograms), respectively. The current estimate of SSB relative to the threshold is 0.84, which is less than 1, indicating the stock is overfished. The stock has been overfished since 2014.

### ASSESSMENT METHODS

LDWF's most recent Spotted Seatrout assessment uses an Age-Structured Assessment Program (ASAP), a statistical catch-at-age model, to describe the dynamics of the female portion of the Louisiana Spotted Seatrout stock from 1982 through 2018 (West et al. 2019). This model projects abundance at age from estimates of abundance in the initial year of the time series and recruitment estimates in subsequent years. Minimum data requirements for the model are fishery catch-at-age and an index of abundance. Landings are taken from LDWF's Recreational Creel Survey (LA Creel) and commercial trip ticket programs, the National Marine Fisheries Service's (NMFS) commercial statistical records, and NMFS' Marine Recreational Informa-

tion Program (MRIP). Abundance indices are developed from LDWF's experimental marine gillnet survey. Age composition of fishery catches are estimated with length-at-age-keys derived from direct samples of the fishery and a growth model.

### Fishery Catch-at-Age

Commercial Spotted Seatrout landings are taken from LDWF's trip ticket program and NMFS' commercial statistical records. For aging purposes, annual landings are allocated into six-month seasons (i.e., January-June and July-December). Because only limited seasonal landings data are available from earlier in the fishery's history, the monthly landings records that are available are pooled into time periods of consistent regulations (1981-1996 and 1997-1998) to develop seasonal catch compositions. Seasonal catches from 1999 onward are taken directly from LDWF's trip ticket program. Size composition of commercial catches in each year and season are derived from LDWF sampling (pre-1997 and 2014-2018) and MRIP records (1997-2013). Pre-1997 size distributions are only available for a limited number of years (1986 and 1990-1992) during which time the commercial sector operated under different minimum length limits (MLLs) and used a wider variety of harvest methods. Therefore, the 1990-1992 data are combined to describe the size composition of commercial catches from 1987 through 1996 (i.e., primarily a net fishery with a 14-inch (356 millimeter) MLL) and the 1986 data are used to describe the 1981-1986 commercial size compositions (i.e., primarily a net fishery with 10 and 12-inch (254 and 305 millimeter) MLLs). Seasonal size distributions of commercial catches are not available pre-1997; therefore, equivalent size composition is assumed for each six-month period. For years following the commercial net ban (1997-present; only rod and reel harvest allowed with a 14-inch (356 millimeter) MLL), size composition of commercial catches is obtained from MRIP records and LDWF's Biological Sampling Program, assuming equivalent vulnerability to rod and reel gear for both fisheries but selecting only sizes greater than or equal to 14 inches (356 millimeters) total length (TL).

Recreational Spotted Seatrout landings estimates are taken from LA Creel (2014-2018) and estimates hindcast to the historic MRIP time series (1982-2013; LDWF unpublished data). Consequently, the pre-2014 recreational harvest estimates used in this assessment differ from the Louisiana estimates currently published by MRIP. Furthermore, due to changes made to the MRIP Access Point Angler Intercept Survey (APAIS) in 2013 and the recent transition from the MRIP Coastal Household Telephone Survey to the new Fishing Effort Survey, harvest estimates currently available from MRIP also differ from those used in the prior Louisiana Spotted Seatrout stock assessment (West et al. 2014).

Age-length-keys are developed to estimate age composition/catch-at-age of fishery and survey catches. Spotted Seatrout in Louisiana exhibit a protracted spawning season, with spawning primarily occurring across a six-month period from April through September (Hein and Shepard 1979a). The mid-point of the spawning season (July 1) is typically assumed as a biological birthday. However, for purposes of this assessment, ages were assigned based on the calendar year by assuming a Jan. 1 birthday, where Spotted Seatrout spawned the previous year become age 1 on Jan. 1 and remain age 1 until the beginning of the following year.

Ages of both commercial and recreational Spotted Seatrout landings are derived from samples directly from the fishery beginning in 2002; earlier years are from a damped growth model (Porch et al. 2002).

### Index of Abundance

For sampling purposes, coastal Louisiana is currently divided into five Coastal Study Areas (CSAs; *Figure 1*). LDWF biologists routinely sample within each CSA using standardized gear (marine gill net, trammel net, and beach seines) as part of a long-term comprehensive monitoring program to collect life-history information and measure relative abundance and size distributions of recreationally and commercially important species.



**FIGURE 1.** Map of Louisiana's coastal study areas (CSAs).

Results from the gillnet survey are used in the Spotted Seatrout stock assessment to develop an index of abundance for the assessment model. LDWF conducts the gillnet survey year round. Survey gear is a 750-foot long and 8-foot deep net, with five separate 150-foot panels of differing mesh sizes. The differing panels increase in size and are composed of 1, 1.25, 1.5, 1.75, and 2-inch bar meshes. Samples are taken by striking the net. All captured Spotted Seatrout are enumerated, and a maximum of 30 randomly selected Spotted Seatrout per mesh panel are collected for length measurements, gender determination, and maturity information. When more than 30 Spotted Seatrout are captured per mesh panel, catch-at-size is derived as the product of the total catch and proportional subsample-at-size. Biologists record water temperature, dissolved oxygen, conductivity, salinity, and turbidity data along with each biological sample. LDWF (2018) contains a full description of the survey methodology.

Current CSAs are defined as: CSA 1 - Mississippi state line to South Pass of the Mississippi River (Pontchartrain Basin); CSA 3 - South Pass to Bayou Lafourche (Barataria Basin); CSA 5 - Bayou Lafourche to eastern shore of Atchafalaya Bay (Terrebonne Basin); CSA 6 - Atchafalaya Bay to western shore of Vermilion Bay (Vermilion/Teche/Atchafalaya Basin); and CSA 7 - western shore of Vermilion Bay to Texas state line (Mermentau/Calca-sieu/Sabine Basins).

See the full assessment report in Appendix I for complete details of the current stock status and assessment methods.

### REGIONAL ASSESSMENT EFFORTS

Individual Gulf states have produced state-specific assessments of Spotted Seatrout; however, no regional assessment of Spotted Seatrout has been produced. The five Gulf states regularly assess the Spotted Seatrout stock within their state waters. Given that sampling methods and coverage vary across the Gulf states, producing inconsistent data sets, a Gulf-wide assessment is not currently feasible. Harvest regulations and conservation standards also vary greatly state by state.

### STOCK RESILIENCE

LDWF's most recent Spotted Seatrout stock assessment evaluates factors that can be used to gauge the resilience of the Spotted Seatrout stock (West et al. 2019). Productivity is a function of fecundity, growth rates, natural mortality, age of maturity, and longevity which can be a reasonable proxy for resilience, i.e. 'the ability to rebound after perturbation' (Holling 1973). The assessment characterizes the relative productivity of Spotted Seatrout based on life-history characteristics with a classification scheme developed at the FAO's Second Technical Consultation on the Suitability of the Convention on International Trade in Endangered Species of Wild Fauna and Flora Criteria for Listing Commercially-Exploited Aquatic Species (FAO 2001). Each life-history characteristic (von Bertalanffy growth rate, age at maturity, longevity, and natural mortality rate) was assigned a rank (low=1, medium=2, and high=3) and then averaged to compute an overall productivity score. In this case, the overall productivity score for Louisiana Spotted Seatrout is 2.75, indicating high productivity and resilience (Table 1). The von Ber-

talannya growth rate referenced above is replaced in the most recent assessment with the mean growth rate across ages from the damped growth model (Porch et al. 2002) weighted by expected relative abundance-at-age ( $k = 0.357$ ).

**TABLE 1.** FAO proposed guideline for indices of productivity for exploited aquatic species.

PARAMETER	PRODUCTIVITY			SPECIES	SCORE
	Low (1)	Medium (2)	High (3)	Spotted Seatrout	
Natural mortality rate (M)	<0.2	0.2 - 0.5	>0.5	0.3	2
von Bertalanffy growth rate (K)	<0.15	0.15 - 0.33	>0.33	0.36	3
Age at maturity ( $t_{mat}$ )	>8	3.3 - 8	<3.3	2	3
Maximum age ( $t_{mat}$ )	>25	14 - 25	<14	10	3
Examples	Orange Roughy, many sharks	Cod, Hake	Sardine, Anchovy	Spotted Seatrout Productivity Score = 2.75 (high)	

# Description of the Fishery



## Fishery Monitoring

LDWF monitors commercial landings and fishing effort through a trip ticket program. Through this program, LDWF collects commercial landings data on a trip basis from wholesale/retail seafood dealers and commercial fishermen holding fresh products licenses.

LDWF conducts economic research pertaining to Louisiana and Gulf fisheries resources using information from the trip ticket program and surveys.

Comprehensive descriptions of the Louisiana commercial and recreational Spotted Seatrout fisheries prior to 2000 including development and history of exploitation, effort and harvest, economics, markets, value, and processing are available through numerous publications including Bourgeois et al. (1996) and Blanchet et al. (2001).

## DATA COLLECTION AND ANALYSES

### COMMERCIAL FISHERY

#### VOLUME AND VALUE OF LANDINGS

The volume and value of commercial landings of Spotted Seatrout have been modest since 2000, when LDWF's trip ticket program was implemented and three years after the institution of the restrictive licensing requirements for participation in the fishery. Commercial landings declined from approximately 109,000 pounds in 2001 to about 17,000 pounds in 2005 to roughly 10,000 pounds in 2008 (*Table 2*). Landings were below 7,000 pounds in every year between 2009 and 2019. Real dockside value (in constant inflation-adjusted 2018 dollars) dropped from \$301,000 in 2001 and \$181,000 in 2002 to \$42,000 in 2005. Real dockside value was below \$24,000 in each of the last 14 years of the 2000-2019 study period.

NMFS' landings statistics recorded landings of Spotted Seatrout from 15 states between 2000 and 2019 (*Table 3*). National total statistics for the species cannot be calculated from the publicly available data because confidentiality standards preclude the release of complete landings data for all states from 2004 onward. One state, North Carolina, accounted for more Spotted Seatrout landings than any other state during the period with totals ranging between 75,239 pounds in 2011 to 570,934 pounds in 2000.

**TABLE 2.** Pounds and value of Louisiana landings of Spotted Seatrout, 2000-2019.

YEAR	POUNDS	NOMINAL VALUE	INFLATION-ADJUSTED VALUE	YEAR	VOLUME	REAL DOCKSIDE VALUE	REAL DOCKSIDE PRICE PER POUND
2000	40,283	\$68,727	\$97,168	2010	*	*	*
2001	109,467	\$217,771	\$301,285	2011	*	*	*
2002	71,547	\$132,905	\$181,010	2012	98	\$275	\$303
2003	19,402	\$37,900	\$50,676	2013	3,711	\$10,725	\$9,592
2004	19,874	\$38,753	\$50,458	2014	6,877	\$22,032	\$23,458
2005	16,948	\$33,429	\$42,211	2015	4,035	\$13,892	\$14,634
2006	2,042	\$4,068	\$4,986	2016	2,462	\$9,622	\$10,027
2007	11,050	\$15,706	\$18,746	2017	3,571	\$14,330	\$14,654
2008	10,232	\$15,404	\$18,035	2018	4,009	\$15,289	\$15,289
2009	999	\$1,379	\$1,620	2019	*	*	*

Inflation-adjusted values are expressed in 2018 dollars.

\*Data withheld to maintain LDWF confidentiality standards.

**TABLE 3.** Blue crab landings (pounds) and value (dollars), hard, soft, and peeler crabs combined, from major blue crab producing U.S. states: 2000-2017.

State	YEAR									
	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009
Alabama	0	0	0	0	*	*	*	*	*	*
Connecticut	0	0	0	0	0	0	0	0	0	0
Delaware	0	0	0	0	0	0	3	0	0	0
Florida	66,308	48,073	62,366	53,714	39,981	56,631	43,520	51,971	28,156	62,377
Georgia	1,997	0	969	0	815	0	0	*	*	*
Louisiana	40,283	109,468	71,547	19,401	19,874	16,948	2,042	11,050	10,232	999
Maryland	20,270	24,754	11,771	902	342	2,410	243	*	290	*
Massachusetts	0	0	0	4	121	3,936	0	0	0	0
Mississippi	45,501	43,146	32,483	25,940	30,469	18,850	23,404	28,098	33,533	52,615
New Jersey	0	0	0	0	0	0	0	*	0	0
New York	0	0	0	856	0	19,747	20,701	14,111	0	0
North Carolina	376,657	105,797	175,643	181,529	131,018	129,644	312,714	374,722	304,430	320,247
Rhode Island	0	0	0	0	2,002	86	50	*	0	0
South Carolina	0	0	0	0	0	0	0	0	0	0
Virginia	19,918	3,773	9,308	5,310	17,156	21,448	28,529	40,719	43,512	26,350
<b>Total</b>	<b>570,934</b>	<b>335,011</b>	<b>364,087</b>	<b>287,656</b>	<b>&gt;241,778</b>	<b>&gt;269,700</b>	<b>&gt;431,206</b>	<b>&gt;520,671</b>	<b>&gt;420,153</b>	<b>&gt;462,588</b>

State	YEAR									
	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019
Alabama	*	*	*	*	*	*	*	*	*	*
Connecticut	0	0	0	0	0	19	78	4	25	39
Delaware	0	0	0	0	0	0	0	0	0	0
Florida	52,897	76,252	79,225	74,586	49,481	47,681	32,853	21,925	26,633	19,708
Georgia	*	*	0	*	*	0	0	0	0	0
Louisiana	*	*	98	1,244	1,122	1,939	1,847	3,571	4,009	*
Maryland	*	640	*	*	*	*	*	*	*	*
Massachusetts	0	0	0	*	0	0	0	0	0	0
Mississippi	41,534	38,675	61,099	50,820	29,437	27,995	50,436	54,062	52,404	36,913
New Jersey	0	0	0	0	0	0	0	0	0	0
New York	*	*	288	689	104	*	0	*	120	*
North Carolina	200,822	75,239	265,016	367,610	242,245	128,752	274,583	299,910	128,926	378,491
Rhode Island	0	0	0	56	0	0	0	*	*	0
South Carolina	0	0	0	0	0	0	*	0	0	0
Virginia	20,870	17,315	116,767	42,086	90,051	7,889	18,483	55,219	22,407	135,729
<b>Total</b>	<b>&gt;297,263</b>	<b>&gt;192,817</b>	<b>&gt;407,738</b>	<b>&gt;497,018</b>	<b>&gt;324,403</b>	<b>&gt;208,401</b>	<b>&gt;361,813</b>	<b>&gt;381,489</b>	<b>&gt;214,135</b>	<b>&gt;437,170</b>

Sources: NMFS and LDWF

\*Data withheld to maintain NMFS or LDWF confidentiality standards.

In years for which complete data are unavailable, commercial landings estimates are calculated using landings only for those states were published. The greater than symbol (>) is used to indicate that the national total exceeded the value included in the table.

**TABLE 4.** Average pounds of Louisiana commercial Spotted Seatrout landings by month, 2000-2019.

MONTH	AVERAGE	MONTH	AVERAGE	MONTH	AVERAGE	MONTH	AVERAGE
January	5,789	April	1,483	July	199	October	614
February	5,429	May	556	August	128	November	795
March	5,366	June	399	September	58	December	3,900

**TABLE 5.** Number of seafood dealers handling Spotted Seatrout, 2000-2019.

YEAR	DEALERS	YEAR	DEALERS	YEAR	DEALERS	YEAR	DEALERS
2000	15	2005	7	2010	*	2015	5
2001	11	2006	3	2011	*	2016	4
2002	10	2007	4	2012	4	2017	3
2003	7	2008	6	2013	13	2018	4
2004	9	2009	4	2014	5	2019	*

**TABLE 6.** Landings of Spotted Seatrout by gear type, 2000-2019.

YEAR	ELECTRICAL OR HYDRAULIC REEL	GILL NETS	HAND LINES	MANUAL REEL	ROD AND REEL	SKIMMER NETS	HOOP & FYKE NETS, FISH	TRAWLS	TROT LINES
2000	*	*	1,098	0	38,722	0	0	*	428
2001	0	*	*	*	91,172	0	0	0	*
2002	*	*	*	1,687	61,809	*	0	*	*
2003	0	0	0	0	18,984	0	0	0	*
2004	0	*	0	*	16,347	*	0	0	555
2005	0	0	*	0	15,519	0	0	0	*
2006	0	0	0	0	2,042	0	0	0	0
2007	0	*	*	0	10,778	0	0	0	*
2008	0	*	*	0	9,060	0	0	0	0
2009	0	0	0	0	*	*	0	0	*
2010	0	0	0	0	*	0	0	*	0
2011	0	0	0	0	*	0	0	0	*
2012	0	0	*	0	*	0	0	0	*
2013	0	*	0	0	3,222	0	0	0	*
2014	*	0	0	0	6,850	0	0	0	0
2015	0	0	*	0	3,196	0	*	0	0
2016	0	0	*	0	*	0	0	0	0
2017	0	0	*	0	3,027	0	0	0	0
2018	0	0	*	*	3,611	0	0	0	0
2019	0	0	*	0	*	0	0	0	0

\*Data withheld to maintain LDWF confidentiality standards.

**TABLE 7.** Number of vessels with Spotted Seatrout landings and landings by vessel length, 2000-2019.

YEAR	NUMBER OF VESSELS	CUMULATIVE POUNDS OF SPOTTED SEATROUT				YEAR	NUMBER OF VESSELS	CUMULATIVE POUNDS OF SPOTTED SEATROUT			
		16 to 20 Feet	21 to 30 Feet	Longer than 30 Feet	Unidentified Length			16 to 20 Feet	21 to 30 Feet	Longer than 30 Feet	Unidentified Length
2000	39	17,342	19,846	1,337	1,411	2010	*	*	*	0	0
2001	26	24,029	47,034	31,304	4,989	2011	*	*	*	0	0
2002	24	8,316	47,383	14,480	1,368	2012	5	2	2	94	0
2003	11	552	17,404	1,446	0	2013	6	226	3,485	0	0
2004	12	1,277	17,954	643	0	2014	6	1,003	5,847	27	0
2005	7	3,500	13,448	0	0	2015	7	1,699	410	1,926	0
2006	3	45	1,099	898	0	2016	4	1,103	155	1,204	0
2007	6	455	9,569	0	1,026	2017	4	3,069	22	480	0
2008	8	424	9,808	0	0	2018	6	3,722	22	241	24
2009	5	75	909	0	15	2019	*	*	*	*	*

\*Data withheld to maintain LDWF confidentiality standards.

### Landings by Month

Average monthly landings in Louisiana for the 2000-2019 period indicate that most commercial harvests of Spotted Seatrout were landed in the winter. Approximately 83% of total average monthly landings occurred in December, January, February or March (*Table 4*). Estimates of monthly averages the entire 2000-2019 period are affected by high values in the earlier years and are not indicative of the quantities typically harvested within the specified months in recent years.

### Number of Seafood Dealers

The number of dealers that reported purchases of Spotted Seatrout on trip ticket transactions was modest throughout the 2000–2019 study period (*Table 5*). On three occasions (2010, 2011, and 2019), the count was sufficiently small (below three) as to preclude the publication of landings data for the year according to LDWF confidentiality standards. In the last six years of the study period, the number of dealers with reported Spotted Seatrout landings has five or fewer.

### Landings by Gear Type

Most of the Spotted Seatrout landed commercially in Louisiana in the 2000-2019 study period were harvested with rod and reel (*Table 6*). This gear type accounted for 87.7% of all commercial Spotted Seatrout landed in Louisiana between 2000 and 2019 and at least 75% of any year's landings in all but three years (2010, 2012, and 2016). Moderate amounts of Spotted Seatrout have been harvested occasionally using hand lines, manual reels, trot lines, electronic or hydraulic reels, gill nets, skimmer nets, hoop and fyke nets, and trawls.

### Landings by Vessel Length

The number of vessels associated with commercial landings of Spotted Seatrout in Louisiana dropped from 39 in 2000 to roughly two dozen in 2001 and 2002 to eight vessels or fewer in each of the last 15 years of the study period (*Table 7*). Most of the Spotted Seatrout landed commercially in Louisiana are harvested by fishermen in small to medium-sized vessels. Vessels between 16 and 30 feet long accounted for the majority of Spotted Seatrout landings in all but one year (2012) and for at least 75% of the total for 12 of the 20 years in the 2000-2019 study period.

### Landings by Area

The Terrebonne and Barataria basins in the central portion of the coast accounted for the majority of commercial seatrout landings twice (2000 and 2004) in the earlier portion of the study period (*Table 8*). However, most Spotted Seatrout harvested commercially in Louisiana were reported from the eastern portions of the state: the Mississippi River Basin near the mouth of the river and the Lake Pontchartrain Basin. In every year since 2010, the Lake Pontchartrain Basin, which includes Breton Sound and Chandeleur Sound, accounted for at least 70% of the year's total commercial Spotted Seatrout landings (*Table 8*).

## COMMERCIAL SPOTTED SEATROUT FISHERMEN AND FISHING EFFORT

The number of commercial fishermen reporting trip ticket landings of Spotted Seatrout in Louisiana dropped from 26 in 2000 to 15 in 2001 and 2002 to six or fewer in each of the last 10 years (*Table 9*). In some years, the count of fishermen has been less than the count of vessels, implying that some fishermen used more than one vessel. In 2016, the number of fishermen

**TABLE 8.** Landings of spotted seatrout by area, 2000-2019.

YEAR	SABINE RIVER	CALCASIEU RIVER	VERMILION-TECHE	TERREBONNE	BARATARIA	MISSISSIPPI RIVER	LAKE PONTCHARTRAIN	MISSISSIPPI COAST	LOUISIANA GRID 13	LOUISIANA GRID 14	LOUISIANA GRID 15
2000	0	*	0	13,405	*	3,690	6,052	0	3,237	*	0
2001	0	0	0	5,952	6,105	88,334	2,685	0	*	*	0
2002	0	0	0	6,423	*	61,021	3,265	0	0	*	0
2003	*	0	0	*	*	*	5,780	0	0	0	0
2004	0	*	0	*	*	*	1,241	0	0	*	0
2005	0	0	0	*	*	12,771	*	0	0	0	0
2006	0	0	0	*	*	*	*	0	0	0	0
2007	0	0	0	*	*	*	0	0	0	*	0
2008	0	0	*	*	*	*	*	0	0	*	*
2009	0	0	*	0	*	*	*	0	0	0	0
2010	0	0	0	0	0	0	*	0	0	0	0
2011	0	0	0	0	0	0	*	0	0	0	0
2012	0	*	*	0	0	0	*	0	0	0	0
2013	0	0	*	*	*	226	2,937	0	0	0	0
2014	0	0	0	0	*	0	6,076	*	0	0	0
2015	0	0	0	*	*	0	3,632	0	0	0	0
2016	0	0	0	0	*	0	2,220	0	0	0	0
2017	0	0	0	0	*	0	2,631	0	0	0	0
2018	0	0	0	0	*	0	3,476	0	0	0	0
2019	0	0	0	0	*	0	*	0	0	0	0

\*Data withheld to maintain LDWF confidentiality standards.

exceeded the number of vessels, suggesting that some fishermen reported landings from the same vessel.

The number of commercial trips or trip ticket transactions with Spotted Seatrout landings stood at 199 in 2000, 172 in 2001, and 167 in 2002 (*Table 10*). The number of trips slipped to 78 in 2004 and dropped to less than 60 trips in each year between 2005 and 2019.

### DOMESTIC AND FOREIGN MARKET

In addition to landings data for Spotted Seatrout, NMFS published commercial landings data for Sand Seatrout *Cynoscion arenarius* for the years 2000 through 2019 and for Silver Seatrout *Cynoscion nothus* from 2007 through 2019 (*Table 11*). NMFS also indicated that commercial landings for unspecified “seatrouts” were reported in six states (Georgia, Maryland, Massachusetts, New York, Rhode Island, and Virginia), but these landings data could not be disclosed under the agency’s confidentiality standards. Landings of Spotted Seatrout comprised at least 69% of all published landings for seatrout in every year in the 2000-2019 study period.

It is likely, however, that Spotted Seatrout and all other types of seatrout are a part of a larger market for fish of many different species with light to moderate flavor. The scope of the market, defined by the array of species considered similar to or substitutable for Spotted Seatrout, is difficult to specify. Combined commercial landings of three types of fish with light to moderate flavor that might be considered suitable substitutes for Spotted Seatrout (Butterfish, drums, and snappers) ranged between 16 and 28 million pounds between 2006 and 2019.

The U.S. Customs Service does not publish international trade statistics for seatrout. Combined imports of Butterfish and snappers, reasonable substitutes for Spotted Seatrout, ranged between 32 million and 49 million pounds between 2000 and 2019.

### RECREATIONAL FISHERY

Spotted Seatrout are a popular sportfish for Louisiana anglers. They are relatively abundant throughout the state’s inshore and nearshore waters. Spotted Seatrout typically gather in large numbers along the coast and barrier islands during the spring and summer months and transition inshore during the fall and winter months to lakes, bayous, and deeper channels. Spotted Seatrout can be caught using a variety of tackle including soft and hard plastics, live bait or plastic under a cork, or live or artificial bait fished on the bottom.

Recreational landings, derived from NMFS’ MRIP estimates from 2000 through 2013 show large variability in the amount of Spotted Seatrout landed in Louisiana (*Table 12*). In recent years, landings have been more consistent but seem to vary cyclically. Recreational landings averaged 15.8 million Spotted Seatrout (17.3 million pounds) annually from 2003 through 2013 (Pers. comm. NMFS Fisheries Statistics Division, 2019).

LA Creel landing estimates from 2014 through 2019 show a wide range of variability in the amount of Spotted Seatrout landed in Louisiana (*Figure 2*). During this same time period,

2.58 to 5.33 million fish were harvested statewide from the Lake Pontchartrain, Barataria, Terrebonne/Timbalier, Vermilion/Teche, and Calcasieu basins. LA Creel landings estimates show that in 2014, 3.23 million Spotted Seatrout were landed statewide, with an increase to 4.29 million Spotted Seatrout landed statewide in 2015. Statewide landings were relatively stable in 2016 and 2017 at 5.33 and 5.14 million fish per year, respectively. Landings then sharply dropped in 2018 and 2019 to 2.58 and 3.54 million fish per year, respectively.

The total number of saltwater fishing trips taken by private recreational fisherman in Louisiana between 2014 and 2019 has varied from a low of 1.94 million trips in 2019 to a high of 2.27 million trips in 2015 with an average of 2.1 million trips (*Table 13*). During the same time period, an average of 166,707 for-hire trips were taken in Louisiana. For-hire trips varied from a high of 183,301 trips in 2018 to a low of 130,615 trips in 2014. The total number of recreational saltwater fishing trips, including private and for-hire, in Louisiana averaged 2.26 million trips from 2014 to 2019.

From 2014 through 2019, Spotted Seatrout were observed in 11.7 to 42.6% of private recreational fishing trips surveyed through LA Creel (*Table 14*). Similarly, Spotted Seatrout were observed in 17.0 to 50.5% of for-hire trips surveyed through LA Creel from the same time-period (2014-2019).

Between 2014 and 2019, most Spotted Seatrout harvested by private recreational fishermen were landed from the Lake Pontchartrain Basin. An average of 1.11 million Spotted Seatrout per year, with a high of 1.59 million Spotted Seatrout in 2016 and a low of 617,817 Spotted Seatrout in 2018, were landed in the Lake Pontchartrain Basin (*Figure 3*). The next highest amount of annual private recreational landings came from the Barataria Basin, with an average of 994,383 Spotted Seatrout per year, a high of 1.37 million Spotted Seatrout in 2016, and a low of 544,664 Spotted Seatrout in 2014. The Terrebonne/Timbalier Basin private recreational landings of Spotted Seatrout averaged 971,313 per year, with a high of 1.28 million in 2017 and a low of 667,777 in 2014. The Calcasieu Basin private recreational landings averaged 212,464 Spotted Seatrout per year, with a high of 266,260 Spotted Seatrout in 2015 and a low of 84,275 Spotted Seatrout in 2018. The Vermilion/Teche Basin private recreational landings averaged 72,751 Spotted Seatrout per year, with a high of 154,195 Spotted Seatrout in 2014 and a low of 41,270 Spotted Seatrout in 2018. There is some recreational catch of Spotted Seatrout in offshore waters off Louisiana; offshore landings averaged 19,294 Spotted Seatrout per year during the same time period, with a high of 38,103 Spotted Seatrout in 2015 and a low of 8,028 Spotted Seatrout in 2018.

From 2014 through 2019, for-hire landings of Spotted Seatrout in Louisiana averaged highest in the Barataria Basin at 223,362 Spotted Seatrout per year, with a high of 364,810 Spotted Seatrout in 2017 and a low of 115,919 Spotted Seatrout in 2014 (*Figure 4*). The next highest average came from the Terrebonne/Timbalier Basin, with an average of 180,303 Spotted Seatrout per year, a high of 243,133 Spotted Seatrout in 2017, and a low of 83,459 Spotted Seatrout in 2014. The Lake Pontchartrain Basin averaged 116,456 Spotted Seatrout per year, with a high of

**TABLE 9.** Commercial fishermen with landings of Spotted Seatrout, 2000-2019.

YEAR	DEALERS	YEAR	DEALERS	YEAR	DEALERS	YEAR	DEALERS
2000	26	2005	5	2010	*	2015	5
2001	15	2006	3	2011	*	2016	5
2002	15	2007	5	2012	5	2017	4
2003	8	2008	7	2013	6	2018	4
2004	10	2009	4	2014	5	2019	*

\*Data withheld to maintain LDWF confidentiality standards.

**TABLE 10.** Fishing effort: commercial trips with Spotted Seatrout landings, 2000-2019.

YEAR	DEALERS	YEAR	DEALERS	YEAR	DEALERS	YEAR	DEALERS
2000	199	2005	46	2010	*	2015	58
2001	172	2006	15	2011	*	2016	55
2002	167	2007	31	2012	6	2017	46
2003	63	2008	27	2013	34	2018	39
2004	78	2009	5	2014	23	2019	*

\*Data withheld to maintain LDWF confidentiality standards.

**TABLE 11.** Commercial landings of Spotted Seatrout, Sand Seatrout, and Silver Seatrout, 2000-2019.

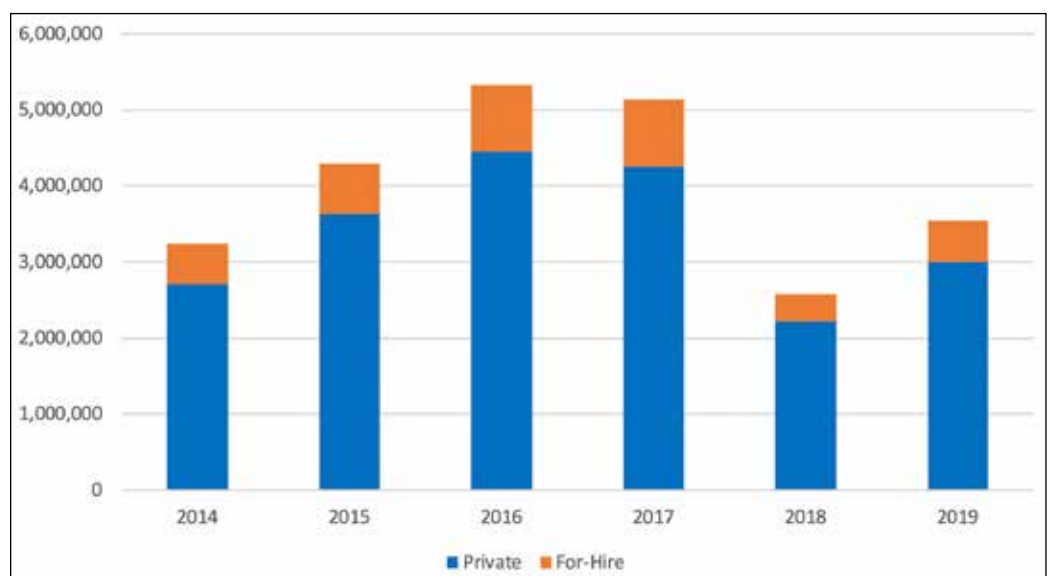
YEAR	SPOTTED SEATROUT	SAND SEATROUT	SILVER SEATROUT	SEATROUTS	YEAR	SPOTTED SEATROUT	SAND SEATROUT	SILVER SEATROUT	SEATROUTS
2000	570,934	167,460			2010	> 297,263	> 80,021	7,039	0
2001	335,011	126,166			2011	> 192,817	> 71,454	14,263	0
2002	364,087	144,000			2012	> 407,738	> 43,101	20,491	*
2003	287,656	111,984			2013	> 497,018	31,229	14,442	0
2004	> 241,778	77,238			2014	> 324,403	> 36,952	9,666	*
2005	> 269,700	72,725			2015	> 208,401	19,109	9,587	0
2006	> 431,206	63,687			2016	> 361,813	20,504	> 3,037	*
2007	> 520,671	> 75,319	> 16,436	*	2017	> 381,489	> 19,568	2,351	0
2008	> 420,153	68,975	15,066	0	2018	> 214,135	> 17,174	1,743	0
2009	> 462,588	> 68,938	15,540	*	2019	> 437,170	> 17,769	2,341	*

\*Data withheld to maintain LDWF confidentiality standards.

In years for which complete data are unavailable, commercial landings estimates are calculated using landings only for those states were published. The greater than symbol (>) is used to indicate that the national total exceeded the value included in the table.

**TABLE 12.** Commercial landings of Spotted Seatrout, Sand Seatrout, and Silver Seatrout, 2000-2019.

YEAR	NUMBER OF FISH	POUNDS
2000	19,337,611	23,713,691
2001	16,233,366	19,914,255
2002	11,175,267	13,621,551
2003	12,138,716	13,380,992
2004	11,612,386	12,004,661
2006	15,611,145	16,654,889
2007	13,392,951	14,600,011
2008	17,832,509	19,219,941
2009	17,958,898	18,632,635
2010	15,582,001	16,458,627
2011	19,035,440	23,496,671
2012	19,410,132	22,025,840
2013	16,267,462	16,800,834



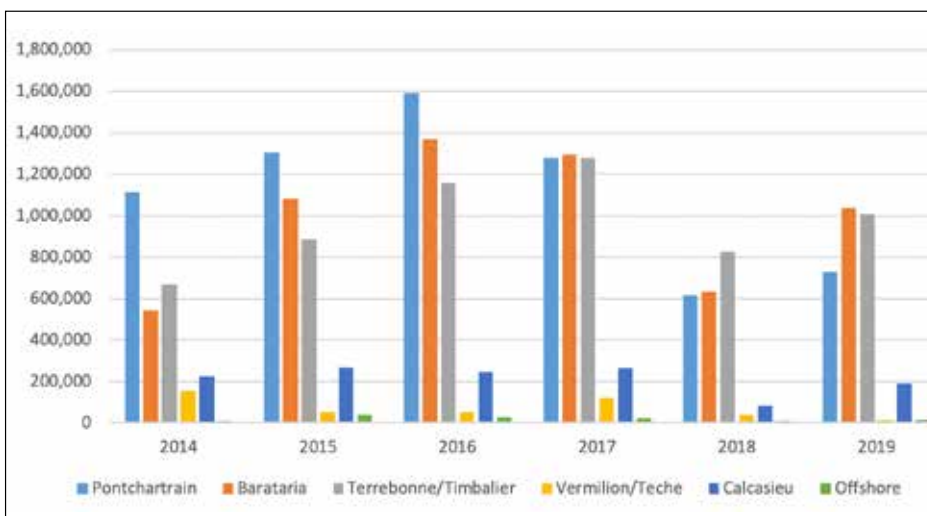
**FIGURE 2.** Annual private recreational and for-hire landings of Spotted Seatrout in Louisiana in number of fish, 2014-2019.

**TABLE 13.** Statewide effort of private recreational and for-hire saltwater fishing trips, 2014-2019.

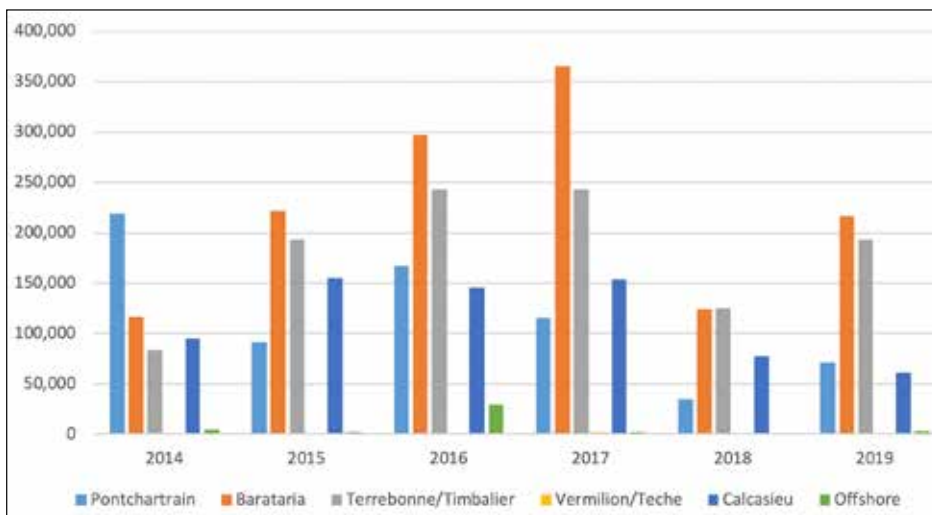
YEAR	PRIVATE TRIPS	FOR-HIRE TRIPS	TOTAL TRIPS
2014	2,096,246	130,615	2,226,861
2015	2,266,506	159,786	2,426,292
2016	2,063,347	179,239	2,242,586
2017	2,127,350	178,719	2,306,069
2018	2,092,640	183,301	2,275,941
2019	1,939,883	168,579	2,108,462

**TABLE 14.** Annual percentage of surveyed private recreational and for-hire saltwater fishing trips that landed Spotted Seatrout, 2014-2019.

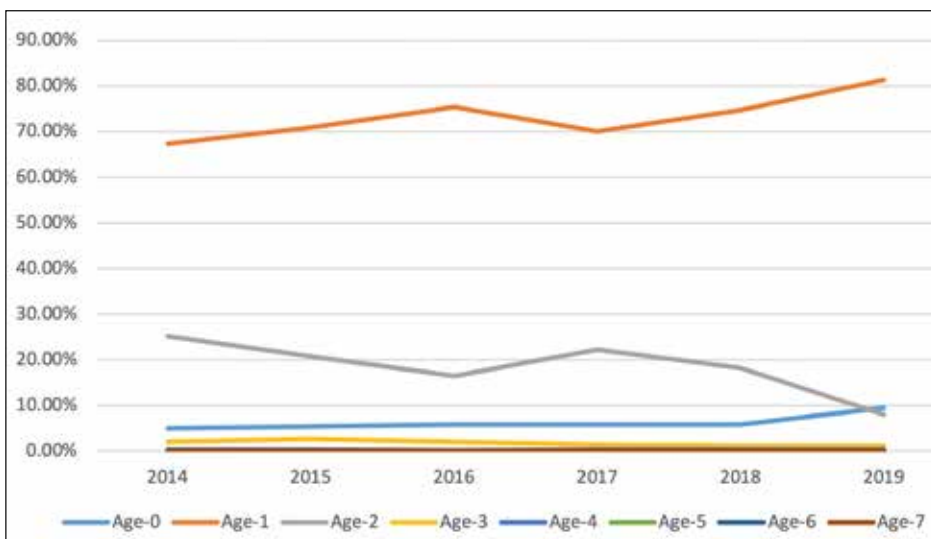
YEAR	TRIPS	REAL DOCKSIDE VALUE PER TRIP
2014	11.69%	17.02%
2015	37.59%	42.16%
2016	42.62%	50.51%
2017	42.06%	48.20%
2018	32.84%	29.41%
2019	35.97%	28.14%



**FIGURE 3.** Annual private recreational landings of Spotted Seatrout in Louisiana by area in number of fish, 2014-2019.



**FIGURE 4.** Annual for-hire landings of Spotted Seatrout in Louisiana by area in number of fish, 2014-2019.



**FIGURE 5.** Age composition of annual female Spotted Seatrout recreational landings in Louisiana, 2014-2019.

219,208 Spotted Seatrout in 2014 and a low of 35,098 Spotted Seatrout in 2018. The Calcasieu Basin averaged 114,666 Spotted Seatrout per year, with a high of 155,365 Spotted Seatrout in 2015 and a low of 61,585 Spotted Seatrout in 2019. For-hire landings in the Vermilion/Teche Basin were only recorded for one year during the time period, with 21 Spotted Seatrout landed from this area in 2017. Offshore for-hire landings of Spotted Seatrout averaged 7,584 Spotted Seatrout per year during the time period; there were no offshore for-hire landings recorded in 2018.

Statewide, the majority of female Spotted Seatrout landed by Louisiana recreational fishermen from 2014 through 2019 were 1-year-old fish (*Figure 5*). Proportionally, age 1 fish made up a high of 81% of landed fish in 2019 and a low of 67% in 2014. Landings of 2-year-old Spotted Seatrout from 2014 through 2019 ranged from a high of 25% in 2014 and decreased annually to a low of 8% in 2019. Landings of 3-year-old Spotted Seatrout from 2014 through 2019 represent less than 3% of total landings, while Spotted Seatrout above age 4 represent less than 1% of landed fish during the same time period.

## INTERACTIONS WITH OTHER FISHERIES OR USER GROUPS

Since the commercial Spotted Seatrout fishery is restricted to rod and reel only, it is likely there is minimal impact on other fisheries. A commercial entangling net ban implemented by the Louisiana Legislature in 1995, which was phased in by 1998, restricted commercial harvest of Spotted Seatrout to rod and reel only. Since this commercial gear restriction has been in place it is presumed that, just as with recreational rod and reel gear, there is minimal impact to other fisheries by the commercial Spotted Seatrout fishery. Most recreational anglers target multiple species during the same trip, making the Spotted Seatrout fishery contemporaneous with that of Red Drum, Black Drum, and other finfish. LDWF has received concerns from some anglers within the Spotted Seatrout recreational fishery in regards to the for-hire industry (e.g. captains possessing limits, multiple trips in a day, etc.).

While rod and reel gear may have minimal impacts to habitat, there is potential for conflicts between other commercial fisheries and recreational and commercial Spotted Seatrout anglers. As access to private lands under navigable waterways continues to be limited through physical or legal impediments, recreational, for-hire, and commercial fishermen find themselves crowding the same productive water bodies often leading to confrontations. Likewise, the presence of commercial vessels occupying and disturbing preferred angler fishing locations may be a minor inconvenience but does not seem to be a major concern for the majority of anglers.

There is some concern from anglers that other legal fisheries may have an impact on the Spotted Seatrout stock, predominantly the commercial harvest of Gulf Menhaden. An analysis by LDWF of Spotted Seatrout bycatch in the commercial menhaden fishery indicates that Spotted Seatrout bycatch in that fishery accounts for less than 1% of all total Spotted Seatrout landings (LDWF unpublished data). Potential conflicts

or concerns with other fisheries seem less problematic to anglers and have also been estimated to potentially have minimal impacts on the Spotted Seatrout stock in Louisiana. Cagle and West (2020) conducted a study to evaluate the bycatch from the inshore commercial shrimp fishery in Louisiana waters and indicated that Spotted Seatrout made up 0.46% of bycatch by weight from skimmer and butterfly nets.

# Ecosystem Considerations & Environmental Factors



## Addressing Potential Impacts

LDWF actively monitors the impact of the Spotted Seatrout fishery on the ecosystem and the impact of other fisheries to the Spotted Seatrout population, for example, conducting research on bycatch in other fisheries that may encounter Spotted Seatrout such as the menhaden and shrimp fisheries.

## ECOSYSTEMS CONSIDERATIONS

### HABITAT

There are little data available specifically on the impacts of Louisiana's commercial and recreational Spotted Seatrout fisheries on habitat. However, the impact of the Spotted Seatrout fisheries on habitat is likely low. Commercial and recreational rod and reel/hook and line gear is considered to have minimal impacts on Louisiana estuarine habitat, but improperly disposed of fishing line and tackle can entangle and harm organisms (Barnette 2001).

Commercial fishing is prohibited in more than 625,000 acres (2,529 km<sup>2</sup>) of Louisiana's coastal areas, approximately 343,699 acres (1,391 km<sup>2</sup>) of which are water bottoms, including Spotted Seatrout habitat. There are restrictions on recreational fishing in some of these areas as well. These coastal areas include state wildlife management areas, private sanctuaries, state and federal wildlife refuges, and areas designated by LA R.S. 56 or LAC 76.

### BYCATCH AND DISCARDS

Data regarding the type and frequency of bycatch and discards in Louisiana's commercial and recreational Spotted Seatrout fisheries are limited as there is no observer monitoring nor studies specific to bycatch and discards in these fisheries. However, other studies, landings data, and interviews with fishermen can provide a general description of bycatch and discards in these fisheries. Commercial fishermen are restricted on what bycatch they may retain by the permits they possess. Recreational anglers may retain a variety of bycatch as long as it complies with applicable regulations. Mortality of discarded fish from both commercial and recreational fishermen is believed to be minimal. Discard mortality estimates from hook and line fishing are extremely variable (~5-95%; Murphy et al. 1995; Stunz and McKee 2006; James et al. 2007). These studies report that post-release mortality depends on multiple factors including bait/hook type, anatomical hooking location, and water quality. Discard mortality is assumed to

be 10% for LDWF’s modeling purposes; this rate is incorporated directly into recreational landings estimates and represents an annual average from Gulf studies (West et al. 2019).

**Finfish**

In Louisiana, the commercial harvest of Spotted Seatrout is exclusively limited to rod and reel gear. Rod and reel is a subset of hook and line gear, but the term is used to specify when a mechanical reel is used in combination with a rod. Hook and line gear is any line that extends from the tip of a rod and uses a lure or baited hook tied to the end of the line to attract fish. Rod and reel gear became the only allowed method for commercial harvest of Spotted Seatrout in 1997 after a commercial entangling net ban was instituted by the Louisiana Legislature through the Louisiana Marine Resources Conservation Act of 1995 (Act 1316 of the 1995 Regular Session), and commercial landings of Spotted Seatrout have declined significantly since then (West et al. 2019). Rod and reel is fairly selective and incidentally caught species can likely be released.

Other commercial fisheries are permitted to retain and sell most bycatch for commercial purposes as long as they are in compliance with applicable regulations for those species. However, they may not commercially harvest gamefish or Spotted Seatrout (as commercial rod and reel gear is the only legal gear for harvesting spotted seatrout and no vessel carrying or fishing a gill, hoop, trammel, or seine net may have Spotted Seatrout aboard). LDWF monitors harvest and sales of these species through LDWF’s trip ticket program. Commercial fishermen may also retain fish for personal consumption as long as it is within minimum size and recreational daily possession limits; however, they must have applicable recreational fishing licenses and any retained fish must be within recreational minimum size and daily possession limits.

Statewide, Spotted Seatrout is the number one target (45%), second is Red Drum (38%), third is no target (13%) based upon LA Creel data. Recreational fishermen in Louisiana fishing for other sportfish typically also target Spotted Seatrout. Spotted Seatrout may be recreationally harvested using hook and line, trolling line, handline, yo-yos or trigger devices, dip nets, and fly casting apparatus. The majority of recreational bycatch of desirable species may be retained when in compliance with applicable regulations for those species or can be released with relatively high success rate of survival.

**Protected Species**

Five species of sea turtles share some habitat with Spotted Seatrout in Louisiana and Gulf waters. All of these species are currently listed as threatened or endangered under the Endangered Species Act (ESA; Table 15).

**TABLE 15.** Protected sea turtles in Louisiana and Gulf waters.

COMMON NAME	SCIENTIFIC NAME	ESA STATUS
Loggerhead sea turtle	<i>Caretta caretta</i>	Threatened
Green sea turtle	<i>Chelonia mydas</i>	Threatened
Kemp’s ridley sea turtle	<i>Lepidochelys kempii</i>	Endangered
Leatherback sea turtle	<i>Dermochelys coriacea</i>	Endangered
Hawksbill sea turtle	<i>Eretmochelys imbricate</i>	Endangered

There are no documented cases of sea turtles caught as bycatch in the commercial Spotted Seatrout fishery; however, there is also no observer monitoring for this fishery. The commercial fishery is a rod and reel fishery only. Under Section 118 of the Marine Mammal Protection Act (MMPA), NMFS is required to classify all U.S. commercial fisheries into one of three categories based on the level of incidental serious injury and mortality of marine mammals. NMFS classifies Spotted Seatrout as a Category III gillnet fishery, however gillnets are not a permitted gear for commercial Spotted Seatrout harvest in Louisiana, where commercial harvest is restricted to rod and reel gear only. However, Gulf of Mexico hook-and-line fisheries (rod and reel being a subset of hook-and-line) are as a whole listed as Category III fisheries, meaning there is remote likelihood of/no known incidental mortality or serious injury of marine mammals. Owners of vessels or gear engaged in a Category III fishery are not required to register with NOAA Fisheries or obtain a marine mammal authorization to lawfully take non-endangered and non-threatened marine mammals incidental to commercial fishing operations. Commercial fishermen must report to NMFS all incidental mortalities and injuries of marine mammals that occur during commercial fishing operations, regardless of the category in which the fishery is placed (I, II, or III), within 48 hours of the end of the fishing trip. In addition, any animal that ingests fishing gear or any animal that is released with fishing gear entangling, trailing, or perforating any part of the body is considered injured, regardless of the presence of any wound or other evidence of injury, and must be reported. Recreational fisheries are not classified by NMFS in this manner.

**ENVIRONMENTAL FACTORS**

**HYDROLOGICAL CONDITIONS (Salinity, Water Temperature, Dissolved Oxygen and Turbidity)**

Spotted seatrout are primarily an estuarine-dependent species (Tabb 1961) found in varied estuarine environments along the U.S. Atlantic coast and the northern coast of the Gulf (Mahood 1974; Baker and Matlock 1993). Spotted Seatrout are euryhaline and found in salinity ranges of 0.2 ppt (Perret et al. 1971) to 75 ppt (Simmons 1957), though specific habitat preferences differ between adults and juveniles.

Herke et al. (1984) found that most juvenile Spotted Seatrout entered the marsh of Sabine National Wildlife Refuge in late August through September at 0.59 to 1.77 inches (15 to 45 millimeters standard length), with peak catches in canals and bayous rather than shallow marsh habitats (Alshuth and Gilmore 1993). While juveniles exhibited limited use of low salinity, shallow marsh habitats and may prefer edge habitat, the major nursery areas were higher salinity bays or more likely nearshore Gulf waters (Saucier et al. 1992; Saucier and Baltz 1993).

Adult Spotted Seatrout in Louisiana are found associated with a range preferred habitats including areas of submerged vegetation, areas with structure like oil platforms, around emergent or submerged islands, deep canals and bayous within inshore areas of the Gulf, sandy bottoms, and shell reefs (Lorio and Perret 1980; TinHan et al. 2018; Livernois et al. 2020). Spotted Seatrout are taken throughout the water column with no apparent preference for any depth and may be found throughout

their range in clear to very turbid waters (Lorio and Perret 1980). The offshore habitat of adults is poorly known. However, Stanley and Wilson (1990) reported that Spotted Seatrout, along with Red Snapper *Lutjanus campechanus* were the most commonly caught species around oil and gas structures off Louisiana. Perret et al. (1980) generalized that “Spotted Seatrout are probably found in any area offering suitable salinity and temperature regimes combined with sufficient primary productivity to support a food web suitable to their needs.”

Juvenile and adult Spotted Seatrout seem to be equally tolerant of environmental variations typical of their particular area; however, abrupt changes in the environment affect them (Tabb 1966; Chesney et al. 2000). The largest catches of Spotted Seatrout in Mississippi occurred between temperatures of 77 and 86°F (25 and 30°C; Loman 1978), while optimum temperature for adults ranged from 59 to 80.6°F (15 to 27°C) in Florida (Tabb 1958). Simmons (1957) found that Spotted Seatrout live and feed actively at temperatures between 39.2 and 91.4°F (4 and 33 °C), if they are gradually acclimated to the extremes of this range; however, sudden and extreme temperature decreases accompanying cold fronts often result in mass mortalities (Gunter 1941; Gunter and Hildebrand 1951; Moore 1976; Adkins et al. 1979; McDonald et al. 2010). The rate of temperature reduction, as well as salinity, probably influence the tolerance of Spotted Seatrout to low temperatures and low salinities (Overstreet 1974, 1983). Optimum salinity ranges for Spotted Seatrout larvae were 20 to 35 ppt (Arnold et al. 1976) and 18.6 to 37.5 ppt (Taniguchi 1981). Johnson and Seaman (1986) suggested 5 ppt salinity as the minimum tolerance level for both larval and juvenile Spotted Seatrout.

Spotted Seatrout mortalities associated with natural perturbations were documented by several authors. Tabb and Manning (1961) and Tabb et al. (1962) observed Spotted Seatrout strandings due to rapidly receding waters following hurricanes and subsequent mortalities due to suffocation in excessively turbid waters. Springer and Woodburn (1960) listed Spotted Seatrout as one of the species of fish killed by red tide *Gymnodinium breve* in Tampa Bay, Florida, in 1957. Mortalities of Spotted Seatrout from gas bubble disease were reported for Galveston Bay by Renfro (1963); this disease is caused from gas bubbles formed in the bloodstream of the fish during a period when waters were supersaturated with dissolved oxygen from a phytoplankton bloom.

There have also been large areas of hypoxic or oxygen-depleted waters documented off of Louisiana’s continental shelf that occur seasonally, from late spring through early fall, which may impact Spotted Seatrout. Hypoxic areas are often referred to as dead zones where dissolved oxygen levels in deeper water may be too low to sustain marine life. Dissolved oxygen levels above 4 parts per million (ppm) are adequate to sustain most aquatic organisms; however, levels below 2 ppm, particularly during prolonged periods, may cause stress and mortalities (Renaud 1986). These hypoxic areas are largely attributed to heavy nutrient loads discharged by the Mississippi River. Hypoxic areas may impact Spotted Seatrout through direct mortality, increased susceptibility to disease, or redistribution as Spotted Seatrout move to more favorable areas (Blaylock and Overstreet 2003).

LDWF biologists monitor hydrological conditions through their sampling program to determine how they influence Spotted Seatrout and other resources. LDWF can make a declaration of emergency to close a fishery should biological and technical data regarding hydrological conditions indicate a need to protect the resource or the public.

## DISEASES AND PARASITES

Spotted Seatrout are potential hosts to numerous ecto- and endo-parasites (Lorio and Perret 1980; Blaylock and Overstreet 2003). Records of parasites and diseases of Spotted Seatrout are widely scattered in the parasitological literature. The most conspicuous parasite of Spotted Seatrout in Louisiana is the metacystode stage of the parasitic tapeworm *Poecilancistrum caryophyllum*, sometimes referenced as *P. robustum* (Overstreet 1983). Tapeworm larvae are elongated with a terminal bulbous enlargement, appear whitish-opaque in color, and encyst in the fleshy musculature of the upper back of the fish on either side of the vertebral column. Collins et al. (1984) found a maximum infection intensity of 10 *P. caryophyllum plerocercoids* per Spotted Seatrout. Means of transmittal and host-parasite relationships are poorly understood; however, these parasites are probably transmitted to fish by ingestion of food such as penaeid shrimp, which harbor tapeworm larvae. Sharks, such as Bull Shark *Carcharhinus leucas* and Lemon Shark *Negaprion brevirostris*, have been identified as definitive hosts of this parasite.

*P. caryophyllum* does not affect the condition coefficients of adult Spotted Seatrout (Overstreet 1977). One cestode was noted encysted in the musculature of a 9.84-inch (250 millimeter) Spotted Seatrout, suggesting that most individuals probably live in Spotted Seatrout at least three years before degenerating (Overstreet 1983). Numerous authors (Guest and Gunter 1958; Overstreet 1978; Adkins et al. 1979; Lorio and Perret 1980) have stated that fishermen often discard fish infected with tapeworm larvae because of a perceived danger. Overstreet (1983) questioned fishermen participating in Mississippi fishing rodeos and reported that 43.8% saw the cestode and did not mind eating infected fish, although some culled the worms, and 24.8% of those fishermen who caught infected fish did not eat them. Infected fish less than 5.51 inches (140 millimeters standard length, SL) probably die, while those greater than 5.51 inches (140 millimeters) SL may develop an immunological response (Overstreet 1983). Tarver (1972) noted a greater occurrence of the parasite in Spotted Seatrout older than 1 year. The prevalence and intensity of infection was greater during years of high salinity because of the probable increased availability of infected intermediate hosts (Overstreet 1977).

The hemurid digenean *Stomachiola magna* is another parasite of Spotted Seatrout. This pink-colored worm is surrounded by a dark colored pigment and is found encapsulated, or wandering, in the peritoneum, flesh, or viscera (Overstreet 1983). Higher levels of prevalence and intensity of infection were found to occur more often in Sand Seatrout than in Spotted Seatrout (Corkum 1966; Sinclair et al. 1972).

A protozoan parasite was found in leucocytes of Spotted Seatrout by Saunders (1954). Various trematodes were reported from Spotted Seatrout by Manter (1938), Hargis (1956), Hopkins (1956), and Sparks and Thatcher (1958). Overstreet (1977) surveyed cestodes in Spotted Seatrout.

Larval Spotted Seatrout reared with wild plankton became infested with the chalimus stage of *Caligus* sp., which usually attached to the dorsum near the developing dorsal fin (Houde 1972 personal communication, cited in Overstreet 1983). Rosenthal (1967) found ascaridoid nematode, *tetraphyllidean cestode*, *lernaecocid copepod*, and *Caligus rapax* infected larval herring, and later Overstreet (1983) found that Spotted Seatrout are infected by similar species of parasites. These larval parasites, especially the nematode and lernaecocid, killed about 10% of the larval fish (Rosenthal 1967). Moravec et al. (2006) found two new species of *Philometra* in Spotted Seatrout in the estuaries of South Carolina.

The isopod *Lironeca ovalis*, the most common external metazoan parasite of Spotted Seatrout in Mississippi, is capable of inflicting extensive damage to gill filaments and may result in juvenile mortalities (Overstreet 1983). Pearson (1929) noted that in Texas, *L. ovalis* commonly occurred on Spotted Seatrout of less than 3 years old but was rarely found on older individuals. Pearson (1929) also suggested that growth of infected fish was reduced compared to uninfested fish of the same year class and that these fish would gradually be eliminated from the population. Calligid copepods were found to infest the gills of Spotted Seatrout in Texas (Pearse 1952; Guest and Gunter 1958). Overstreet (1983) collected Spotted Seatrout of 3.94 to 6.69 inches (10 to 17 centimeters) TL from November through May and found that one or two of these parasites per fish were common, yet larger fish rarely demonstrated infestation.

McElroy et al. (2020) found that the heart of some wild Spotted Seatrout is infected by *Aporocotylid Cardicola laruei*, and prevalence of infection by adult flukes (61%) and granulomas (84%) peak in summer.

Bere (1936) and Causey (1953) recorded several *Lernanthropes gisleri* on the gills of Spotted Seatrout. Pearse (1952) found 45 specimens of *L. gisleri* from 29 Spotted Seatrout. This species seems to have more of an affinity for Spotted Seatrout than any other parasitic copepod.

Overstreet (1983) also listed the dinoflagellate *Amyloodinium ocellatum*, peritrich ciliates, and monogeanas as parasites of cultured Spotted Seatrout. Harmless parasites such as *Scolex polymorphus*, a phyllobothriid tetraphyllidean metacestode, occur in large numbers in the cystic duct, gall bladder, and intestine of its host; though the cystic duct may enlarge several fold, metabolism, condition coefficients, and food in the intestine appeared normal. Small numbers of larval helminths that have no adverse effects on Spotted Seatrout were also observed.

Several pathogens have been documented in Spotted Seatrout. The viral disease lymphocystis, which infects connective tissue cells in the fins and body proper and results in hypertrophy, have been observed in Spotted Seatrout in Mississippi Sound

(Howse and Christmas 1970). *Vibrio parahaemolyticus*, a bacterium known to cause food poisoning, was found in samples of Mississippi oysters, shrimp, and fish by Keel and Cook (1975). *Hysterothylacium* type MB larvae, which may cause mucosal hemorrhaging and focal eosinophilia in humans, has been verified in Spotted Seatrout (Overstreet and Meyer 1981).

Spotted Seatrout are also susceptible to fungal and bacterial infections. Spotted Seatrout and weakfish have a predisposition for fin rot syndrome, a term for describing certain nonspecific lesions (Mahoney et al. 1973; Overstreet and Howse 1977; Sindermann 1979). In Louisiana, Spotted Seatrout killed during prolonged low temperatures during February 1978 were found to have lesions and abrasions contaminated with fungi and bacteria (Adkins et al. 1979). Decreased activity of Spotted Seatrout in association with low water temperature results in increased susceptibility to fungal and bacterial infections.

## PREDATION

Although Spotted Seatrout are considered a top carnivore, they are also a prey for numerous other species. Several fishes feed on Spotted Seatrout. Klima and Tabb (1959) listed Striped Bass *Morone saxatilis*, Snook *Centropus undecimalis*, Tarpon *Megalops atlantica*, Alligator Gar *Lepisosteus spatula*, Barracuda *Sphyraena barracuda*, Spanish Mackerel *Scomberomorus maculatus*, King Mackerel *S. cavalla*, Bluefish *Pomotomus saltatrix*, and Silver Perch *Bairdiella chrysura* as predators of Spotted Seatrout in Apalachee Bay, Florida.

It is commonly thought that sharks will opportunistically predate Spotted Seatrout; however, Barry (2002) studied the diets of sharks in Timbalier Bay and found sciaenids comprised roughly 15% of Blacktip Shark *Carcharhinus limbatus* diet, but none of those prey items were identified as Spotted Seatrout. Additionally, none of the Sharpnose Sharks *Rhizoprionodon terraenovae* caught in that study contained sciaenids of any kind. Studies indicate that Spotted Seatrout are occasionally cannibalized (Game, Fish, and Oyster Commission 1932; Moody 1950; Darnell 1958; Lorio and Schafer 1966; Adams et al. 1973; Rutherford 1982; Manley et al. 2013; LDWF unpublished data).

Additional predators of Spotted Seatrout include birds and dolphins. Spotted Seatrout were second only to sea catfish and mullet in the diet of ospreys in Florida Bay (Tabb, Bio Tropical Industries 1983 personal communication, cited in Johnson and Seaman 1986). Spotted Seatrout tagged by Rogillio (1982) had to be transported to adjacent areas for release to avoid predators such as Cormorants *Phalacrocorax auritus* and Brown Pelicans *Pelecanus occidentalis*, as well as Bottlenose Dolphin *Tursiops truncatus*. Numerous studies suggest that the drumming sounds of Spotted Seatrout make them targeted prey by Bottlenose Dolphins (Gannon et al. 2004; McCabe et al. 2010; Volker 2020). McCabe et al. (2010) found the diet of Bottlenose Dolphins in Florida was made up largely (51.9%) of soniferous fishes including Spotted Seatrout.

## COMPETITION FROM OTHER SPECIES

Spotted Seatrout have very few competitors (Tabb 1966); even the closely related, but habitat segregated, Sand Seatrout and Silver Seatrout offer little interspecific competition (Barnes

2014). Gunter (1945) pointed out that juvenile Spotted Seatrout can apparently penetrate farther into low salinity areas than larger individuals, enabling them to escape competition and predation by larger individuals of their own species as well as of other species. Conversely, there may be increased susceptibility to predation and competition when Spotted Seatrout, in response to environmental extremes, move seaward through tidal inlets. Willis et al. (2015) observed that the diets of opportunistic species (those feeding on whatever is available and abundant) residing in the nearshore environment and feeding on benthic food sources likely overlap, but their different feeding strategies could reduce competition for resources even when their diets significantly overlap.

Klima and Tabb (1959) suggested that Hardhead Catfish *Arius felis*, grouper *Mycteroperca sp.*, Red Drum *Sciaenops ocellatus*, Spot *Leiostomus xanthurus*, Atlantic Croaker *Micropogonias undulates*, and Southern Rock Bass *Ambloplites rupestris ariomus* were competitors of Spotted Seatrout (Dietz 1976; Perret et al. 1980). In Lake Pontchartrain, Louisiana, Spotted Seatrout, Silver Perch *Bairdiella chrysoura*, and Tarpon *Megalops atlanticus* of comparable lengths had similar food habits (Darnell 1958; Dietz 1976; Perret et al. 1980).

Larvae and juvenile stages of Spotted Seatrout are most susceptible to predation and competition (Johnson and Seaman 1986; Hettler 1989; McMichael and Peters 1989). Probable competitors for food and space in the early planktonic stages of the Spotted Seatrout are larvae of other sciaenids, Pinfish *Lagodon rhomboides*, and Hardhead Catfish; juveniles of menhaden, anchovy, and Silversides *Menidia audens*; and adult menhaden and anchovy (Darnell 1958; Hettler 1989; McMichael and Peters 1989). Invertebrate larvae and adults of crustaceans, coelenterates, mollusks, ctenophores, and polychaetes may also compete with larval Spotted Seatrout for food (Hettler 1989).

## INVASIVE SPECIES

Global connectivity has led to the proliferation of invasive species around the world and in the United States. Invasive species can present many problems for native species by competing for both habitat and prey resources. In Louisiana, invasive species have not yet posed a threat to the Spotted Seatrout population, but the potential for threats continues and should be monitored.

## INCIDENTAL CATCH OF SPOTTED SEATROUT IN OTHER FISHERIES

Spotted Seatrout are caught as bycatch in the commercial shrimp fishery with otter trawls and skimmer and butterfly nets. The amount of bycatch of Spotted Seatrout in skimmer and butterfly nets is a minor percentage (0.463% of bycatch by weight; Cagle and West 2020) of total Spotted Seatrout landings. Spotted Seatrout are incidentally caught in the commercial Menhaden fishery. An analysis by LDWF of Spotted Seatrout bycatch in the commercial Menhaden fishery indicates that Spotted Seatrout bycatch in that fishery accounts for less than 1% of total Spotted Seatrout landings (LDWF unpublished data). Rod and reel fishing for other finfish can also account for incidental catch of Spotted Seatrout, but this is considered to likely make up a very small portion of annual mortality of Spotted Seatrout as Spotted Seatrout are also a desired species and any discards are likely the result of regulations.

## HABITAT LOSS AND RESTORATION

Eighty percent of annual coastal marsh loss in the United States occurs in Louisiana. Several factors contribute to the regional loss of marshes, including natural factors such as subsidence, sea level rise, storms, and floods, as well as manmade factors such as water management, dredging for oil and gas exploration, construction of pipelines and navigation channels, salt-water intrusion, and coastal development. Changes resulting from natural fluctuations have usually occurred less frequently and over a longer period of time than man-induced changes (CPRA 2017). Marsh loss may affect the abundance of estuarine dependent species such as Spotted Seatrout. Most likely, overall populations have been reduced as a result of habitat alterations; loss of vegetated wetlands have the most serious impact to larval and juvenile Spotted Seatrout as these low salinity areas provide food and shelter during these highly sensitive early life stages (Perret et al. 1971).

Louisiana's Coastal Protection and Restoration Authority (CPRA) monitors and measures coastal habitat loss and has proposed and/or implemented a number of coastal protection and restoration projects to help combat and slow some of these impacts through the Louisiana's Coastal Master Plan. These projects range from freshwater diversion and marsh creation to the construction of levees (CPRA 2012). These projects may have both positive and negative impacts on Spotted Seatrout abundance from increased marsh habitat through marsh creation to changes in salinity/temperature regimes through freshwater and sediment diversions. These projects may also impact Spotted Seatrout fisheries. For example, levees and other protection features could create access issues by disrupting travel to or modifying existing fishing grounds; however, they could also protect the existing fishery infrastructure as well as residences of fishermen. LDWF provides input into the Coastal Master Plan, but its authority is limited on project selection. However, LDWF will be directly involved in drafting operational plans for diversions and will, as feasible, provide guidance while considering conditions required for Spotted Seatrout and all estuarine species to thrive while also protecting Louisiana's land dwelling population. Unfortunately, both habitat loss and efforts to minimize its impacts could affect the ability of marshes to provide habitats for Spotted Seatrout and other estuarine dependent species. In fact, the changing coast of Louisiana would impact the fishery and Spotted Seatrout even if nothing were done to counteract the natural and manmade causes of coastal land loss. Increased monitoring before, during, and after construction of large-scale ecosystem restoration projects will allow LDWF to document response by species of importance and can help inform the adaptive management process, which may be relied on as Louisiana moves forward on these unprecedented steps to maintain some portion of coastal Louisiana.

## 2010 DEEPWATER HORIZON OIL SPILL

The Programmatic Damage Assessment and Restoration Plan (PDARP) documents the impacts to the habitat and natural resources of the Gulf caused by the 2010 *Deepwater Horizon* oil spill. According to the PDARP, approximately 65% of the total oiled shorelines and oiled wetland shorelines occurred in Louisiana, and the "heaviest and most persistent shoreline oiling occurred in salt marshes in Northern Barataria Bay" (DWH

NRDA 2016). While no studies have been conducted specifically on Spotted Seatrout, laboratory toxicity tests demonstrated that exposure of marsh organisms to sediments contaminated with Deepwater Horizon oil resulted in a series of adverse effects, including death, reduced growth, and reduced reproductive success. For example, studies noted damage to gill and liver tissues, reduced growth rates, and mortality in Southern Flounder; growth inhibition in juvenile Red Drum and Pacific White Shrimp *Litopenaeus vannamei* (used as a surrogate for Gulf Brown *Farfantepenaeus aztecus* and White Shrimp *Litopenaeus setiferus* in laboratory testing); reduced reproduction and survival in Gulf Killifish *Fundulus grandis*; and adverse effects in all oyster life stages tested, at varying concentrations. Projects to restore natural resources injured as a result of the Deepwater Horizon oil spill in Louisiana will focus on restoring Louisiana coastal marshes, given both the extensive impacts to Louisiana marsh habitats and species and the critical role that these habitats play across the Gulf for many injured resources and the overall productivity of the Gulf. These projects will be consistent with the Coastal Master Plan, to the extent possible. Additional details regarding completed and ongoing restoration projects can be found at [www.gulfspillrestoration.noaa.gov/restoration-areas/louisiana](http://www.gulfspillrestoration.noaa.gov/restoration-areas/louisiana).

# Fishery Management Program



## Collaborative Fishery Management

Louisiana's fishery management authorities collaborate with the other Gulf states, other aquatic resource management authorities, public health and safety authorities, industry, and other stakeholders in the management of the state's Spotted Seatrout resource and fisheries.

## MANAGEMENT FRAMEWORK

The Constitution of Louisiana provides the foundation for the sustainable management of the state's fisheries resources, including Spotted Seatrout, recognizing their importance to Louisiana's environment, citizens, and economy. According to the Constitution of Louisiana, "The freedom to hunt, fish, and trap wildlife, including all aquatic life, traditionally taken by hunters, trappers and anglers, is a valued natural heritage that shall be forever preserved for the people. Hunting, fishing and trapping shall be managed by law and regulation consistent with Article IX, Section I of the Constitution of Louisiana to protect, conserve and replenish the natural resources of the state." Louisiana's legislative statutes and administrative code provide the legal and administrative framework for the state's fishery management system. LA R.S. 56:638.1-5 define the legislative intent, findings, purposes, policy, and standards for the conservation, management, and sustainability of all species of fish in Louisiana and are similar to those found in the Magnuson-Stevens Fishery Conservation and Management Act (MSA), the law that guides U.S. federal fishery management. According to these statutes, fishery conservation and management in Louisiana should sustain:

- Louisiana's fisheries resources (fish and shellfish)
- The ecosystems in which they live (habitat and other aquatic species)
- The people that depend upon these resources (commercial and recreational fishing industries and coastal communities).

See *Appendix II* for specific details of these statutes.

## AUTHORITIES

### LOUISIANA

#### Legislature

The primary authority for managing the Spotted Seatrout fishery in Louisiana's state waters rests with the Legislature. The Legislature is the lawmaking body of the state and enacts Revised Statutes defining the legal framework for fishery management. The Constitution of Louisiana empowers the Legislature to enact laws to protect, conserve, and replenish the natural resources of the state, with consideration for the health, safety, and welfare of the people. The Legislature has delegated some of its authority to the Commission and the Secretary of LDWF. In general, management actions such as gear changes, licensing, and entry limitations are under the authority of the Legislature. With respect to Spotted Seatrout, in 1995, the Legislature outlawed the use of set gill nets and trammel nets in saltwater areas of Louisiana and restricted Spotted Seatrout harvest with strike nets to the period between the third Monday in November through April 30 of the following year or until the annual quota is reached. Commercial harvest was prohibited after sunset and before sunrise as well as between sunset Friday through sunrise Monday. Commercial harvest was restricted to only those who obtained a special non-transferrable Spotted Seatrout permit, which includes qualifying criteria. The Legislature established a commercial rod and reel license, which includes qualifying criteria, and, in 1997, restricted commercial harvest of Spotted Seatrout to only rod and reel gear, banning the use of entangling nets for Spotted Seatrout harvest. The Legislature established the MLL for commercially harvested trout as 14 inches. The Legislature also set the length, bag, and possession limits for recreational harvest of Spotted Seatrout but has allowed the Commission authority to change those regulations (LA R.S. 56:325.1). Guidelines for commercial harvest and commercial size limits are provided in LA R.S. 56:325.3 and 56:326 respectively.

The Legislature adopts laws according to Louisiana's legislative process. LDWF, in coordination with the Louisiana Finfish Task Force, may develop proposed legislation specific to the Spotted Seatrout fishery and assist in finding sponsors for those particular bills. Legislators also develop bills of their own.

See Appendix III for a diagram outlining Louisiana's legislative process.

#### Wildlife and Fisheries Commission

The Commission is charged with the control and supervision of the wildlife of the state, including all aquatic life. Part of the executive branch, the Commission consists of seven members appointed by the governor, subject to confirmation by the Senate. The Commission operates as a policy-making and budgetary control board, with no administrative function.

The Commission receives and reviews biological, socioeconomic, and other technical data and management recommendations from LDWF, gathers public input, and ultimately votes on which actions will best achieve long term management goals. In general, the Commission is charged with setting seasons, times, places, size limits, quotas, daily take, and possession lim-

its based upon biological data and setting fees for nonresident recreational fishing licenses, among other authorities. With respect to Spotted Seatrout, the Commission is granted the authority to adjust seasons, size limits, bag and possession limits, and quotas on commercial harvest of Spotted Seatrout within the constraints already established by the Legislature (LA R.S. 56:325.3 and 326.3). Bag, possession, and size limits for recreational harvest of Spotted Seatrout may be set by the Commission under those same authorities.

See Appendix IV for complete details on the Commission's authorities and duties as outlined in LA R.S. 56.

The Commission adopts rules according to the process defined in Louisiana's Administrative Procedure Act (APA, LA R.S. 49:950ff). The APA requires that the Commission give appropriate notice of their intended action, make the proposed rule available for public review and comment, and include a Fiscal and Economic Impact Statement (FEIS), summarizing what social and economic impacts the proposed rule might have. In addition to the FEIS, a proposed rule must also include Family Impact, Poverty Impact, and Provider Impact Statements. Once the rule has gone through the process and is approved, it is published as final in the Louisiana Register and is compiled with other Commission rules in LAC 76.

#### Department of Wildlife and Fisheries

LDWF serves as the administrative and operational arm of the Commission. The Secretary of LDWF is appointed by the governor, subject to confirmation by the Senate. The Secretary is the executive head and chief administrative officer of LDWF. In general, LDWF monitors fishery populations and fisheries by collecting and analyzing fishery dependent and independent data; conducts scientific research; provides data and management recommendations to the Commission and Legislature; and administers and enforces laws, rules, and regulations as adopted by the Commission and Legislature.

The Legislature and Commission may grant the Secretary of LDWF additional authorities to create administrative rules. For example, the Secretary, when authorized, can make a declaration of emergency in times when public health, safety, and welfare are in jeopardy and quick and immediate action is required.

See Appendix V for complete details of the Secretary and LDWF's authorities and duties related to Spotted Seatrout as described in LA R.S. 56 and LAC 76.

#### Governor

The governor of Louisiana also has authority to issue executive orders, which are not statutes like those passed by the Legislature but do have the force of law.

#### Finfish Task Force

The Legislature established the Louisiana Finfish Task Force to study and monitor the finfish industry and to make recommendations to the Commission, LDWF, and other state agencies for the maximization of benefit from that industry for the state of Louisiana and its citizens. The Louisiana Finfish Task Force is composed of 15 voting (including six alternates) and six non-voting members.

## **Voting Members Include**

- Three certified licensed Louisiana commercial fishermen (and three alternates) appointed by the governor - three of which must be selected from a list of six nominees submitted by the Louisiana Shrimp Association and three of which must be selected from a list of six nominees submitted by the Delta Commercial Fisheries Association
- One active Louisiana dock buyer of finfish appointed by the governor
- Three licensed Louisiana recreational freshwater and saltwater fishermen (and three alternates) appointed by the governor - four of which must be selected from a list of eight nominees submitted by the Coastal Conservation Association of Louisiana and two of which must be selected from a list of four nominees submitted by the Louisiana Chapter of the Bass Anglers Sportsman Society
- One member of the Senate appointed by the president of the Senate
- One member of the House of Representatives appointed by the speaker of the House of Representatives.

## **Nonvoting Members Include**

- The governor or his designee
- Three members appointed by the Secretary of LDWF including a fisheries biologist, an enforcement agent, and an economist
- The commissioner of the Louisiana Department of Agriculture and Forestry (LDAF) or his designee
- The secretary of the Louisiana Department of Health (LDH) or his designee.

The Louisiana Finfish Task Force has no direct management authority for the Spotted Seatrout fishery. According to LA R.S. 56:301.10, the Louisiana Finfish Task Force is responsible for:

- Coordinating efforts to increase finfish production and marketability
- Studying the decline in finfish marketability and market price
- Studying the impacts of imported finfish on the domestic market
- Assisting in the development of a state finfish inspection program
- Assisting in the development of a Louisiana finfish certification and branding program
- Making recommendations to the Commission, LDWF, the Louisiana Department of Natural Resources (LDNR), LDAF, and LDH on policies to help enhance the domestic finfish industry
- Making recommendations on issues pertaining to the finfish industry and finfish production to state agencies responsible for elements of the finfish industry in Louisiana, including LDWF, LDNR, CPRA, LDH, LDAF, and the Legislature.
- Developing markets and marketing strategies for the development and expansion of markets for finfish harvested from Louisiana waters
- Representing the interests of the Louisiana finfish industry before federal and state administrative and legislative bodies on issues important to the Louisiana finfish industry
- Contracting for legal services to represent the interests of the Louisiana finfish industry in judicial, administrative, and legislative proceedings

- Performing any acts deemed necessary and proper to carry out its duties and responsibilities.

## **Other Aquatic Resource Management Authorities**

Although not involved in marine fishery management directly, several state and local agencies are involved in managing other aquatic or coastal resources, such as protecting habitat or monitoring water quality. LDNR is charged with regulating development activities and managing resources in Louisiana's coastal zone. Several coastal parishes have also developed their own coastal zone management programs. CPRA is responsible for developing, implementing, and enforcing the Coastal Master Plan, including monitoring and measuring coastal habitat loss and coordinating habitat restoration projects. LDWF collaborates with all of these agencies, reviewing permits, commenting on coastal zone management and habitat restoration activities, and participating in the Coastal Master Plan development process.

## **Public Health and Safety Authorities**

All seafood produced and processed in Louisiana must meet quality and safety standards set forth in the Louisiana Sanitary Code. LDH routinely inspects the state's approximately 350 seafood processing plants using federal Hazard Analysis Critical Control Point (HACCP) requirements to ensure safe handling practices and that only safe product reaches the market. More details on these programs are available from LDH.

The Louisiana Department of Environmental Quality (LDEQ) is responsible for setting pollution standards and monitoring all waters of the state, including the Gulf, to ensure they meet water quality standards.

LDH works with LDEQ to issue fish consumption advisories based on fish tissue sampling in areas of suspected contamination and assessments of risk to human health. LDH and LDEQ consult LDWF and LDAF throughout the advisory development and dissemination process.

## **Public Participation and Engagement**

Louisiana's fishery management authorities encourage public participation throughout the management process to not only ensure stakeholders' interests are considered but also to ensure they understand the regulatory process and resulting management actions. All meetings of the Legislature's natural resources committees and the Commission are open to the public according to Louisiana's Open Meetings Law (LA R.S. 42:12-28). This law mandates that government decisions be made in an open forum, ensuring state integrity and the public's trust and awareness of its governing officials. Meetings must be announced at least 24 hours in advance, provide opportunities for public comment, allow for audience recording of the meeting, and have recorded minutes of the proceedings.

## **REGIONAL**

### **Other Gulf States**

The other U.S. states bordering the Gulf are responsible for the conservation and management of Spotted Seatrout fisheries within their respective waters. Louisiana cooperates with

other Gulf states in the scientific research and management of fisheries that cross jurisdictional boundaries, including Spotted Seatrout, through the Gulf States Marine Fisheries Commission (GSMFC). LA R.S. 56:71-87 establish Louisiana’s authority to enter into the Gulf States Marine Fisheries Compact with other states. The GSMFC has no direct authority over the Spotted Seatrout fishery but is authorized to make recommendations to the governors and legislatures of the five Gulf states on programs beneficial to management of shared fisheries. The GSMFC also consults with and advises member states over fishery conservation problems, advises U.S. Congress, and testifies on legislation and marine policies affecting the Gulf states.

Specific to the Spotted Seatrout fishery, the GSMFC has assisted in addressing issues of importance to Spotted Seatrout on a regional scale. In 2001, the GSMFC recognized developed a fishery management plan for Spotted Seatrout due to the importance of the fishery across the Gulf states, as well as states maintaining different target conservation metrics.

See Appendices VI and VII for a table of other states’ regulations for commercial and recreational Spotted Seatrout fisheries.

**Federal Authorities**

The Gulf of Mexico Fishery Management Council (Gulf Council) and NMFS are responsible for monitoring and managing fisheries resources in Gulf federal waters (from the seaward boundary of state waters to 200 nautical miles offshore). Spotted Seatrout fisheries operate almost exclusively in state waters; landings occasionally come from federal waters. Federal agencies do not directly manage Spotted Seatrout, and the Gulf Council has not developed a fishery management plan for Spotted Seatrout. However, through their administration of laws, regulations, and policies, certain federal agencies may influence the Spotted Seatrout resource and fisheries and management thereof.

See Appendix VIII for a list of related federal management institutions and their authorities and jurisdictions and Appendix IX for a list of related federal laws, regulations, and policies.

**EXISTING MANAGEMENT MEASURES**

**PLANS**

LDWF’s Report on the Status of Spotted Seatrout (1997) and Biological Profile of Spotted Seatrout (1996) summarized relevant scientific information and studies regarding the management of Spotted Seatrout; described the biological and economic aspects of the Spotted Seatrout fishery; reviewed Louisiana management authorities and laws affecting Spotted Seatrout; described the problems and needs of the Spotted Seatrout fishery; and suggested management strategies and options to solve problems and meet the needs to the stock (Blanchet et al. 1997). Blanchet et al. (1997) included a summary of the 1991 stock assessment and the 1996 biological profile and provided recommendations on commercial and recreational size limits, and commercial quotas.

The GSMFC’s Spotted Seatrout Fishery of the Gulf of Mexico, United States: A Regional Management Plan (2001) summarized, referenced, and discussed relevant scientific information

and studies regarding the management of Spotted Seatrout; described the biological, social, and economic aspects of the Spotted Seatrout fishery; reviewed state and federal management authorities and their jurisdictions, laws, regulations, and policies affecting Spotted Seatrout; described the problems and needs of the Spotted Seatrout fishery; and suggested management strategies and options to solve problems and meet the needs of the stocks.

**POLICIES**

LA R.S. 56:6 tasks the Commission with promulgating rules and regulations for Spotted Seatrout to set seasons, times, places, size limits, quotas, daily take, and possession limits based upon biological and technical data. LDWF provides the Commission with scientific and technical data, including an assessment of the Spotted Seatrout stock in Louisiana waters, for consideration of management to maintain the sustainability of the stock.

LA R.S. 56:325.1 gives the Commission authority to set take, possession, and size limits for saltwater finfish caught recreationally, while LA R.S. 56:325.3 tasks the Commission with regulating the maximum annual quota, seasons, possession, and other aspects of commercial Spotted Seatrout fishery.

**STATUTES AND RULES**

Louisiana’s Spotted Seatrout fisheries are governed by both legislative statutes (LA R.S. 56) and rules promulgated by the Commission (LAC 76). Specific regulations are described below. This summary of regulations does not retain their exact language and should be not be relied on for legal purposes. See Appendix X for detailed text of these regulations. See Appendix XI for a chronological history of major changes to Louisiana’s Spotted Seatrout regulations.

**Commercial**

**Licensing**

No person shall be issued a license or permit for the commercial taking of Spotted Seatrout unless that person meets all of the following requirements:

- The person shall provide proof that they purchased a valid Louisiana commercial saltwater gill net license in any two of the years 1995, 1994, and 1993.
- The person shall provide copies of unamended, original income tax returns, including Schedule C from the federal form 1040, which show that the person derived more than 50% of their earned income from the capture and sale of seafood species in any two of the years 1995, 1994, and 1993.
- The applicant shall not have been convicted of any fishery-related violations that constitute a class three or greater violation.

Both resident and nonresident fishermen must have the appropriate commercial fishing and gear licenses to harvest Spotted Seatrout commercially in Louisiana waters. Gear licenses may not be transferred between licensed commercial fishermen. Nonresidents may not purchase licenses for commercial fishing gear prohibited in the state in which they reside. Five dollars of each resident gear license fee and 20 dollars from each nonres-

ident gear license fee are deposited in the Seafood Promotion and Marketing Fund. Vessel owners must also have the appropriate vessel licenses.

Licensed commercial fishermen may transport and sell their own catch to any licensed Louisiana wholesale/retail seafood dealer located within Louisiana. They must have a fresh products license to sell their catch directly to a consumer; they may purchase a secondary fresh products license for their spouse for a reduced fee. Commercial fishermen that sell their catch to anyone other than a consumer or licensed dealer and anyone else that buys, acquires, handles, transports, or exports Spotted Seatrout for sale or resale must have the appropriate licenses. A portion of each license fee is deposited in the Seafood Promotion and Marketing Fund.

Licenses may be suspended, denied or revoked for failure to pay child support, nonpayment of unemployment compensation overpayment, and nonpayment of individual income taxes.

### **Fishery Access**

The Spotted Seatrout fishery is not an open access fishery. Persons must provide proof that they purchased a valid Louisiana commercial saltwater gill net license in any two of the years 1995, 1994, and 1993 or participate in the apprentice program established in LAC 76:409.

### **Legal Gear and Gear Requirements**

Commercial fishermen may harvest Spotted Seatrout with rod and reel gear only. Commercial fishermen must have a Spotted Seatrout permit and a rod and reel gear license to use rod and reel as a commercial gear in state waters. Commercial fishermen may not use any of the following types of gear to harvest Spotted Seatrout in state saltwater areas:

- Spears
- Stupefying substances or devices
- Guns
- Poisons
- Explosives
- Tree-topping devices
- Electric shocking instruments or devices
- Trawls
- Trotlines
- Seines
- Gill, trammel, and strike nets
- Snagging devices (not including bows and arrows)
- Longlines
- Bandit gear
- Elevated trotlines (except in exempt areas).

Additionally, commercial fishermen may not use any aircraft including fixed-wing aircraft, dirigibles, balloons, helicopters, or any other form of aerial surveillance to assist in harvesting Spotted Seatrout.

### **Seasons**

Open season for commercial harvest of Spotted Seatrout runs from the second day of January through Dec. 31 of each year or until the annual quota is reached. Commercial harvest of Spotted Seatrout is prohibited during the period from sunset on Friday through sunrise on Monday.

### **Size and Possession Limits**

No person shall take or possess Spotted Seatrout under 14 inches minimum TL with the mouth closed for commercial purposes. Fish of the prescribed legal size may be taken, held in possession, or sold in unlimited quantities, provided there is compliance with all other requirements of the law. Spotted Seatrout under the minimum legal size shall be returned immediately to the waters from which taken without avoidable injury. Spotted Seatrout possessed by a commercial fisherman shall have the head and caudal fin intact until set or put on shore or when sold.

### **Bycatch**

Commercial fishermen are permitted to retain and sell most bycatch for commercial purposes as long as they are in compliance with appropriate regulations for those species. However, they may not commercially harvest gamefish. LDWF monitors landings and sales of these species through LDWF's trip ticket program. Commercial fishermen may also retain bycatch for personal consumption; however, they must have applicable recreational fishing licenses and any retained fish must be within recreational minimum size and daily possession limits.

Fishermen may not waste any fish of this state. Waste is defined as harvesting of any fish for commercial purposes which results in the excessive killing of such fish. Excessive killing is defined as the killing resulting from taking or attempting to take any fish in excess of what the possessor thereof can process, utilize, or transport from the fishing grounds.

### **Area Restrictions**

Commercial harvest of Spotted Seatrout is prohibited within Louisiana waters west of the Mermentau River. Commercial fishermen may not set gear that interferes with the free passage of fish within 500 feet of the mouth of any inlet or pass or within 500 feet of any water control structures. Gear and other restrictions may vary in state wildlife management areas, refuges, and other areas to protect important habitat and reduce conflicts with other users.

Commercial fishing is prohibited in coastal national wildlife refuges.

### **Operational Restrictions**

Commercial fishermen must land Spotted Seatrout whole with heads and tails attached to assist enforcement agents in easily identifying the fish. However, fish may be gilled and gutted prior to landing.

### **Fishing Gear Interactions**

It is illegal for any person to knowingly and intentionally use or employ any net to encircle a vessel or to otherwise knowingly and intentionally use or employ any vessel or fishing gear to interfere with the legal fishing of another. It is also illegal for any person to knowingly and intentionally use or employ any vessel or recreational gear to interfere with the legal commercial fishing of another.

### **Packaging**

The Secretary of LDWF has the authority to adopt rules and regulations to establish standards for the packaging of seafood

in Louisiana for wholesale or retail sale. These standards may govern the quality, contents, and weight of all seafood packaged in this state. The Louisiana Seafood Promotion and Marketing Board may make recommendations to the Secretary for standards for the packaging of seafood.

Shipments containing fish shall be plainly marked, the tags or certificates to show the date and names of the consignor and the consignee, with an itemized statement of the number of pounds of fish and the names of each kind contained therein.

Bills of lading issued by a common carrier for such shipments shall state the number of packages which contain fish, and the date and names of the consignor and consignee, with an itemized statement of the number of pounds of fish and the names of each kind contained therein.

## **Recreational**

### ***Licensing***

Residents and nonresidents 16 years of age and older must have basic and saltwater fishing licenses to harvest Spotted Seatrout recreationally in Louisiana.

### ***Legal Gear and Gear Requirements***

Recreational fishermen typically use hook and line gear to catch Spotted Seatrout. Recreational fishermen may not use any of the following to take Spotted Seatrout (or other saltwater finfish):

- Crossbows
- Gill nets
- Spears
- Poisons
- Stupefying substances or devices
- Explosives
- Guns
- Tree-topping devices
- Any instrument or device capable of producing electric current to shock fish
- Snagging devices.

### ***Size and Possession Limits***

Spotted Seatrout must be 12 inches minimum TL to be kept. Each licensed angler may keep 25 fish per day. In a defined area of Cameron and Calcasieu parishes, located in southwestern Louisiana, the daily bag and possession limit is 15 fish, with no more than two Spotted Seatrout exceeding 25 inches TL.

Recreational saltwater anglers may possess a two days' bag limit on land; however, no person shall be in possession of fish over the daily bag limit in any one day or while fishing or while on the water, unless that recreational saltwater angler is aboard a trawler engaged in commercial fishing for a consecutive period of longer than 25 hours.

The possession limit for Spotted Seatrout taken south of U.S. Hwy 90 is three times the daily take limit when the fisherman holds and is in possession of a valid recreational fishing license and can show a landing receipt from a public boat launch located south of U.S. Hwy 90 that demonstrates to the satisfaction

of LDWF that the fisherman has been actively on the water or at a remote camp that can be accessed only by water for two days or more. The fish must be kept whole or whole gutted in separate bags for each species of fish. The bags must be marked with the date the fish were taken, the species, the number of fish contained in the bag, and the name and license number of the person taking the fish. The fish must only be in the possession of the person who harvested the fish. However, no fisherman may be actively fishing or engaged in fishing while in possession of more than the daily take limit.

Fillets may not be possessed on the water, except for the purpose of consumption at sea aboard the harvesting vessel. An individual must not have more than 2 pounds of finfish parts per person in state waters, or more than 1.5 pounds of finfish parts per person in federal waters, on board the vessel, provided that the vessel is equipped to cook finfish and that the finfish does not exceed applicable bag limits. These provisions do not apply to bait species. Saltwater finfish caught or transported by a recreational fisherman are presumed to have been caught in Louisiana waters, for license requirements.

A fisherman who holds and is in possession of a valid recreational fishing license and can demonstrate to LDWF's satisfaction use of a boat launch located south of U.S. Highway 90 and that the fisherman has been actively on the water or at a remote camp that can be accessed only by water for two days or more may possess up to the possession limit of filleted Spotted Seatrout. The filleted fish must have sufficient skin remaining on the fillet to allow for identification of the species and must be segregated by species into plastic bags or plastic containers that are marked by species to allow for easy identification, the date caught, and the name and license number of the person who took the fish. Spotted Seatrout fillets must be no less than 10 inches in length. The fish must be in possession only of the person who took the fish. However, no fisherman shall be actively fishing or engaged in fishing while in possession of more than the daily take limit.

All regulations regarding these species apply whether caught in freshwater or saltwater areas.

### ***Area Restrictions***

Restrictions vary in state wildlife management areas, refuges, and other areas as well as coastal national wildlife refuge.

### ***Operational Restrictions***

Recreational fishermen must land Spotted Seatrout with their head and tail fins intact to assist in identification of the fish for enforcement purposes, except as mentioned above when fishing south of U.S. Highway 90.

### ***Fishing Gear Interactions***

It is illegal for any person to knowingly and intentionally use or employ any vessel or recreational gear to interfere with the legal commercial fishing of another.

## Other

### **Louisiana Seafood Promotion and Marketing Board (LSPMB)**

The Louisiana Seafood Promotion and Marketing Board works to enhance the public image of commercial fisheries products, promote the consumption of these products, and assist the seafood industry, including commercial fishermen and wholesale and retail dealers, in market development to better use existing markets and help establish new markets.

### **Louisiana Wild Seafood Certification Program (LWSCP)**

LDWF established the Louisiana Wild Seafood Certification Program (LWSCP) to build a brand that guarantees the origin of Louisiana wild-caught seafood. Through strict chain of custody requirements, the program guarantees that all seafood products bearing the Certified Louisiana Wild Seafood logo were caught in Louisiana or Gulf waters by a licensed Louisiana fisherman, landed at a Louisiana dock, and processed and packaged by a Louisiana-based company. The program provides education for participants on best seafood handling and sanitation practices to ensure the utmost safety and quality. When a buyer sees this logo, they can be confident they are buying authentic Louisiana wild-caught seafood, a premium product known for fresh flavor, consistent quality, and sustainability, and that they are supporting local Louisiana fishing communities.

By branding and showcasing Louisiana seafood, LWSCP helps suppliers increase the value of their seafood products and remain competitive in the seafood marketplace. LWSCP participants benefit from free program marketing support, such as:

- Market portal linking Certified Louisiana Wild Seafood suppliers with buyers
- Promotions through the program website, social media, and events including seafood festivals and industry conventions
- Free point-of-sale materials such as window clings, apparel, brochures, stickers, and decals
- Access to program partners including the LSPMB, Audubon GULF, NMFS, Louisiana Sea Grant, and other in- and out-of-state partners who purchase and promote Certified Louisiana Wild Seafood.

Licensed Louisiana commercial fishermen are automatically eligible for the program; licensed Louisiana wholesale/retail seafood dealers must apply for and receive a permit to participate. They must also comply with all state and federal reporting requirements and have all legally required permits to operate their business.

### **Professionalism Programs**

LDWF, in collaboration with Louisiana Sea Grant and the LSU AgCenter, developed Louisiana Fisheries Forward, a multi-year, multi-phase professionalism program for all sectors of Louisiana's commercial fishing industry, including fishermen, dock owners, processors, and distributors. Launched in 2014, this program provides education and training essential for the continued economic success of the industry. This program delivers training videos and corresponding fact sheets on a number of topics such as; how to be a commercial fisherman, seafood business finance and management, as well as hands-on workshops, training days, and demonstrations to showcase new technology

for vessel refrigeration/ cooler systems, seafood freezing equipment, fuel efficiency equipment, and fishing/harvesting equipment, plus seafood handling and processing best practices.

### **Fisheries Outreach**

Through outreach efforts, LDWF promotes public awareness and advises the public on stewardship and best practices in preserving the unique nature of the state's natural resources. Via a strong presence at recreational events, industry-related expos, workshops, seminars, and other state sponsored events, LDWF strives to foster a community sense of resource and habitat stewardship. At these events, LDWF distributes an assortment of printed materials, which focus on fishing regulations, commercial and recreational fishing topics, as well as species profile brochures that highlight the life cycle and habitat requirements of Spotted Seatrout and other native Louisiana species. Through participation in events, distribution of educational materials, and other activities, LDWF reaches more than 200,000 Louisiana citizens each year.

## COMPLIANCE

### REPORTING METHODS AND REQUIREMENTS

Since 1999, LDWF has monitored harvest of Spotted Seatrout at the point of initial sale through LDWF's trip ticket program. Under the program, wholesale/retail seafood dealers purchasing or accepting transfers of Spotted Seatrout from commercial fishermen must complete a commercial trip ticket at the time of purchase or transfer of the catch from the fisherman to the dealer. Fresh products license holders (commercial fishermen licensed to sell their catch directly to consumers) are also required to submit trip tickets.

When a commercial fisherman sells or transfers their catch to a wholesale/retail dealer, they must present their license for verification and provide the dealer with information necessary to complete a commercial trip ticket. The dealer must record the sale or transfer on a three-part LDWF issued trip ticket form or via the electronic reporting program and include the following information:

- Commercial fisherman's name and license number
- Wholesale/retail seafood dealer's name and license number
- Vessel registration or U.S. Coast Guard (USCG) documentation number
- Transaction date
- Gear used
- Primary location of where the Spotted Seatrout was caught (according to LDWF-issued trip ticket maps)
- Duration of the fishing trip
- Species identification
- Quantity and units of each species
- Size and condition of each species
- Unit price of each species
- Permit number for species requiring a permit to harvest.

The fisherman and dealer must sign each trip ticket attesting that the information is correct. The dealer retains one part of the trip ticket, provides the fisherman with one part, and submits one part to LDWF. If using the electronic trip ticket program, instead of a trip ticket form, the fisherman and dealer

must fill out a signature log to sign the trip ticket. The signature log includes the trip ticket number, date, vessel name, fisherman's signature, and dealer's initials. By signing and initialing the signature log, the fisherman and dealer are attesting the information filled out electronically via the electronic trip ticket program is correct.

When a commercial fisherman sells their catch under a fresh products license, they must record all information required on the commercial trip ticket, using their fresh products license number in place of the dealer license number. The commercial fisherman must sign each trip ticket, as both the dealer and commercial fisherman, attesting that the information provided is correct.

On or before the 10th of each month, dealers and fresh products license holders must submit to LDWF all trip tickets from the previous month. A monthly submission sheet must accompany these trip tickets, certifying that the submitted trip tickets represent all of the dealer's transactions with commercial fishermen for that month. When using the electronic trip ticket program, dealers and fresh products license holders must submit the computer generated monthly submission sheet and the signature logs to LDWF on or before the 10th of the month.

Trip ticket records must be maintained for three years and are open to inspection by LDWF. Trip ticket information is confidential and is protected by both state and federal law to limit access to business-specific information. However, LDWF and approved contractors may analyze and compile individual trip information into reports to provide reliable information for monitoring harvest from locations across the state, while still protecting sensitive information. LDWF enforces the trip ticket program; violation of statutes related to the program can result in citations written by LDWF or other law enforcement officials.

### RECORDKEEPING REQUIREMENTS

Wholesale/retail seafood dealers, retail seafood dealers, restaurants, and retail grocers must keep records of the following:

- The quantity and species of fish acquired, the date the fish were acquired, and the name and license number of the wholesale/retail seafood dealer or the out-of-state seller from whom the fish were acquired
- The quantity and species of fish sold, the date the fish were sold, and the name and license number of the person to whom the fish were sold. When sold to a consumer, the records must indicate the quantity, species, and date and shall state that the fish were sold to the consumer.

### ENFORCEMENT

Through events, outreach materials, and other resources, LDWF informs commercial and recreational fishermen about programs, projects, and most importantly, relevant 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. LDWF's Law Enforcement Division is also responsible for enforcing laws as provided for in the Constitution of Louisiana; Louisiana Revised Statutes, and numerous federal laws including the MSA, ESA, MMPA, and Lacey Act.

LDWF's Law Enforcement Division partners with NMFS and USCG enforcement agents and officers to increase their enforcement capabilities and carry out their important mission in Louisiana's waters and beyond. Local parishes also assist in enforcement, primarily through the legal functions of each parish's district attorney. Local sheriff's offices sometimes assist LDWF's Law Enforcement Division as well. Local and state sanitarians and health department employees help enforce public health and safety related regulations.

### PENALTIES

Classes of violations vary by legislative statute or Commission rule. Specific penalties for violations vary with the severity of the violation and include fines, jail time, loss of fishing license, and forfeiture of property. Violation of any Commission regulation pertaining to the Spotted Seatrout fishery, constitutes a Class 6 violation. In addition, LDWF may seize any Spotted Seatrout in connection with the violation. Specific penalties are listed in Appendix XII.

A person who kills, catches, takes, possesses, or injures any aquatic life in violation of an applicable state statute or regulation or a federal statute or regulation is also liable to the state for the value of each aquatic life unlawfully killed, caught, taken, possessed, or injured.

Violation of Spotted Seatrout regulations is punishable by a fine of \$25 dollars per fish under 12 inches TL or over the limit of 25 or in violation of such minimum size and take and possession limits as established by the Commission. In addition to any applicable fines, violators' fishing licenses may be revoked and they may be prohibited from obtaining any new fishing licenses for a period of up to three years thereafter.

# Current Issues & Management Options



This section identifies current issues facing Louisiana’s commercial and recreational Spotted Seatrout fisheries, provides a description of each issue, and recommends options for future action to address these issues. Before implementing any recommendation, LDWF will evaluate the feasibility and potential impacts of the action on the resource and fisheries.

## ACHIEVING MANAGEMENT GOALS

Addressing current issues facing Louisiana’s commercial and recreational Spotted Seatrout fisheries through options identified in this section or through stakeholder participation will advance these fisheries toward meeting long-term management goals.

## STOCK OVERFISHED

LDWF uses SSB as an indicator of the health of Spotted Seatrout population in Louisiana. The target SSB for Spotted Seatrout is based on the long-term median for the population and is set at 6.2 million pounds, with the lower threshold set at 4.7 million pounds. The threshold represents a biomass level that the stock should not fall below, while the target represents a sustainable level of harvest. The 2019 stock assessment showed that Spotted Seatrout SSB was the lowest ever recorded in 2017 and 2018, at 3.4 and 4.0 million pounds respectively, and that the stock has been overfished since the previous stock assessment in 2014. Additionally, the 2019 stock assessment found that the proportion of age 3+ individuals in the stock has dropped to its lowest point recorded (5%). When biomass falls below a specified limit, there is a high risk that recruitment will be reduced to undesirable levels. This can likely lead to the stock reaching unsustainable levels where there are simply too few adult fish capable of maintaining the population. Management actions are

needed to recover the SSB to levels above the current threshold and near the target to avoid the population remaining in an unsustainable condition. LDWF projections indicate that a 20% annual reduction in harvested fish (female biomass) would be required to recover the stock within five years. The following options were designed to meet this 20% reduction as of the 2019 stock assessment. Recovery time increases the longer the fishery is without new regulations, and the SSB could decline further until new regulations are enacted to reduce fishing mortality.

## OPTIONS

In September of 2019, LDWF presented an assessment of Spotted Seatrout indicating the stock is overfished and undergoing overfishing to the LWFC. Subsequently, at its January 2020 meeting, LDWF presented management options to the LWFC for consideration. All management options apply to the recreational fishery and are projected to reduce harvested fish by 20% during a five-year attempted recovery period preferred by LDWF. As of the publication of this document, no changes have been enacted by the Commission.

- Reduce creel limit to 9 fish, maintaining current 12-inch minimum size limit.
- Increase minimum size limit to 14 inches, maintaining current 25-fish creel limit.
- Reduce creel limit to 11 fish and increase minimum size limit to 13 inches.
- Reduce creel limit to 13 fish within a slot of 13 to 20 inches with one fish over 20 inches.
- Reduce creel limit to 15 fish and increase minimum size limit to 13.5 inches.
- Establish seasonal or temporal closed seasons.

# Future Research & Data Needs

## SCIENCE TO SUPPORT MANAGEMENT

Throughout the development of this fishery management plan, LDWF has identified several research needs that would provide data to address some of the issues and data gaps in the Spotted Seatrout fishery or species biology.

Specific research needs are listed below. They are not listed in order of importance. The list includes aspects of the species or fisheries that have been noted for decades in addition to relatively recently identified issues.

- Conduct an assessment of basin-specific Spotted Seatrout populations to differentiate exploitation rates and stock status within the state to determine if regional management is an effective alternative to a statewide management strategy.
- Generate information describing the connectivity of near-shore and inshore Spotted Seatrout populations along the Louisiana coast.
- Investigate the relationship between wetland loss and the continuation of fishery production as it applies to the Louisiana Spotted Seatrout stock.
- Further evaluate differences between trends in fishery-independent catch rates and fishery-dependent sources to determine which trends are truly reflective of population abundance, or whether other factors (e.g., efficacy of fishery-independent techniques or changing vulnerabilities of the stock) are involved.
- Conduct continued age sample collection from LDWF's marine gillnet survey to allow a more accurate representation of survey age composition in future assessments of the Spot-

ted Seatrout stock, as only limited age data are currently available. Ages of survey catches are assigned from age-length keys developed from a growth model.

- Investigation of the relationship between Spotted Seatrout cold-stun deaths and age-classes is needed to determine if winter-kill events disproportionately affect certain aged fish within the population.
- Factors that influence year-class strength of Spotted Seatrout are poorly understood. Ecosystem wide investigations of these factors could elucidate causes of inter-annual variation in abundance, as well as the species stock-recruitment relationship.
- Spawning Potential Ratio (SPR) estimates may be biased if egg production does not scale linearly with female body weight and existing estimates of batch fecundity and spawning frequency are conflicting. A recent fecundity study conducted by LDWF suggests Spotted Seatrout egg production and female body weight are equivalent. However, sample sizes from this study were low due to the difficulty obtaining samples of spawning fish in the proper condition. Current management benchmarks are based on the history of the stock by requiring the stock biomass to not fall below the lowest level observed earlier in the fishery. If management strategy were to change so that benchmarks are based on the reproductive potential of the stock, unbiased estimates of SPR would be needed.
- Estimate Spotted Seatrout spawning frequency and recruitment contribution as a function of age and size.

## RESEARCH PRIORITIES, FUNDING AND PUBLICATIONS

LDWF prioritizes future research according to several factors, including whether or not it:

- Fits the agency's mission
- Can be adequately funded
- Can be reasonably expected to produce answers to specific management questions
- Can be reasonably undertaken without compromising other capabilities and efforts
- Has or will have the support of stakeholders
- Has or can engender cooperation with other researchers, managers, user groups, and/or the general public.

Research is typically funded through state license fees and federal, state, and private (nongovernmental organization) grants and programs. Funding is allocated based on priority as described above. While LDWF may not have funding for many of the topics listed above, outside funding sources may be available for other researchers to pursue some of these studies. Our hope is that by our including these research and data needs here, those outside funding sources may be more inclined to support some of the studies described above. LDWF analyzes research and data and reports results in multiple formats, as appropriate. Ultimately, all information is publicly available (other than information linked to private enterprises, e.g. confidential landings data).



# Acknowledgments

Other individuals who contributed to this document include: Joe Acosta, Katie Chapiesky, Willie Cherie, Andrew Cumberland, Aimee Eschete, Roy Moffett, Joe West, Christian Winslow, and Becky Chapman.

# Literature Cited

- Adams, C.A., M.J. Oesterling, S.C. Snedaker, and W. Seaman. 1973. Quantitative dietary analysis for selected dominant fishes of the Ten Thousand Islands, Florida. University of Florida, Report to the U. S. Fish and Wildlife Service.
- Adkins, G., J. Tarver, P. Bowman, and B. Savoie. 1979. A study of the commercial finfish in coastal Louisiana. Louisiana Department of Wildlife and Fisheries Technical Bulletin Number 29. 87 p.
- Adkins, G., and M. Bourgeois. 1982. An evaluation of gill nets of various mesh sizes. Louisiana Department of Wildlife and Fisheries Technical Bulletin 36. 59 p.
- Allshouse, W.C. 1983. The distribution of immigrating larval and postlarval fishes into the Aransas-Corpus Christi Bay complex. Master's Thesis. Corpus Christi State University, Corpus Christi, Texas. 118 p.
- Alshuth, S., and R.G. Gilmore. 1993. Salinity and temperature tolerance limits for larval Spotted Seatrout, *Cynoscion nebulosus* C. (Pisces: Scianedidae). In ICES Council Meeting Papers, Denmark: ICES, 19 p.
- Arnold, C.R., T.D. Williams, W.A. Fable, J.L. Lasswell, and W.H. Bailey. 1976. Methods and techniques for spawning and rearing Spotted Seatrout in the laboratory. Proceedings of the 30th Annual Conference of the Southeastern Association of Fish and Wildlife Agencies 30:167-178.
- Arnoldi, D.C. 1982. Certain aspects of the life history and habits of the Spotted Seatrout in Calcasieu Lake, Louisiana. Louisiana Department of Wildlife and Fisheries Project Number F-32. 97 p.
- Baer, A.M. 2019. Population Dynamics and Demographics of Spotted Seatrout, *Cynoscion nebulosus*, through Spatial Analysis: Towards an Integrative Management Approach. LSU Doctoral Dissertations. 4831.
- Baker, W.B., Jr. and G.C. Matlock. 1993. Movement of Spotted Seatrout tagged in Trinity Bay, Texas. Northeast Gulf Science 13(1):29-34.
- Baltz, D.M., R.G. Thomas, and E.J. Chesney. 2003. Spotted Seatrout Habitat Affinities in Louisiana, pp. 147-175, In: Biology of the Spotted Seatrout, S. A. Bortone, ed., CRC press, Boca Raton, FL.
- Barnes, B.T. 2014. Seasonal Differences in Diet of Two Predatory Fishes in Relation to Reef Type in the Inshore Northern Gulf of Mexico. University of Southern Mississippi, Master's Theses. 14.
- Barnette, M.C. 2001. A review of the fishing gear utilized within the Southeast Region and their potential impacts on essential fish habitat. NOAA Technical Memorandum NMFS-SEFSC-44 9, 62pp.
- Barry, K.P. 2002. Feeding habits of blacktip sharks, *Carcharhinus limbatus*, and Atlantic sharpnose sharks, *Rhizoprionodon terraenovae*, in Louisiana coastal waters. LSU Master's Theses. 66.
- Benson, N.G. 1982. Life history requirements of selected finfish and shellfish in Mississippi Sound and adjacent areas. United States Fish and Wildlife Service FWS/OBS-81/51. United States Army Corp of Engineers, Slidell, Louisiana.
- Bere, R. 1936. Parasitic copepods from Gulf of Mexico fish. American Midland Naturalist 17(3):577-625.
- Blanchet, H., M. van Hoose, L. McEachron, B. Muller, J. Warren, J. Gill, T. Waldrop, J. Waller, C. Adams, R. Ditton, D. Shively, and S. VanderKooy. 2001. The Spotted Seatrout Fishery of the Gulf of Mexico, United States: A Regional Management Plan. Publication Number 87. Gulf States Marine Fisheries Commission, Ocean Springs, Mississippi.
- Blanchet, H.R., J.A. Shepard, H. Holloway, D.R. Lavergne, C. Clark, and J. Mayne. 1997. 1997 Report on the Status of Spotted Seatrout. Louisiana Department of Wildlife and Fisheries. 29 pp.
- Blaylock, R.B., and R.M. Overstreet. 2003. Diseases and Parasites of the Spotted Seatrout, pp. 197-229, In: Biology of the Spotted Seatrout, S. A. Bortone, ed., CRC press, Boca Raton, FL.
- Bortone, S.A. 2003. Biology of the Spotted Seatrout, CRC Marine Biology Series. Boca Raton, FL.
- Boswell K.M., M.P. Wilson, P.S.D. MacRae, C.A. Wilson, and J.H. Cowan, Jr. 2010. Seasonal Estimates of Fish Biomass and Length Distributions Using Acoustics and Traditional Nets to Identify Estuarine Habitat Preferences in Barataria Bay, Louisiana. Marine and Coastal Fisheries, 2:1, 83-97, DOI: 10.1577/C09-022.1
- Bourgeois, M.J., V. Guillory, and H. Blanchet. 1996. A biological and fisheries profile for Louisiana Spotted Seatrout, *Cynoscion nebulosus*. Louisiana Department of Wildlife and Fisheries, Fishery Management Plan Series Number 3, Part 1. Baton Rouge, Louisiana. 104 p.
- Bramer, N.M. 2015. Habitat Preferences of Adult Spotted Seatrout, *Cynoscion nebulosus*, in Lake Pontchartrain, Louisiana. LSU Master's Theses. 3457.
- Brown-Peterson, N.J., P. Thomas, and C.R. Arnold. 1988. Reproductive biology of the Spotted Seatrout, *Cynoscion nebulosus*, in south Texas. Fishery Bulletin 86:373-388.
- Brown-Peterson, N.J., and J.W. Warren. 2001. The Reproductive Biology of Spotted Seatrout, *Cynoscion nebulosus*, along the Mississippi Gulf Coast. Gulf of Mexico Science 19(1)

- Cagle, P., and Joe West. 2020. Evaluation of Commercial Shrimp Fishery Bycatch in Louisiana Waters. Office of Fisheries, Louisiana Department of Wildlife and Fisheries.
- Callihan, J.L. 2011. Spatial ecology of adult Spotted Seatrout, *Cynoscion nebulosus*, in Louisiana coastal waters. LSU Doctoral Dissertations. 941.
- Carrol, J., and S.K. Lowerre-Barbieri. 2019. Interactions of dimorphic growth, reproductive behavior, and a size-regulated fishery: a case study using Spotted Seatrout *Cynoscion nebulosus*. *Marine Ecology Progress Series* 608: 233–245
- Causey, D. 1953. Parasitic copepoda from Grand Isle. *Louisiana Occasional Papers of the Marine Laboratory*. Louisiana State University 7:1-18.
- Chesney, E.J., D.M Baltz, and R.G. Thomas. 2000. Louisiana estuarine and coastal fisheries and habitats: perspective from a fish's eye view, *Ecol. Appl.*, 10:350-366.
- Collins, M.R., M.J. Marshall, and C.A. Lanciani. 1984. The distribution of *Poecilocystidium caryophyllum* (Trypanorhyncha) plerocercoids in spot, *Leiostomus xanthurus* Lacepede, and Spotted Seatrout, *Cynoscion nebulosus* (Cuvier). *Journal of Fish Biology* 25(1):63-68.
- Corkum, K.C. 1966. The digenetic trematodes of some flatfishes from Barataria Bay, Louisiana. *Proceedings of the Louisiana Academy of Sciences* 29:45-51.
- Coastal Protection and Restoration Authority (CPRA). 2012. Louisiana's Comprehensive Master Plan for a Sustainable Coast. CPRA, Baton Rouge, Louisiana. 190 pp.
- CPRA. 2017. Louisiana's Comprehensive Master Plan for a Sustainable Coast. CPRA, Baton Rouge, Louisiana. 184 pp.
- Cooper, W.T., L.R. Barbieri, M.D. Murphy, and S.K. Lowerre-Barbieri. 2013. Assessing stock reproductive potential in species with indeterminate fecundity: Effects of age truncation and size dependent reproductive timing. *Fisheries Research*, 138:31-41
- Czapla, T.C, M.E. Pattilo, D.M. Nelson and M.E. Monaco. 1991. Distribution and abundance of fishes and invertebrates in central Gulf of Mexico estuaries. National Oceanic and Atmospheric Administration, National Ocean Service, Strategic Environmental Assessments Divisions, ELMER Report 5, Rockville, Maryland.
- Darnell, R.M. 1958. Food habits of fishes and larger invertebrates of Lake Pontchartrain, Louisiana, an estuarine community. *Publication of the Institute of Marine Science of Texas* 5:353-416.
- Deepwater Horizon Natural Resource Damage Assessment Trustees (DWH NRDA). 2016. Deepwater Horizon oil spill: Final Programmatic Damage Assessment and Restoration Plan and Final Programmatic Environmental Impact Statement. Retrieved from <http://www.gulfspillrestoration.noaa.gov/restoration-planning/gulf-plan>.
- de Mutsert, K., K. Lewis, S. Milroy, J. Buszowski, and J. Steenbeek. 2017. Using ecosystem modeling to evaluate trade-offs in coastal management: Effects of large-scale river diversions on fish and fisheries. *Ecological Modelling* 360:14-16
- Dietz, R.A. 1976. Food and feeding habits of *Cynoscion arenarius* Ginsburg, *Cynoscion nebulosus* (Cuvier) and *Bairdiella chrysoura* (Lacepede) (Pisces: Sciaenidae) in the Anclote Anchorage, Tarpon Springs, Florida. Master's Thesis, University of South Florida, Tampa, Florida. 83 p.
- Dippold, D.A., R.T. Leaf, J.R. Hendon, and J.S. Franks. 2016. Estimation of the Length-at-Age Relationship of Mississippi's Spotted Seatrout. *Transactions of the American Fisheries Society* 145:295-304.
- FAO. 2001. Second Technical Consultation on the Suitability of the CITES Criteria for Listing Commercially-exploited Aquatic Species: A background analysis and framework for evaluating the status of commercially-exploited aquatic species in a CITES context.
- Fable, W.A., Jr., T.D. Williams, and C.R. Arnold. 1978. Description of reared eggs and young larvae of the Spotted Seatrout, *Cynoscion nebulosus*. *Fisheries Bulletin* 76:65-71.
- Flaherty-Walia, K.E., R.E. Matheson, Jr., and R. Paperno. 2015. Juvenile Spotted Seatrout (*Cynoscion nebulosus*) Habitat Use in an Eastern Gulf of Mexico Estuary: The Effects of Seagrass Bed Architecture, Seagrass Species Composition, and Varying Degrees of Freshwater Influence. *Estuaries and Coasts* 38:353-366.
- Fontenot, B.J., and H.E. Rogillio. 1970. A study of estuarine sportfishes in the Biloxi marsh complex, Louisiana. *Fisheries Bulletin*. Louisiana Wildlife and Fisheries Commission 8:1-72.
- Game, Fish, and Oyster Commission. 1932. *Fishes of Texas*. Texas Parks and Wildlife Department.
- Gannon, D.P., N.B. Barros, D.P. Nowacek, A.J. Read, D.M. Waples, and R.S. Wells. 2004. Prey detection by bottlenose dolphins, *Tursiops truncatus*: an experimental test of the passive listening hypothesis. *Animal Behavior* 69:709-720.
- Gold, J.R., L.R. Richardson, and C. Furman. 1999. Mitochondrial DNA diversity and population structure of Spotted Seatrout (*Cynoscion nebulosus*) in coastal waters of the southeastern United States. *Gulf of Mexico Science* 17 (1).
- Gold, J.R., and L.R. Richardson. 1998. Mitochondrial DNA diversification and population structure in fishes from the Gulf of Mexico and western Atlantic. *The Journal of Heredity* 89:404-414.
- Guest, W.C., and G. Gunter. 1958. The seatrout or weakfishes (genus *Cynoscion*) of the Gulf of Mexico. *Gulf States Marine Fisheries Commission Technical Summary* 1. 40 p.
- Gunter, G. 1945. *Studies on marine fishes of Texas*. Publications of the Institute of Marine Science 1:1190.
- Gunter, G. 1941. Death of fishes due to cold on the Texas coast, January 1940. *Ecology* 22(2):203-208
- Gunter, G., and H.H. Hildebrand. 1951. Destruction of the fishes and other organisms on the south Texas coast by the cold wave of January 28-February 3, 1951. *Ecology* 32:731-736.

- Hargis, W.J., Jr. 1956. Monogenetic trematodes of Gulf of Mexico fishes. Part X. The Family Microcotylidae Taschenberg, 1879. Transactions of the American Microscopical Society 75(4):436453.
- Hein, S., and J. Shepard. 1979a. Spawning of Spotted Seatrout in a Louisiana estuarine ecosystem. Proceedings of the Annual Conference of the Southeastern Association of Fish and Wildlife Agencies 33:451-465.
- Hein, S., and J. Shepard. 1979b. Size disparity between "inside" and "outside" Spotted Seatrout (*Cynoscion nebulosus*) during a three-month study in south-central Louisiana. Louisiana Department of Wildlife and Fisheries Technical Bulletin 28:16-28.
- Helser, T.E., R.E. Condrey, and J.P. Geaghan. 1993. Spotted Seatrout distribution in four coastal Louisiana estuaries. Transactions of the American Fisheries Society 122:99-111.
- Hendon, J.R. 2013. Habitat Characterization, Habitat Use and Associated Growth of Juvenile Spotted Seatrout (*Cynoscion nebulosus*) in a Mississippi Bay System: Implications for Stock Enhancement Practices. University of Southern Mississippi, Dissertations. 743.
- Hettler, W.F., Jr. 1989. Food habits of juvenile Spotted Seatrout and gray snapper in western Florida Bay. Bulletin of Marine Science 44(1):155-162.
- Herke, W.H., B.D. Rogers, and E.E. Knudsen. 1984. Habits and habitats of young Spotted Seatrout in Louisiana marshes. Research Report Number 3. Contribution Number 39 of the Louisiana Cooperative Fishing Research Unit. School of Forestry, Wildlife, and Fisheries. Louisiana Agricultural Center, Baton Rouge, Louisiana. 48 p.
- Hildebrand, S.F., and L.E. Cable. 1934. Reproduction and development of whiting or kingfishes, drums, spot, croaker, and weakfishes or seatrouts, Family Sciaenidae, of the Atlantic coast of the United States. United States Bulletin of the Bureau of Fisheries 48:41-117.
- Holling, C.S. 1973. Resilience and stability of ecological systems. Annual Review of Ecology and Systematics 4:1-23.
- Holt, G.J., S.A. Holt, and C.R. Arnold. 1985. Diel periodicity of spawning in sciaenids. Marine Ecology Progressive Series 27:1-7.
- Holt, G.J., and S.A. Holt. 2003. Effects of Variable Salinity on Reproduction and Early Life Stages of Spotted Seatrout, pp. 135-145, In: Biology of the Spotted Seatrout, S. A. Bortone, ed., CRC press, Boca Raton, FL.
- Hopkins, S.H. 1956. Two new trematodes from Louisiana, and the excretory system of Bucephalidae. Transactions of the American Microscopical Society 75(1):129-135.
- Houde, E.D., and J.A. Lovdal. 1984. Seasonality of occurrence, foods and food preferences of ichthyoplankton in Biscayne Bay, Florida. Estuarine, Coastal, and Shelf Science 18:403-419.
- Howse, H.D., and J.Y. Christmas. 1970. Lymphocystis tumors: histochemical identification of hyaline substances. Transactions of the American Microscopical Society 89(2):276-282.
- Iversen, E.S., and A.W. Moffet. 1962. Estimation of abundance and mortality of a Spotted Seatrout population. Transactions of the American Fisheries Society 91:395-398.
- James, T.J., G.W. Stuntz, D.A. McKee, and R.R. Vega. 2007. Catch-and-release mortality of Spotted Seatrout in Texas: effects of tournaments, seasonality, and anatomical hooking location. North American Journal of Fisheries Management. 27:900-907.
- Jannke, T.E. 1971. Abundance of young sciaenid fishes in Everglades National Park, Florida, in relation to season and other variables. University of Miami Sea Grant Program, Sea Grant Technical Bulletin 11. 138 p.
- Johnson, G.D. 1978. Development of fishes of the Mid Atlantic Bight. In An Atlas of Egg, Larval and Juvenile Stages. Volume IV. Carangidae through Ehippiidae. United States Fish and Wildlife Service, Biological Service Program Report FWS/OBS-78/12.
- Johnson, D.R., and W. Seaman, Jr. 1986. Species profiles: life histories and environmental requirements of coastal fishes and invertebrates (south Florida). Fish and Wildlife Service, United States Department of the Interior Biological Report 82(11.43) TR EL-82-4. 18 p.
- Keel, J. A., and D.W. Cook. 1975. Isolation of *Vibrio parahaemolyticus* from the Mississippi Sound. Journal Mississippi Academy of Science 20:30-34.
- King, B.D., III. 1971. Study of migratory patterns of fish and shellfish through a natural pass. Texas Parks and Wildlife Department Technical Series Number 9. Austin, Texas. 54 p.
- Klima, E.F., and D.C. Tabb. 1959. A contribution to the biology of the spotted weakfish, *Cynoscion nebulosus*, (Cuvier) from northwest Florida, with a description of the fishery. Marine laboratory, Institute of Marine Science of the University of Miami. Technical Series Number 30. Miami, Florida. 27 p.
- LDWF. 2018. Marine Fisheries Division Field Procedures Manual. Louisiana Department of Wildlife and Fisheries, Version 02-1, Baton Rouge, Louisiana.
- Livernois M.C., S.P. Powers, M.A. Albins, and J.F. Mareska. 2020. Habitat Associations and Co-Occurrence Patterns of Two Estuarine-Dependent Predatory Fishes. Marine and Coastal Fisheries: Dynamics, Management, and Ecosystem Science 12:64-77
- Loman, M.J. 1978. Other finfish. Pages 119-167 in Fisheries Assessment and Monitoring, Mississippi PL88-309, Project 2-215-R Completion Report
- Lorio, W.J., and W.S. Perret. 1980. Biology and ecology of the Spotted Seatrout (*Cynoscion nebulosus* Cuvier). Pages 7-14 in Proceedings: Colloquium on the Biology and Management of Red Drum and Seatrout. Gulf States Marine Fisheries Commission Publication Number 5. Ocean Springs Mississippi.

- Lorio, W.J., and H.E. Schafer. 1966. A food habit study of the Spotted Seatrout, *Cynoscion nebulosus*, in the Biloxi marsh area, Louisiana. Proceedings of the Annual Conference of Southeastern Association Game and Fish Commissioners 19:289-296.
- Lowerre-Barbieri, S.K., S. Walters, J. Bickford, W. Cooper, and R. Mueller. 2013. Site fidelity and reproductive timing at a Spotted Seatrout spawning aggregation site: individual versus population scale behavior. *Marine Ecology Progress Series*. 481: 181–197
- MacRae, P.S.D., and J.H. Cowan. 2010. Habitat preferences of Spotted Seatrout, *Cynoscion nebulosus*, in coastal Louisiana: A step towards informing spatial management in estuarine ecosystems. *The Open Fish Science Journal* 3:154-163
- Mahoney, J., F. Midlige, and D. Duel. 1973. The fin rot disease of marine and euryhaline fishes in the New York Bight. *Transactions of the American Fisheries Society* 102:596-605.
- Mahood, R.K. 1974. Seatrout of the genus *Cynoscion* in coastal waters of Georgia. Georgia Department of Natural Resources Contribution Series 26:1-35.
- Manley C.B., C.F. Rakocinski, P.G. Lee, and R.B. Blaylock. 2013. Stocking density effects on aggressive and cannibalistic behaviors in larval hatchery-reared Spotted Seatrout, *Cynoscion nebulosus*. *Aquaculture* 420–421:89–94
- Manter, H.W. 1938. Two new monogenetic trematodes from Beaufort, North Carolina. *Livio Jub. Prof. Lauro Tracassos* 1938:293-298.
- Mason, W.T., Jr., and S.A. Zengel. 1996. Foods of juvenile Spotted Seatrout in seagrasses at Seahorse Key, Florida. *Gulf of Mexico Science* 1996(2):89-104
- Mather, F.J., III. 1952. Sport fishes of the vicinity of the Gulf of Honduras, certain Caribbean islands, and Carmen, Mexico. Pages 118-129 in Proceedings of the Gulf and Caribbean Fisheries Institute, 4th Annual Session.
- McCabe, E.J.B., D.P. Gannon, N.B. Barros, and R.S. Wells. 2010. Prey selection by resident common bottlenose dolphins (*Turisops truncatus*) in Sarasota Bay, Florida. *Marine Biology* 157:931-942.
- McDonald, D.L., B.W. Bumguardner, and M.R. Fisher. 2010. Winterkill Simulation on Three Size Classes of Spotted Seatrout. Texas Parks and Wildlife. Management Data Series, 259
- McElroy E.J., B. Nowak, K.M. Hill-Spanik, W.O. Granath, V.A. Connors, J. Driver, C.J. Tucker, D.E. Kyle, and I. Buron. 2020. Dynamics of infection and pathology induced by the aporocotylid, *Cardicola laruei*, in Spotted Seatrout, *Cynoscion nebulosus* (Sciaenidae). *International Journal for Parasitology*, 50:10–11
- McMichael, R.H., Jr., and K.M. Peters. 1989. Early life history of Spotted Seatrout, *Cynoscion nebulosus* (Pisces: Sciaenidae), in Tampa Bay, Florida. *Estuaries* 12(2):98-110.
- Mercer, L.P. 1984. A biological and fisheries profile of Spotted Seatrout, *Cynoscion nebulosus*. North Carolina Department of Natural Resources and Community Development, Division of Marine Resources, Morehead City, North Carolina. Special Scientific Report Number 40. 87 p.
- Miles, D.W. 1950. The life histories of the sea-trout, *Cynoscion nebulosus*, and the redfish, *Sciaenops ocellatus*: sexual development. Texas Game and Fish Commission, Marine Laboratory Annual Report, 1949-1950:66-103
- Merriner, J.V. 1980. History and management of the Spotted Seatrout fishery. Pages 55-61 in R. Williams, J.C. Weaver and F.A. Kalber (Co-chairmen) Proceedings of the Colloquium on the Biology and Management of Red Drum and Seatrout. Gulf States Marine Fisheries Commission Publication Number 5. Ocean Springs, Mississippi.
- Moody, W.D. 1950. A study of the natural history of the Spotted Seatrout, *Cynoscion nebulosus*, in the Cedar Key, Florida, area. *Quarterly Journal of the Florida Academy of Sciences* 12(3):147-171.
- Moore, R.H. 1976. Observations on fishes killed by cold at Port Aransas, Texas, 11-12 January 1973. *Southwestern Naturalist* 20(4):461-466.
- Moravec F., I. de Buron, and W.A. Roumilat. 2006. Two new species of *Philometra* (Nematoda: Philometridae) parasitic in the perciform fish *Cynoscion nebulosus* (Sciaenidae) in the estuaries of South Carolina, USA. *Folia Parasitologica. Mar*; 53(1):63-70.
- Murphy, M.D., R.F. Heagey, V.H. Neugebauer, M.D. Gordon, and J.L. Hintz. 1995. Mortality of Spotted Seatrout released from gill-net or hook-and-line gear in Florida. *North American Journal of Fisheries Management* 15:748-753.
- Neahr, T.A., G.W. Stunz, and T.J. Minello. 2010. Habitat use patterns of newly settled Spotted Seatrout in estuaries of the north-western Gulf of Mexico. *Fisheries Management and Ecology* 17:404-413.
- Nieland, D.L., R.G. Thomas, and C.A. Wilson. 2002. Age, Growth, and Reproduction of Spotted Seatrout in Barataria Bay, Louisiana. *Transactions of the American Fisheries Society* 131:245–259.
- Overstreet, R.M. 1974. An estuarine low-temperature fish-kill in Mississippi, with remarks on restricted necropsies. *Parasitology* 4(3):328-350.
- Overstreet, R.M. 1977. *Poecilancistrum caryophyllum* and other trypanorhynch cestode plerocercoids from the musculature of *Cynoscion nebulosus* and other sciaenid fishes in the Gulf of Mexico. *Journal of Parasitology* 63(5):780-789.
- Overstreet, R.M. 1978. Trypanorhynch infections in the flesh of sciaenid fishes. *Marine Fishery Review* 40(10):37-38.
- Overstreet, R.M. 1983. Aspects of the biology of the Spotted Seatrout, *Cynoscion nebulosus*, in Mississippi. *Gulf Research Reports, Supplement* 1. 43 p.
- Overstreet, R.M. and H.D. Howse. 1977. Some parasites and diseases of estuarine fishes in polluted habitats of Mississippi. *Annual New York Academy of Sciences* 298:427-462.

- Overstreet, R.M., and G.W. Meyer. 1981. Hemorrhagic lesions in stomach of rhesus monkey caused by a piscine ascarioid nematode. *Journal of Parasitology* 67(2):226-235.
- Pattillo, M.E., T.E. Czapla, D.M. Nelson, and M.E. Monaco. 1997. Distribution and abundance of fishes and invertebrates in Gulf of Mexico estuaries, volume II: species life history summaries. ELMR Report Number 11. National Oceanic and Atmospheric Administration, National Ocean Service Strategic Environmental Assessments Division, Silver Spring, Maryland. 377 p.
- Pearse, A.S. 1952. Parasitic crustacea from the Texas coast. *Publication of the Institute of Marine Sciences, University of Texas* 2(2):5-42.
- Pearson, J.C. 1929. Natural history and conservation of the redfish and other commercial sciaenids on the Texas coast. *Bulletin of the United States Bureau of Fisheries* 44:129-214.
- Peeler, L.M., D.M. Lindstedt, and J.G. Gooselink. 1976. The Spotted Seatrout and Red Drum fishery in Louisiana and surrounding waters. Department of Marine Science, Louisiana State University, Baton Rouge, Louisiana. 34 p.
- Perret, W.S., J.E. Weaver, R.O. Williams, P.L. Johansen, T.D. McIlwain, R.C. Raulerson, and W.M. Tatum. 1980. Fishery profiles of Red Drum and Spotted Seatrout. Gulf States Marine Fisheries Commission Publication Number 6. Ocean Springs, Mississippi. 60 p.
- Perret, W.S., W.R. Latapie, J.F. Pollard, W.R. Mock, G.B. Adkins, W.J. Gaidry and C.J. White. 1971. Phase IV, Biology Section I. Pages 29-175 in Cooperative Gulf of Mexico Estuarine Inventory and Study, Louisiana. Louisiana Wildlife and Fisheries Commission, New Orleans, Louisiana.
- Powell, A.B., R.T. Cheshire, E.H. Laban, J. Colvocoresses, P. O'Donnell, and M. Davidian. 2004. Growth, mortality, and hatchdate distributions, of larval and juvenile Spotted Seatrout (*Cynoscion nebulosus*) in Florida Bay, Everglades National Park. *Fishery Bulletin* 102:142-155.
- Powers, J.P. 2012. Distribution Patterns of Juvenile Spotted Seatrout (*Cynoscion nebulosus*) and Red Drum (*Sciaenops ocellatus*) along Shallow Beach Habitats in Pamlico River, North Carolina. East Carolina University, Thesis.
- Porch C.E., C.A. Wilson C.A., D.L. Nieland. 2002. A new growth model for Red Drum (*Sciaenops ocellatus*) that accommodates seasonal and ontogenic changes in growth rates. *Fish Bulletin* 100:149-152.
- Renaud, M.L. 1986. Detecting and avoiding oxygen deficient sea water by brown shrimp, *Penaeus aztecus* (Ives), and white shrimp, *Penaeus setiferus* (Linnaeus). *Journal of Experimental Marine Biology and Ecology* 98:283-292.
- Renfro, W.C. 1963. Gas-bubble mortality of fishes in Galveston Bay, Texas. *Transactions of the American Fisheries Society* 92:320-322.
- Rogillio, H.E. 1975. An estuarine sportfish study in southeastern Louisiana. *Fisheries Bulletin Number 14*. Louisiana Wildlife and Fisheries Commission, New Orleans, Louisiana. 71 p.
- Rogillio, H.E. 1982. Movement study of estuarine sportfish. Louisiana Department of Wildlife and Fisheries, Completion Report D-J Project F-41. 40 p.
- Rosenthal, H. 1967. Parasites in larvae of the herring (*Clupea harengus* L.) fed with wild plankton. *Marine Biology* 1(1):10-1
- Rutherford, E.S. 1982. Age, growth and mortality of Spotted Seatrout, *Cynoscion nebulosus*, in Everglades National Park, Florida. Master's Thesis, University of Miami, Coral Gables, Florida. 65 p.
- Sabins, D.S., and F. Truesdale. 1975. Diel and seasonal occurrence of immature fishes in a Louisiana tidal pass. Proceedings of the Annual Conference of Southeastern Association of Game and Fish Commissioners 28:161-170.
- Saucier, M.H., and D.M. Baltz. 1993. Spawning site selection by Spotted Seatrout, *Cynoscion nebulosus*, and Black Drum, *Pogonias cromis*, in Louisiana. *Environmental Biology of Fishes* 36(3):257-272.
- Saucier, M.H., D.M. Baltz, and W.A. Roumillat. 1992. Hydrophone identification of spawning sites of Spotted Seatrout *Cynoscion nebulosus* (Osteichthys:Sciaenidae) near Charleston, South Carolina. *Northeast Gulf Science* 12(2):141-145.
- Saunders, D.C. 1954. A new haemogregarine reported from the spotted squet-eague, *Cynoscion nebulosus*, in Florida. *Journal of Parasitology* 40(6):699-700.
- Seagle, J.H. 1969. Food habits of Spotted Seatrout *Cynoscion nebulosus* (Cuvier) frequenting turtle grass (*Thalassia testudinum* König) beds in Redfish Bay, Texas. *Taius* 2(1):58-63.
- Shaw, A.L., B.S. Frazier, J.R. Kucklick, and G. Sancho. 2016. Trophic Ecology of a Predatory Community in a Shallow-Water, High-Salinity Estuary Assessed by Stable Isotope Analysis. *Marine and Coastal Fisheries: Dynamics, Management, and Ecosystem Science* 8:46-61.
- Sinclair, N.R., F.G.S. Smith, and J.J. Sullivan. 1972. The *Stomachiola rubea*: *Tubulovesicula pinguis* enigma. *Proceedings Helminthological Society of Washington* 39(2):253-258.
- Sindermann, C.J. 1979. Pollution-associated diseases and abnormalities of fish and shellfish: a review. *Fishery Bulletin* 76(4):717-719.
- Simmons, E.G. 1957. An ecological survey of the upper Laguna Madre of Texas. *Publications of the Institute of Marine Science* 4:156-200.
- Simonsen, K.A., and J.H. Cowan, Jr. 2013. Effects of an inshore artificial reef on the trophic dynamics of three species of estuarine fish. *Bulletin of Marine Science* 89(3):000-000.
- Springer, V.G., and K.D. Woodburn. 1960. An ecological study of the fishes of the Tampa Bay area. Florida Board of Conservation Marine Laboratory, Professional Paper Series 1:1-104.
- Sparks, A.K., and V.E. Thatcher. 1958. A new species of *Stephanostomum* (Trematoda: Acanthocypidae) from marine fishes of the northern Gulf of Mexico. *Transactions of the American Microscopical Society* 77(3):287-290.

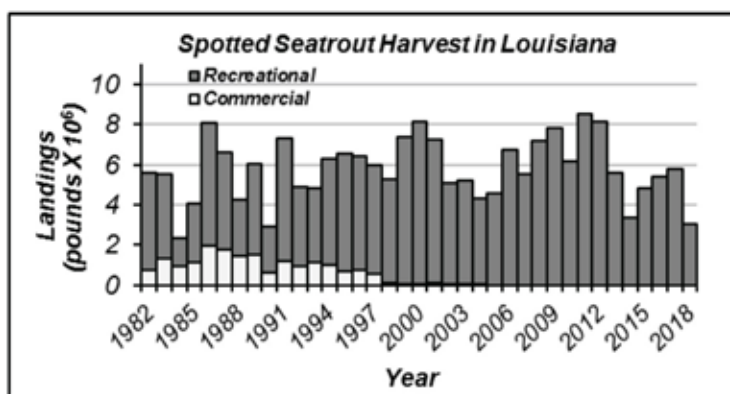
- Stanley, D.R., and C.A. Wilson. 1990. A fishery-dependent based study of fish species composition and associated catch rates around oil and gas structures off Louisiana. *Fisheries Bulletin* 88(4):719-730.
- Stewart, K.W. 1961. Contributions to the biology of the Spotted Seatrout (*Cynoscion nebulosus*) in the Everglades National Park, Florida. Master's Thesis, University of Miami, Coral Gables, Florida. 103 p
- Stunz, G.W., and D.A. McKee. 2006. Catch-and-release mortality of Spotted Seatrout in Texas, *North American Journal of Fisheries Management*, 26:4, 843-848
- Sundararaj, B.I., and R.D. Suttkus. 1962. Fecundity of the Spotted Seatrout *Cynoscion nebulosus* (Cuvier) from Lake Borgne area, Louisiana. *Transactions of the American Fisheries Society* 91:84-88.
- Taniguchi, A.K. 1981. Survival and growth of larval Spotted Seatrout *Cynoscion nebulosus* in relation to temperature, prey abundance, and stocking densities. *Rapports et Procès-Verbaux des Réunions, Conseil International pour l'Exploration de la Mer* 178:507-508.
- Tabb, D.C. 1958. Differences in the estuarine ecology of Florida waters and their effect on populations of spotted weakfish, *Cynoscion nebulosus* (Cuvier and Valenciennes). *Transactions of the 23rd North American Wildlife Conference*:392-401.
- Tabb, D.C. 1961. A contribution to the biology of the Spotted Seatrout, *Cynoscion nebulosus* (Cuvier), of east-central Florida. Florida State Board of Conservation, Marine Research Laboratory, Technical Series 35:1-24.
- Tabb, D.C. 1966. The estuary as a habitat for Spotted Seatrout, *Cynoscion nebulosus*. *American Fisheries Society Special Publication* 3:59-67.
- Tabb, D.C., and R.B. Manning. 1961. A checklist of the flora and fauna of northern Florida Bay and adjacent brackish waters of the Florida mainland collected during the period July 1957 through September 1960. *Bulletin of Marine Science Gulf and Caribbean* 11:552-649.
- Tabb, D.C., D.L. Dubrow, and R.B. Manning. 1962. The ecology of north Florida Bay and adjacent estuaries. Florida State Board of Conservation Technical Series 39:81.
- Tarver, J.W. 1972. Parasitic worms infesting marine fish in Louisiana. Louisiana Wildlife and Fisheries Commission, Biennial Report 1970-1971.
- TinHan, T.C., J.A. Mohan, M. Dumesnil, B.M. DeAngelis, and R.J.D. Wells. 2018. Linking Habitat Use and Trophic Ecology of Spotted Seatrout (*Cynoscion nebulosus*) on a Restored Oyster Reef in a Subtropical Estuary. *Estuaries and Coast* 41:1793-1805
- Tucker, J.W., Jr., and B.E. Faulkner. 1987. Voluntary spawning patterns of captive Spotted Seatrout. *Northeast Gulf Science* 9:59-63.
- Vetter, R.D. 1982. Seasonal metabolic, compensation in sympatric seatrout: adaption to the estuary. *Transactions of the American Fisheries Society* 111:193-198.
- Volker, K.M. 2020. Diet Analysis of Stranded Bottlenose Dolphins (*Tursiops truncatus*) in Virginia. Master of Science Thesis, Biological Sciences, Old Dominion University
- Wagner, P.R. 1973. Seasonal biomass, abundance and distribution of estuarine dependent fishes in the Caminada Bay system of Louisiana. Doctoral Dissertation, Louisiana State University, Baton Rouge, Louisiana
- Warren, J.R. 1995. Spotted Seatrout sport fish studies in Mississippi. Mississippi Department of Marine Resources. Project F-103. Final Report. 189 p.
- Welsh, W.W., and C.M. Breder, Jr. 1924. Contributions to the life histories of Sciaenidae of the eastern United States coast. *Bulletin of United States Bureau of Fisheries* 39:141-201.
- West, J., J. Adriance, M. Monk, and J.E. Powers. 2011. Assessment of Spotted Seatrout in Louisiana waters. 2011 Report of the Louisiana Department of Wildlife and Fisheries. 95 pp.
- West, J., G. Decossas, A. Melancon, S. Potts, and J.E. Powers. 2014. Update assessment of Spotted Seatrout in Louisiana waters. 2014 Report of the Louisiana Department of Wildlife and Fisheries. 54 pp.
- West, J., X. Zhang, and J. Adriance. 2019. Assessment of Spotted Seatrout in Louisiana waters. 2019 Report of the Louisiana Department of Wildlife and Fisheries. 73 pp.
- Wieting, D.S. 1989. Age, growth, and fecundity of the Spotted Seatrout (*Cynoscion nebulosus*) in Louisiana. Master's Thesis, Louisiana State University, Baton Rouge. 93 p.
- Willis, C.M., J. Richardson, T. Smart, J. Cowan, and P. Biondo. 2015. Diet composition, feeding strategy, and diet overlap of 3 sciaenids along the southeastern United States. *Fishery Bulletin*, vol. 113(3), 290

# Appendices

## APPENDIX I. Assessment of Spotted Seatrout (*Cynoscion nebulosus*) in Louisiana Waters 2019 Report

### Executive Summary

Landings of spotted seatrout (SST) in Louisiana have remained above 5 million pounds per year in the most recent decade with the exceptions of 2014, 2015 and 2018. The 2014 and 2018 recreational harvests were the lowest observed since 1990. The highest recreational harvest on record (over 8 million pounds) was observed in 2011. After the commercial net ban in 1997, when rod and reel gear became the only allowed method of Spotted Seatrout harvest, commercial landings declined significantly and account for less than 0.1% of annual landings in the most recent decade.



A statistical catch-at-age model is used in this stock assessment to describe the dynamics of the female portion of the Louisiana Spotted Seatrout stock. The assessment model forward projects annual abundance at age from estimates of abundance in the initial year of the time-series and recruitment estimates in subsequent years. The model is fit to the data with a maximum likelihood fitting criterion. Minimum data requirements are fishery catch-at-age and an index of abundance. Landings are taken from the Louisiana Department of Wildlife and Fisheries (LDWF) Recreational Creel Survey and Commercial Trip Ticket Programs, the National Marine Fisheries Service (NMFS) commercial statistical records, and the NMFS Marine Recreational Information Program (MRIP). Abundance indices are developed from the LDWF experimental marine gillnet survey. Age composition of fishery catches are estimated with age-length-keys derived from direct samples of the fishery and a growth model.

In earlier assessments of the LA SST stock (West *et al.* 2011, West *et al.* 2014), targets and explicit limits of fishing were proposed to ensure future sustainability of the stock. The proposed limits of fishing were based on the history of the stock by requiring female spawning stock biomass not fall below the lowest level observed earlier in the fishery in which the stock demonstrated sustainability. Based on results of this assessment, estimates of stock status relative to the proposed limits indicates the stock is currently overfished and has been undergoing overfishing. Management actions will be needed in order to prevent future overfishing and recover the stock from its current overfished condition.

### Summary of Changes from 2014 Assessment

Assessment model inputs have been updated through 2018. No changes have been made to the assessment model itself. A number of changes have been made to the data inputs of the assessment model that are described below. Because of these changes, this stock assessment is considered a benchmark assessment rather than an update of the previous assessment.

The time-series of recreational landings estimates used in this assessment has changed. In the previous assessment, recreational landing estimates were taken from the NMFS MRIP survey (1981-2013). In this assessment, recreational landings estimates are taken from the LDWF Recreational Creel Survey (LA Creel; 2014-2018) and estimates hindcast to the historic MRIP time-series (1982-2013; details in *Appendix 1*).

A new sampling program was established in 2014, when LDWF transitioned from MRIP to LA Creel, to provide biological information characterizing the size and age composition of LA fishery landings. In earlier assessments, size composition information of recreational landings was taken entirely from the MRIP survey. In this assessment, beginning in 2014, size composition of recreational landings was obtained from the LDWF Biological Sampling Program and from MRIP for years prior (details in *2. Data Sources*).

The LDWF experimental marine gill net survey is used to develop indices of abundance as data inputs of the assessment model. This survey was conducted from 1986 to April 2013 at fixed sampling stations within each LDWF Coastal Study Area (CSA). In October 2010, additional fixed stations were added to allowing more spatial coverage within each CSA. In April 2013, the survey design was modified where sampling locations are now selected randomly from the established stations within each CSA (details in *2. Data Sources*).

The standard von Bertalanffy growth model that was used in previous LDWF assessments to describe female Spotted Seatrout growth and develop age-length-keys for age assignments of fishery and survey catches has been replaced in this assessment with a growth model that accounts for decreasing growth rates ( $k$ ) with age (details in *Appendix 2*).

A change was also made to better represent the uncertainty of recreational and commercial landings in the assessment model. In the previous assessment, variability of landings was assumed constant across each time-series. In this assessment, annual values of variability are used to control model fits of fishery yield (details in *6. Assessment Model*).

**Assessment of Spotted Seatrout *Cynoscion nebulosus* in Louisiana Waters  
2019 Report  
Post-review Final Version**

Joe West, Xinan Zhang and Jason Adriance  
Office of Fisheries  
Louisiana Department of Wildlife and Fisheries

*Table of Contents*

<i>Executive Summary</i> .....	1
<i>1. Introduction</i> .....	5
<i>1.1 Fishery Regulations</i> .....	5
<i>1.2 Trends in Harvest</i> .....	5
<i>2. Data Sources</i> .....	5
<i>2.1 Fishery Independent</i> .....	5
<i>2.2 Fishery Dependent</i> .....	6
<i>3. Life History Information</i> .....	8
<i>3.1 Unit Stock Definition</i> .....	8
<i>3.2 Morphometrics</i> .....	8
<i>3.3 Growth</i> .....	9
<i>3.4 Sex Ratio</i> .....	9
<i>3.5 Fecundity/Maturity</i> .....	9
<i>3.6 Natural Mortality</i> .....	10
<i>3.7 Discard Mortality</i> .....	10
<i>3.8 Relative Productivity / Resilience</i> .....	10
<i>4. Abundance Index Development</i> .....	11
<i>5. Catch at Age Estimation</i> .....	12
<i>5.1 Fishery</i> .....	12
<i>5.2 Survey</i> .....	13
<i>6. Assessment Model</i> .....	14
<i>6.1 Model Configuration</i> .....	14
<i>6.2 Model Assumptions/Inputs</i> .....	17
<i>6.3 Model Results</i> .....	17
<i>6.4 Management Benchmarks</i> .....	19
<i>6.5 Model Diagnostics</i> .....	21
<i>7. Stock Status</i> .....	22

8. Research and Data Needs .....	23
9. References .....	25
10. Tables.....	28
11. Figures.....	46
Appendix 1:.....	62
Appendix 2:.....	72

## 1. Introduction

A statistical catch-at-age model is used in this stock assessment to describe the dynamics of the female portion of the Louisiana (LA) Spotted Seatrout *Cynoscion nebulosus* (SST) stock from 1982-2018. The assessment model forward projects annual abundance at age from estimates of abundance in the initial year of the time-series and recruitment estimates in subsequent years. The model is fit to the data with a maximum likelihood fitting criterion. Minimum data requirements are fishery catch-at-age and an index of abundance (IOA). Commercial landings values are taken from the Louisiana Department of Wildlife and Fisheries (LDWF) Trip Ticket Program and the National Marine Fisheries Service (NMFS) commercial statistical records. Recreational harvest estimates are obtained from the LDWF Recreational Creel Program (LA Creel) and the NMFS Marine Recreational Information Program (MRIP). Abundance indices are developed from the LDWF experimental marine gillnet survey. Age composition of fishery catches are estimated with age-length keys derived from direct samples of the fishery (2002-2018) and a growth model (1982-2001).

### 1.1 Fishery Regulations

The LA SST fishery is governed by the LA State Legislature, the Wildlife and Fisheries Commission, and the Department of Wildlife and Fisheries. Current recreational regulations are a 12-inch minimum length limit (MLL) and a 25-fish per day creel limit, with the exception of south-west Louisiana (from the Texas border to the Mermentau River) that is currently managed with a 15-fish daily creel limit with a 12-inch MLL and no more than two fish allowed over 25-inches. Commercial harvest is limited to rod and reel gear only, with a 14-inch MLL. Historic commercial and recreational SST fishery regulations were reviewed in an earlier assessment report (West *et al.* 2011).

### 1.2 Trends in Harvest

Time-series of recreational and commercial landings are presented (Table 1, Figure 1). Louisiana Spotted Seatrout landings have remained above 5 million pounds per year in the most recent decade with the exceptions of 2014, 2015 and 2018. The 2014 and 2018 recreational harvests were the lowest observed

since 1990. The highest recreational harvest on record (>8 million pounds) was observed in 2011. After the commercial net ban in 1997, when rod and reel gear became the only allowed method of Spotted Seatrout harvest, commercial landings declined significantly and account for less than 0.1% of annual landings in the most recent decade.

## **2. Data Sources**

### **2.1 Fishery Independent**

The LDWF fishery-independent experimental marine gillnet survey is used in this assessment to develop abundance indices for use in the assessment model. Below is a brief description of this survey's methodology. Complete details can be found in LDWF (2018).

For sampling purposes, coastal Louisiana is currently divided into five LDWF coastal study areas (CSAs). Current CSA definitions are as follows: CSA 1 – Mississippi State line to South Pass of the Mississippi River (Pontchartrain Basin); CSA 3 – South Pass of the Mississippi River to Bayou Lafourche (Barataria Basin); CSA 5 – Bayou Lafourche to eastern shore of Atchafalaya Bay (Terrebonne Basin); CSA 6 – Eastern shore of Atchafalaya Bay to western shore of Freshwater Bayou Canal (Vermillion/Teche/Atchafalaya Basins); CSA 7 – western shore of Freshwater Bayou Canal to Texas State line (Mermentau/Calcasieu/Sabine Basins).

The LDWF Marine Fisheries Section conducts routine standardized sampling within each CSA as part of a long-term comprehensive monitoring program to collect life-history information and measure relative abundance/size distributions of recreationally and commercially important species. These include the experimental marine gillnet, trammel net, and bag seine surveys.

In this assessment, only the experimental marine gillnet survey is used. This survey has the highest Spotted Seatrout catch rates, frequency of occurrence, and precision when compared to the other LDWF FI surveys. The survey is conducted with standardized design. Hydrological and climatological measurements are taken with each biological sample, including water temperature, turbidity, conductivity and salinity. Survey gear is a 750-foot monofilament gillnet comprised of five 150-foot panels of 1.0, 1.25, 1.5, 1.75, and 2.0-inch bar meshes.

Samples are taken by 'striking' the net. All captured SST are enumerated and a maximum of 30 randomly selected SST per mesh panel are collected for length measurements, gender determination, and maturity information. When more than 30 SST are captured per mesh panel, catch-at-size is derived as the product of total catch and proportional subsample-at-size.

The survey was conducted from 1986 to April 2013 at fixed sampling locations within each CSA. The 1.25 and 1.75-inch bar mesh sizes, however, were not included in the survey until 1988. In October of

2010, additional fixed stations were added to this survey allowing more spatial coverage within each CSA. Beginning in April 2013, the survey design was modified where sampling locations are now selected randomly from the established stations within each CSA.

## 2.2 Fishery Dependent

### Commercial

Commercial SST landings are taken from NMFS commercial statistical records (1982-1998; NMFS 2018a) and the LDWF Trip Ticket Program (1999-2017). The 2017 commercial SST landings values are used as a proxy for 2018 commercial landings that were not available at the time of this assessment.

For aging purposes, annual landings are allocated into six-month seasons (*i.e.*, January-June and July-December). Because only limited seasonal landings data are available from earlier in the fishery, the monthly landings records that are available are pooled into time-periods of consistent regulation (1981-1996 and 1997-1998) to develop seasonal catch compositions. Starting in 1999, seasonal catches are taken directly from the LDWF Trip Ticket Program.

Size composition of commercial catches in each year and season are derived from LDWF sampling effort (pre-1997 and 2014-2018) and MRIP records (1997-2013). Pre-1997 size distributions are only available for a limited number of years (1986 and 1990-1992) during which time the commercial sector operated under different MLLs and used a wider variety of harvest methods. Therefore, the 1990-1992 data are combined to describe the size composition of commercial catches from 1987- 1996 (*i.e.*, primarily a net fishery with a 14-inch MLL) and the 1986 data are used to describe the 1981-1986 commercial size compositions (*i.e.*, primarily a net fishery with 10 and 12-inch MLLs; Table 2). Seasonal size distributions of commercial catches are not available pre-1997; therefore, equivalent size composition is assumed for each six-month period. For years following the commercial net ban (*i.e.*, 1997-present; only rod and reel harvest allowed with a 14 inch MLL), size composition of commercial catches are taken from MRIP records and the LDWF Biological Sampling Program (*i.e.*, assuming equivalent vulnerability to rod and reel gear for both fisheries, but selecting only sizes  $\geq 14$  inches total length; Table 3).

### Recreational

Recreational SST landings estimates are taken from the LDWF recreational creel survey (LA Creel; 2014-2018) and estimates hindcast to the historic MRIP time-series (1982-2013; details in *Appendix I*).

Consequently, the pre-2014 recreational harvest estimates used in this assessment differ from the LA estimates currently published by MRIP (<https://www.st.nmfs.noaa.gov/recreational-fisheries/data-and-documentation/queries/index>). Furthermore, due to changes made to the MRIP Access Point Angler Intercept Survey (APAIS) in 2013 (see <https://www.fisheries.noaa.gov/topic/recreational-fishing-data#making-improvements>) and the recent transition from the MRIP Coastal Household Telephone

Survey to the new Fishing Effort Survey (FES; see <https://www.fisheries.noaa.gov/recreational-fishing-data/types-recreational-fishing-surveys#fishing-effort-survey>), harvest estimates currently available from MRIP also differ from those used in the prior LA SST stock assessment (West *et al.* 2014).

For aging purposes, SST harvest and live release estimates are derived in six-month periods described in the previous section. Live releases are further delineated as legal or illegal with LA Creel and MRIP catch disposition codes.

Size composition of SST harvest estimates are derived from the LDWF Biological Sampling Program (2014-2018) and MRIP (1982-2013; prior to the APAIS and FES calibration changes) for each year and six-month season (Table 3); size composition of legal live releases is assumed equivalent. Statewide size compositions obtained from the LDWF Biological Sampling Program are derived by statistically weighting the CSA-specific size compositions by the corresponding recreational landings estimates.

Size composition of under-sized releases in each year and season is estimated by first assuming all illegal discards as < 12 inches total length. Some catch, however, is in fact legal-sized, but coded as illegal due to catches greater than the creel limit. These catches (~3% of LA angler trips per year, 2016-2018; LA Creel unpublished data) occur infrequently and are thus considered negligible for purposes of this assessment. Size composition of SST catches < 12 inches are pooled from the years prior to recreational MLL implementation and used as proxies of sublegal size composition after the 12 inch MLL was implemented in 1987.

### **3. Life History Information**

#### **3.1 Unit Stock Definition**

Spotted Seatrout occur in estuaries and nearshore coastal habitat along the Atlantic and Gulf coasts from Cape Cod, Massachusetts, to the Bay of Campeche, Mexico (GSMFC 2001). Most of the harvest, however, is taken in the Gulf of Mexico (GOM) with the largest recreational harvest occurring in LA waters.

Studies using mitochondrial DNA markers (Gold and Richardson 1998; Gold *et al.* 1999) have confirmed significant population sub-structuring across GOM SST populations. For the purpose of this assessment, the unit stock is defined as those female SST occurring in LA waters. This approach is consistent with the current statewide management strategy; although SST in south-west LA (from the Texas border to the Mermentau River) are managed with slightly different regulations (see *1.1 Fishery Regulations*).

### 3.2 Morphometrics

Weight-length regressions for LA SST were developed by Wieting (1989). For the purpose of this assessment, only the female-specific relationship is used with weight calculated from size as:

$$W = 1.17 \times 10^{-5}(FL)^{2.97} \quad [1]$$

where W is whole weight in grams and FL is fork length in mm. Fish with only FL measurements available are converted to TL (and conversely) using a relationship provided by the Florida Fish and Wildlife Institute (personal communication from Joe O'Hop, July 2010) where:

$$TL = 1.0008 \times FL + 0.6306 \quad [2]$$

### 3.3 Growth

Spotted Seatrout exhibit differences in growth between males and females, with larger SST being predominantly female (Wieting 1989). The von Bertalanffy growth function developed in an earlier assessment for female SST (West *et al.* 2011) is replaced in this assessment with a growth model that accounts for decreasing growth rates with age (*i.e.*, damped growth model; Porch *et al.* 2002; see Appendix 2). Total length-at-age is calculated with the damped growth model as:

$$TL_a = 28.1 \times (1 - e^{\beta - 0.113(a - 0.0373)}) \quad [3]$$

$$\beta = \frac{0.414}{0.329} (e^{-0.329a} - e^{-0.329 \times 0.0373})$$

where  $TL_a$  is female TL-at-age in inches and years.

### 3.4 Sex Ratio

The probability of being female at a specific size is calculated with a logistic function developed in West *et al.* (2011) as:

$$P_{fem,l} = \frac{1}{[1 + e^{(-0.464(TL - 10.9))}]} \quad [4]$$

where  $P_{fem,l}$  is the estimated proportion of females in 1 inch TL intervals. The minimum sex ratio-at-size is assumed as 50:50.

### 3.5 Fecundity/Maturity

Spotted Seatrout are serial spawners where annual fecundity is seasonally indeterminate. To realistically estimate annual fecundity, the number of eggs spawned per batch and the number of batches spawned per season must be known. Consistent estimates of batch fecundity and spawning frequency are currently not available for the LA SST stock (Wieting 1989; Nieland *et al.* 2002); therefore, female spawning stock biomass (SSB) is used as a proxy for total egg production in this assessment. This may introduce bias if fecundity does not scale linearly with body weight (Rothschild and Fogarty 1989).

Female maturity at size is calculated with a logistic function developed in West *et al.* (2011) as:

$$P_{mat,TL} = \frac{1}{[1+e^{-0.765(TL-7.70)}]} \quad [5]$$

where  $P_{mat,TL}$  is the estimated proportion of sexually mature female Spotted Seatrout in 1 inch TL intervals. Female maturity at age is then calculated by substituting equation [5] into equation [3].

### 3.6 Natural Mortality

Spotted Seatrout can live to at least ten years of age (GSMFC 2001, Herdter *et al.* 2019). For purposes of this assessment, a value of constant  $M$  is assumed (0.3) based on longevity of the species, but is allowed to vary with weight-at-age to calculate a declining natural mortality rate with age. This value of  $M$  is consistent with a stock where approximately 5% of the stock remains alive to 10 years of age (Quinn and Deriso 1999). Following SEDAR 12 (SEDAR 2006), the estimate is rescaled where the average mortality rate over ages vulnerable to the fishery is equivalent to the constant rate over ages as:

$$M_a = M \frac{nL(a)}{\sum_{a_c}^{a_{max}} L(a)} \quad [6]$$

where  $M$  is a constant natural mortality rate over exploitable ages  $a$ ,  $a_{max}$  is the oldest age-class,  $a_c$  is the first fully-exploited age-class, and  $n$  is the number of exploitable ages. The Lorenzen curve as a function of age is calculated from:

$$L(a) = W_a^{-0.288} \quad [7]$$

where -0.288 is the allometric exponent estimated for natural ecosystems (Lorenzen 1996) and  $W_a$  is weight-at-age.

### 3.7 Discard Mortality

Reported SST discard mortality estimates are highly variable (~5-95%; Murphy *et al.* 1995; Stunz and McKee 2006; James *et al.* 2007; personal communication from Glenn Thomas, LDWF, July 2011).

Results of these studies suggest the magnitude of post-release mortality as dependent on a number of factors including water quality, bait/hook type, anatomical hooking location, and angler skill-level.

Spotted Seatrout landings, however, are not directly separable into such components. Therefore, discard mortality is assumed constant in this assessment (10%). This rate is consistent with the overall rod-and-reel release mortality rates from the previously mentioned studies, *i.e.* 5, 11, 10 and 14%, respectively.

For modeling purposes, stock losses due to discard mortalities are incorporated directly into recreational landings estimates (see 5. *Catch at Age Estimation*).

### 3.8 Relative Productivity / Resilience

The key parameter in age-structured population dynamics models is the steepness parameter ( $h$ ) of the stock-recruitment relationship. Steepness is defined as the ratio of recruitment levels when the spawning stock is reduced to 20% of its unexploited level relative to the unexploited level and determines the degree of compensation in the population (Mace and Doonan 1988). Populations with higher steepness values are more resilient to perturbation and if the spawning stock is reduced to levels where recruitment is impaired are more likely to recover sooner once overfishing has ended. Generally, this parameter is difficult to estimate due to a lack of contrast in spawning stock size (*i.e.*, data not available at both high and low levels of stock size) and is typically fixed or constrained during the model fitting process.

Estimates of steepness are not available for Spotted Seatrout.

Productivity is a function of fecundity, growth rates, natural mortality, age of maturity, and longevity and can be a reasonable proxy for resilience. We characterize the relative productivity of LA SST based on life-history characteristics, following Southeast Data Assessment and Review (SEDAR) 9, with a classification scheme developed at the Food and Agriculture Organization of the United Nations (FAO) second technical consultation on the suitability of the Convention on International Trade in Endangered Species of Wild Fauna and Flora (CITES) criteria for listing commercially-exploited aquatic species (FAO 2001; Table 4). Each life history characteristic (von Bertalanffy growth rate\*, age at maturity, longevity, and natural mortality rate) is assigned a rank (low=1, medium=2, and high=3) and then averaged to compute an overall productivity score. In this case, the overall productivity score is 2.75 for LA Spotted Seatrout indicating high productivity and resilience. The von Bertalanffy growth rate referenced above is replaced in this assessment with the mean growth rate across ages from the damped growth model (see *Appendix 2*) weighted by expected relative abundance-at-age ( $k = 0.357$ ).

### 4. Abundance Index Development

Abundance indices are developed separately for each mesh panel of the LDWF experimental marine gillnet survey with the exception of the 1.75 and 2.0-inch bar meshes that are excluded due to low catch rates. Stations not sampled regularly through time (prior to October 2010) and the less frequent ‘cold-month’ samples (*i.e.*, October–March) are also excluded. Catch per unit effort is defined as the number of female SST caught in each mesh panel per net sample. To reduce unexplained variability in catch rates unrelated to changes in abundance, each IOA time-series was standardized using methods described below.

A delta lognormal approach (Lo *et al.* 1992; Ingram *et al.* 2010) is used to standardize female SST catch-rates in each year as:

$$I_y = c_y p_y \quad [8]$$

where  $c_y$  are estimated annual mean CPUEs of non-zero female SST catches assumed as lognormal distributions and  $p_y$  are estimated annual mean probabilities of female SST capture assumed as binomial distributions. The lognormal and binomial means and their standard errors are estimated with generalized linear models as least square means and back transformed. The lognormal model considers only samples in which SST were captured; the binomial model considers all samples. Each IOA is then computed from equation [8] using the estimated least-squares means with variances calculated from:

$$V(I_y) \approx V(c_y)p_y^2 + c_y^2V(p_y) + 2c_y p_y \text{Cov}(c, p) \quad [9]$$

where  $\text{Cov}(c, p) \approx \rho_{c,p} [SE(c_y)SE(p_y)]$  and  $\rho_{c,p}$  represents the correlation of  $c$  and  $p$  among years.

Because of the designed nature of the experimental marine gillnet survey, model development was rather straightforward. Variables considered in model inclusion were year, CSA, and sampling location. Because only ‘warm’ month samples (*i.e.*, April-September) are included, time of year was not considered in model inclusion. To determine the most appropriate models, we began the model selection process with a fully-reduced model that included only year as a fixed effect. More complex models were then developed including interactions and random effects and compared using AIC and log-likelihood values. All sub-models were estimated with the SAS generalized linear mixed modeling procedure (PROC GLIMMIX; SAS 2008). In the final sub-models, year was considered a fixed effect, CSA was considered a random block effect, and sampling locations within CSAs were considered random subsampling block effects.

Sample sizes, proportion positive samples, nominal CPUE, standardized index, and coefficients of variation of the standardized indices are presented (Table 5). Standardized and nominal CPUEs, normalized to 1 for comparison, are also presented (Figure 2).

## 5. Catch at Age Estimation

Age-length-keys (ALKs) are developed to estimate age composition/catch-at-age of fishery and survey catches as described below.

Spotted Seatrout in LA exhibit a protracted spawning season, with spawning primarily occurring across a six-month period from April through September (Hein and Shepard 1980). The mid-point of the spawning season (July 1<sup>st</sup>) is typically assumed as a biological birthday. However, for purposes of this assessment, ages were assigned based on the calendar year by assuming a January 1<sup>st</sup> birthday, where SST spawned the previous year become age-1 on January 1<sup>st</sup> and remain age-1 until the beginning of the following year.

### 5.1 Fishery

Beginning in 2002, ALKs are developed from samples directly of the fishery; for earlier years, from the damped growth model.

1981-2001 Probabilities of age  $a$  given length  $l$  in each six-month season ( $s$ ; January-June and July-December) are computed as:

$$P(a|l)_s = \frac{P(l|a)_s}{\sum_a P(l|a)_s} \quad [10a]$$

where the probability of length given age in each season is estimated from a normal probability density as:

$$P(l|a)_s = \frac{1}{\sigma_{as}\sqrt{2\pi}} \int_{l-d}^{l+d} e^{-\frac{(l-l_{as})^2}{2\sigma_{as}^2}} dl \quad [10b]$$

where length bins are 1 inch TL intervals with midpoint  $l$ , maximum  $l + d$ , and minimum  $l - d$  lengths. Mean length-at-age in each season  $l_{as}$  is estimated from equation [3]. Variance in length-at-age is approximated as  $\sigma_{as} = l_{as}CV_l$ , where the coefficient of variation in length-at-age  $CV_l$  is assumed constant (in this case approximated as 0.05). To approximate changes in growth during each season, mean length-at-age is calculated at the midpoint of each six-month period. Thus, two seasonal  $P(a|l)_s$  matrices are developed to assign ages to female SST fishery landings from 1982-2001 (Table 6) and also for instances discussed below.

2002-2018 Probabilities of age given length for each year and six-month season are computed as:

$$P(a|l)_{yfs} = \frac{n_{lays}}{\sum_a n_{lays}} \quad [11]$$

where  $n_{lays}$  is female sample-size in each length/age bin in each year and six-month season (Table 8).

When  $\sum_a n_{lays} < 10$ , the  $P(a|l)$  for that 1 inch TL interval is estimated with Equation [10].

Annual fishery-specific ( $f$ , recreational or commercial) catch-at-age (females only) is then calculated as:

$$C_{afy} = \sum_l \sum_s P_{fem,l} C_{lfs} P(a|l)_s \quad [12]$$

where  $P_{fem,l}$  is taken from equation [4],  $C_{lfs}$  is fishery-specific catch-at-size in each year and six-month season, and  $P(a|l)_s$  are taken from Equations [10 or 11]. Recreational discard mortalities are incorporated directly into the recreational harvest-at-age by applying a 10% discard mortality rate to the estimated recreational releases-at-size and combining them with the recreational harvest-at-size estimates. Resulting fleet-specific annual catch-at-age (including discard mortalities) and associated mean weights-at-age are presented (Tables 10-12).

## 5.2 Survey

Probabilities of age given length for female SST catches of the LDWF marine gillnet survey are computed from equation [10]. Mean length-at-age is estimated from equation [3]. Variance in length-at-age is approximated as  $\sigma_{as} = l_{as}CV_l$ , where the coefficient of variation in length-at-age  $CV_l$  is assumed constant (in this case 0.05). To approximate changes in growth during the survey period (April-September), mean length-at-age is calculated at the midpoint of the six-month survey period. Resulting survey  $P(a|l)$  is presented (Table 7). Annual survey female catch-at-age is then taken from equation [12] with annual gear-specific survey catch-at-size substituted. Resulting annual survey age compositions (females only) are presented (Table 9).

## 6. Assessment Model

The Age-Structured Assessment Program (ASAP3 Version 3.0.12; NOAA Fisheries Toolbox) is used in this assessment to describe the dynamics of the female proportion of the LA SST stock. ASAP is a statistical catch-at-age model that allows internal estimation of a Beverton-Holt stock recruitment relationship and MSY-related reference points. Minimum data requirements are fishery catch-at-age, corresponding mean weights-at-age, and an index of abundance. ASAP projects abundance at age from estimates of abundance in the initial year of the time-series and recruitment estimates in subsequent years. The model is fit to the data with a maximum likelihood fitting criterion. An overview of the basic model configuration, equations, and their estimation, as applied in this assessment, are provided below. Specific details and full capabilities of ASAP can be found in the technical documentation (ASAP3; NOAA Fisheries Toolbox).

### 6.1 Model Configuration

For purposes of this assessment, the model is configured with annual time-steps (1982-2018) and a calendar year time-frame.

#### Mortality

Fishing mortality is assumed separable by age  $a$ , year  $y$ , and fishery  $f$  as:

$$F_{ayf} = v_{af}Fmult_{yf} \quad [13]$$

where  $v_{af}$  are age and fishery-specific selectivities and  $Fmult_{yf}$  are annual fishery-specific apical fishing mortality rates. Apical fishing mortalities are estimated in the initial year and as deviations from the initial estimates in subsequent years.

Fishery-specific selectivities are modeled with double logistic functions as:

$$v_{af} = \left( \frac{1}{1+e^{-(a-\alpha_f)/\beta_f}} \right) \left( 1 - \frac{1}{1+e^{-(a-\alpha_2_f)/\beta_2_f}} \right) \quad [14]$$

Total mortality for each age and year is estimated from the age-specific natural mortality rate  $M_a$  and the estimated fishing mortalities as:

$$Z_{ay} = M_a + \sum_f F_{ayf} \quad [15]$$

For reporting purposes, annual fishing mortalities are averaged by weighting by population numbers at age as:

$$F_y = \frac{\sum_a F_{ay} N_{ay}}{\sum_a N_{ay}} \quad [16]$$

### Abundance

Abundance in the initial year of the time series and recruitment in subsequent years are estimated and used to forward calculate the remaining numbers at age from the age and year-specific total mortality rates as:

$$N_{ay} = N_{a-1,y-1} e^{-Z_{a-1,y-1}} \quad [17]$$

Numbers in the plus group  $A$  are calculated from:

$$N_{Ay} = N_{A-1,y-1} e^{-Z_{A-1,y-1}} + N_{A,y-1} e^{-Z_{A,t-1}} \quad [18]$$

### Stock Recruitment

Expected recruitment is calculated from the Beverton-Holt stock recruitment relationship, reparameterized by Mace and Doonan (1988), with annual lognormal deviations as:

$$\hat{R}_{y+1} = \frac{\alpha SSB_y}{\beta + SSB_y} + e^{\delta_{y+1}} \quad [19]$$

$$\alpha = \frac{4\tau(SSB_0/SPR_0)}{5\tau-1} \quad \text{and} \quad \beta = \frac{SSB_0(1-\tau)}{5\tau-1}$$

where  $SSB_0$  is unexploited female spawning stock biomass,  $SPR_0$  is unexploited spawning stock biomass per recruit,  $\tau$  is steepness, and  $e^{\delta_{y+1}}$  are annual lognormal recruitment deviations..

### Spawning Stock

Female spawning stock biomass in each year is calculated from:

$$SSB_y = \sum_{i=1}^A N_{ay} W_{SSB,a} p_{mat,a} e^{-Z_{ay}(0.5)} \quad [20]$$

where  $W_{SSB,a}$  are female spawning stock biomass weights-at-age,  $p_{mat,a}$  is the proportion of mature females-at-age, and  $-Z_{ay}(0.5)$  is the proportion of total mortality occurring prior to spawning on July 1<sup>st</sup>.

### Catch

Expected fishery catches are estimated from the Baranov catch equation as:

$$\hat{C}_{ayf} = N_{ay} F_{ayf} \frac{(1 - e^{-Z_{ay}})}{Z_{ay}} \quad [21]$$

Expected age composition of fishery catches are then calculated from  $\frac{\hat{C}_{ayf}}{\sum_a \hat{C}_{ayf}}$ . Expected fishery yields are computed as  $\sum_a \hat{C}_{ayf} \bar{W}_{ayf}$ , where  $\bar{W}_{ayf}$  are observed mean catch weights.

### Catch-rates

Expected survey catch-rates are computed from:

$$\hat{I}_{ay} = q \sum_a N_{ay} (1 - e^{-Z_{ay}(0.5)}) v_a \quad [22]$$

where  $v_a$  are survey selectivities,  $q$  are the estimated catchability coefficients, and  $-Z_{ay}(0.5)$  is the proportion of the total mortality occurring prior to the time of the survey (July 1<sup>st</sup> midpoint). Survey selectivities are modeled with double logistic functions (equation [14]). Expected survey age composition is then calculated as  $\frac{\hat{I}_{ay}}{\sum_a \hat{I}_{ay}}$ .

### Parameter Estimation

The number of parameters estimated is dependent on the length of the time-series, number of fisheries/selectivity blocks modeled, and the number of tuning indices modeled. Parameters are estimated in log-space and then back transformed. In this assessment, 152 parameters are estimated:

1. 32 selectivity parameters (5 blocks for the fisheries; 3 blocks for the surveys)
2. 74 apical fishing mortality rates ( $F_{mult}$  in the initial year and 36 deviations in subsequent years for 2 fisheries)
3. 37 recruitment deviations (1982-2018)
4. 5 initial population abundance deviations (age-2 through 6-plus)
5. 3 catchability coefficients (3 surveys)
6. 1 stock-recruitment parameter ( $SSB_0$ ; the steepness parameter is fixed at 1.0 for the base run).

The model is fit to the data by minimizing the objective function:

$$-\ln(L) = \sum_i \lambda_i (-\ln L_i) + \sum_j (-\ln L_j) \quad [23]$$

where  $-\ln(L)$  is the entire negative log-likelihood,  $\ln L_i$  are log-likelihoods of lognormal estimations,  $\lambda_i$  are user-defined weights applied to lognormal estimations, and  $\ln L_j$  are log-likelihoods of multinomial estimations.

Negative log-likelihoods with assumed lognormal error are derived (ignoring constants) as:

$$-\ln(L_i) = 0.5 \sum_i \frac{[\ln(obs_i) - \ln(pred_i)]^2}{\sigma^2} \quad [24]$$

where  $obs_i$  and  $pred_i$  are observed and predicted values; standard deviations  $\sigma$  are user-defined CVs as  $\sqrt{\ln(CV^2 + 1)}$ .

Negative log-likelihoods with assumed multinomial error are derived (ignoring constants) as:

$$-\ln(L_j) = -ESS \sum_{i=1}^A p_i \ln(\hat{p}_i) \quad [25]$$

where  $p_i$  and  $\hat{p}_i$  are observed and predicted age composition. Effective sample-sizes  $ESS$  are used to create the expected numbers  $\hat{n}_a$  in each age bin and act as multinomial weighting factors.

## 6.2 Model Assumptions/Inputs

Model assumptions include: 1) the unit stock is adequately defined and closed to migration, 2) observations are unbiased, 3) errors are independent and their structures are adequately specified, 4) fishery and survey vulnerabilities are dome-shaped, 5) abundance indices are proportional to absolute abundance, and 6) natural mortality and growth do not vary significantly with time. Lognormal error is assumed for catches, abundance indices, the stock-recruitment relationship, apical fishing mortalities, selectivity parameters, initial abundance deviations, and catchabilities. Multinomial error is assumed for fishery and survey age compositions.

The base model was defined with an age-6 plus group, steepness fixed at 1.0, five fishery selectivity blocks, three survey selectivity blocks, and input levels of error and weighting factors as described below.

Input levels of error for recreational fishery landings estimates were specified with the corresponding CV's estimated from the LDWF LA Creel survey (2014-2018) and estimates hindcast to the historic MRIP time-series (1982-2013; Table 12). Input levels of error for commercial fishery landings were specified with CV's of 0.1 for years where landings were obtained from NMFS commercial records (1982-1998) and CV's of 0.05 for years where landings were obtained from the LDWF Trip Ticket Program (1999-2018; Table 13). Input levels of error for survey catch-rates were specified with CV's estimated from each IOA standardization (Table 5). Annual recruitment deviations were specified with CV's of 0.5 for all years of the time-series.

Lognormal components included in the objective function were equally weighted (all lambdas=1). Input effective sample sizes (ESS) for estimation of fishery and survey age compositions were specified equally for all years of the time-series (all ESS=200).

## 6.3 Model Results

Objective function components, weighting factors, and likelihood values of the base model are summarized in Table 13.

**Model Fit**

The base model provides an overall reasonable fit to the data. Model estimated catches match the observations well (Figures 3 and 4); however, patterning of the residuals is apparent in the recreational landings time-series where catches are generally over-estimated in earlier years and under-estimated in more recent years. Model estimated survey catch-rates provide acceptable fits to the data, but fail to fit all extremes (Figures 5-7). Patterning of the residuals is also apparent, where catch-rates are generally under-estimated in the beginning of the time-series and then over-estimated later in the time-series until the beginning of the most recent decade, suggesting a contradiction between data sources (*i.e.*, fishery landings vs. survey catch-rates). Model estimated fishery and survey age compositions provide reasonable fits to the input age proportions (Figures 8-10).

**Selectivities**

Estimated fishery and survey selectivities are presented in Figures 11 and 12. Survey estimates indicate full-vulnerability to the 1.0 and 1.25-inch bar mesh sizes at age-1 and full-vulnerability to the 1.5-inch bar mesh size at age-2. Commercial estimates indicate full-vulnerability at age-2 for each period of consistent regulation. Recreational estimates also indicate full-vulnerability at age-2 for each period of consistent regulation; the age-1 recreational selectivity estimate was reduced by approximately 50% after the 12-inch recreational MLL regulation was implemented in 1987.

**Abundance, Age Composition, Recruitment, and Spawning Stock**

Total stock size and abundance-at-age estimates from the ASAP base model are presented in Table 14. Total stock size has varied considerably over the time-series. Stock size generally increased over the first half of the time-series from 9.1 million females estimated in 1982 to a maximum of 14.0 million females estimated in 2000. After 2000, stock size generally decreased to a minimum of 7.7 million females estimated in 2014. The 2018 estimate of female stock size is 9.1 million females.

The age composition of the stock in the most recent years of the time-series (2015-2018) indicates further truncation where the proportion of the stock  $\geq$  age-3+ is now less than 10%. (Figure 13). The 2016 and 2018 estimates of the proportion of the stock  $\geq$  age-3+ are the lowest on record (7% and 5% respectively). The age composition of the stock  $\geq$  age-3+ varied in earlier years of the time-series (1982-2014) with a maximum of 24% estimated in 1982, a minimum of 8% estimated from 1990-1995, and an average of 13%. The age-composition observed in the landings time-series  $\geq$  age-3+ depicts a similar trend where the lowest estimates on record are the most recent (Figure 13).

Estimates of age-1 recruitment (Figure 14) follow comparable trends with total stock size (Table 14). The average recruitment (geometric mean) over the entire time-series is 6.7 million fish. The average

recruitment (geometric mean) in the most recent decade is 6.4 million fish. The 2018 age-1 recruitment estimate is 7.4 million fish.

Female SSB estimates are presented in Figure 15. Female SSB has also varied considerably over the time-series. After an initial decline in earlier years of the time-series, female SSB generally increased to a maximum of 9.1 million pounds observed in 2008. After 2008, female SSB generally decreased. The 2017 and 2018 female SSB estimates are the lowest on record (3.4 and 4.0 million pounds respectively).

#### **Fishing Mortality**

Estimated fishing mortality rates are presented in Table 15 (annual apical, average, and age-specific) and Figure 16 (average only). Fishing mortality rates have varied over the time-series with an upward trend apparent in the most recent decade. Before 2012, the time-series of average  $F$  was relatively flat and generally lacked a trend. Beginning in 2012, fishing mortality increased ( $>0.9 \text{ yr}^{-1}$ ) and has remained high with the exception of the terminal year estimate. The 2017 estimate of average  $F$  is the highest on record ( $1.2 \text{ yr}^{-1}$ ).

#### **Stock-Recruitment**

No discernable relationship is observed between female SSB and subsequent age-1 recruitment (Figure 17). The most recent female SSB estimates, however, are the lowest on record. The ASAP base model was run with steepness fixed at 1.0. The estimated unexploited female SSB was 45.3 million pounds. When allowed to directly solve for steepness, the parameter was estimated as 1.0. Alternate runs with steepness values fixed at 0.95, 0.90, 0.85, and 0.80 are discussed in the *Model Diagnostics* Section below.

#### **Parameter Uncertainty**

In the ASAP base model, 152 parameters were estimated. Asymptotic standard errors ( $\pm 2$ ) for the time-series of age-1 recruits are presented in Figure 14. Markov Chain Monte Carlo (MCMC) derived confidence intervals (95%) for the average fishing mortality rate and female SSB time-series are presented in Figures 15 and 16.

### **6.4 Management Benchmarks**

Overfishing and overfished limits should be defined for exploitable stocks. The implication is that when biomass falls below a specified limit, there is an unacceptable risk that recruitment will be reduced to undesirable levels. Management actions are needed to avoid approaching this limit and to recover the stock if biomass falls below the limit.

Precautionary limits were proposed in earlier assessments (West *et al.* 2011, West *et al.* 2014) based on the history of the stock by requiring that female SSB not fall below the lowest level observed in the fishery prior to 2010 in which the stock demonstrated sustainability (*i.e.*, no observed decline in

recruitment over a wide range of female SSB; Figure 17). This would be similar to maintaining the stock above a limit spawning potential ratio (SPR; Goodyear, 1993) where SPR is estimated from mature female biomass rather than total egg production. The method for calculating  $SPR_{limit}$  and the corresponding limit reference points is presented below.

When the stock is in equilibrium, equation [20] can be solved, excluding the year index, for any given exploitation rate as:

$$\frac{SSB}{R}(F) = \sum_{a=1}^A N_a p_{mat,a} W_{SSB,a} e^{-Z_a(0.5)} \quad [29]$$

where total mortality at age  $Z_a$  is computed as  $M_a + v_a \times F_{mult}$ ; vulnerability at age  $v_a$  is taken by rescaling the current F-at-age estimate (geometric mean 2016-2018) to the maximum. Per recruit abundance-at-age is estimated as  $N_a = S_a$ , where survivorship at age is calculated recursively from  $S_a = S_{a-1} e^{-Z_a}$ ,  $S_1 = 1$ . Per recruit catch-at-age is then calculated with the Baranov catch equation [21], excluding the year index. Yield per recruit (Y/R) is then taken as  $\sum_a C_a \bar{W}_a$  where  $\bar{W}_a$  are current mean fishery weights at age (arithmetic mean 2016-2018). Fishing mortality is averaged by weighting by relative abundance-at-age.

Equilibrium spawning stock biomass  $SSB_{eq}$  is calculated by substituting  $SSB/R$  estimated from equation [29] into the Beverton-Holt stock recruitment relationship as  $\alpha \times SSB/R - \beta$ . Equilibrium recruitment  $R_{eq}$  and yield  $Y_{eq}$  are then taken as  $SSB_{eq} \div SSB/R$  and  $Y/R \times R_{eq}$ . Equilibrium SPR (e.g.,  $SPR_{limit}$ ) is computed as the ratio of  $SSB/R$  when  $F > 0$  to  $SSB/R$  when  $F = 0$ .

As reference points to guide management, we estimate the spawning potential ratio and average fishing mortality rate that lead to the lowest SSB observed prior to 2010 ( $SSB_{limit}$ ,  $SPR_{limit}$ , and  $F_{limit}$ ). The targets of fishing should not be so close to the limits that the limits are exceeded by random variability of the environment. Therefore, we propose a SSB target ( $SSB_{target}$ ) as the median SSB prior to 2010 in which the stock demonstrated sustainability and estimate the SPR and average F that lead to this target ( $SPR_{target}$  and  $F_{target}$ ).

The proposed limits and targets of fishing are presented in Figure 18 relative to each respective time-series. Current estimates are taken as the geometric mean of the 2016-2018 estimates.

Also presented are a plot of the stock-recruitment data, equilibrium recruitment, and diagonals from the origin intersecting  $R_{eq}$  at the  $SSB_{limit}$ ,  $SSB_{target}$ , and maximum SSB estimates of the time-series, corresponding with a  $SPR_{limit}$  of 10.2%, a  $SPR_{target}$  of 13.6%, and a maximum SPR of 19.8% (Figure 19). Limit and target reference points are also presented in Table 16.

## 6.5 Model Diagnostics

### Sensitivity Analysis

In addition to the base model run, a series of sensitivity runs were used to explore uncertainty in the base model's configuration.

The ASAP base model was run with steepness fixed at 1.0. Alternate runs were conducted examining reference point estimates with steepness fixed at 0.95, 0.90, 0.85 and 0.80 (Models 1-4).

Additional sensitivity runs were conducted by separately up-weighting the contributions of fishery yield and the IOA components within the base models objective function (lambdas increased from 1 to 10; Models 5 and 6).

An additional sensitivity run was conducted by time-varying the baseline M-at-age used in the ASAP base model by adjusting it to a winter-kill index (Model 7). The winter-kill index was developed by compiling water temperature data from continuous water temperature monitoring stations across the LA coast and is calculated as the product of the number of days  $\leq 7$  degrees Celsius (*i.e.*, approximate water temperature where Spotted Seatrout cold-stun deaths begin to occur; Ellis *et al.* 2017) and the inverse of the mean water temperature during that duration (Figure 20). Baseline M-at-age ( $M_a$ ) was allowed to vary with time ( $M_{a,y}$ ) by adjusting to the winter kill index ( $WK_y$ ) assuming winterkill events are additive as:

$$M_{a,y} = M_a + (WK_y \times c) \quad [30]$$

The value of the scaling parameter ( $c$ ) above was chosen arbitrarily (in this case  $c=0.25$ ).

Another sensitivity run was conducted by increasing the discard mortality rate from 10% to 25% (Model 8).

An additional sensitivity run was conducted where the ALK's developed from the damped growth model (Table 6) were used to assign ages to the entire time-series of fishery landings (Model 9).

Another sensitivity run was conducted using the MRIP ACAL time-series (see <https://www.fisheries.noaa.gov/recreational-fishing-data/recreational-fishing-data-glossary#calibrated-data>), rather than the FCAL time-series, to hindcast LA Creel estimates to the historic MRIP time-series (Model 10). This time-series was developed using the same approach described in *Appendix 1* with the ACAL estimates substituted for the FCAL estimates.

A final sensitivity run was conducted using the MRIP size distributions with the FES and APAIS calibrations applied (Model 11).

Results of each sensitivity run relative to the proposed limit reference points are presented in Table 17. Current estimates of female SSB and average F are taken as the geometric mean of the 2016-2018

estimates. Estimates from all sensitivity runs indicate the stock is currently below  $SSB_{limit}$  with the exception of Model 5. Estimates from all sensitivity runs indicate the fishery is currently operating above  $F_{limit}$  with the exception of Models 5, 7, 8 and 10. Model 7 (winter-kill index used to time-vary  $M$ ) resulted in the lowest estimate of current  $F$  due to a high  $M$  estimated from the severe cold spell in 2018, but also led to one of the lowest estimates of current  $SSB$  of all model runs.

Also presented are estimates of maximum sustainable yield ( $MSY$ ) and associated reference points for those sensitivity runs with the steepness parameter not fixed at 1 (Table 18). Results of each run indicate that the fishery is currently operating past  $MSY$ , where ratios of current  $F$  and  $SSB$  to  $F_{MSY}$  and  $SSB_{MSY}$  are above and below 1 respectively. It's important to note, however, that the selection of specific values for the steepness parameter results in specified values of  $SSB_{MSY}$ ,  $F_{MSY}$ , and other  $MSY$  statistics.

Therefore,  $MSY$  values are not estimated per se, but are the results of the value selected for steepness.

### Retrospective Analysis

A retrospective analysis was conducted by sequentially truncating the base model by a year (terminal years 2014-2018). Retrospective estimates of age-1 recruits,  $SSB$  and average fishing mortality differed from the base run (Figure 21). Terminal year estimates of age-1 recruits and female  $SSB$  indicate a marginal positive bias, where estimates tend to decrease as more years are added to the model. Terminal year estimates of average fishing mortality rates indicate a larger negative bias, where estimates tend to increase as more years are added to the model.

## 7. Stock Status

The history of the LA SST stock relative to  $F/F_{limit}$  and  $SSB/SSB_{limit}$  is presented in Figure 22. Fishing mortality rates exceeding  $F_{limit}$  ( $F/F_{limit} > 1.0$ ) are defined as overfishing; spawning stock sizes below  $SSB_{limit}$  ( $SSB/SSB_{limit} < 1.0$ ) are defined as the overfished condition.

### Overfishing Status

The current estimate of  $F/F_{limit}$  is  $< 1.0$ , suggesting the stock is not currently undergoing overfishing. However, the current estimate is extremely close to the overfishing limit ( $F/F_{limit} = 0.99$ ). The current assessment model also indicates that the stock has been undergoing overfishing since 2012 with the exception of 2014 and the terminal year and also experienced overfishing in earlier years of the time-series.

### Overfished Status

The current estimate of  $SSB/SSB_{limit}$  is  $< 1.0$ , suggesting the stock is currently in an overfished state. The current assessment model also indicates that the stock has been overfished since 2014. The current  $SPR$  estimate is 8.5% ( $SPR_{limit} = 10.2\%$ ).

**Control Rules**

There is currently no harvest control rule established for the LA SST stock.

**8. Research and Data Needs**

As with any analysis, the accuracy of this assessment is dependent on the accuracy of the information of which it is based. Below we list additional recommendations to improve future assessments of SST in Louisiana.

Assessment of regional or estuarine-specific Spotted Seatrout populations could differentiate exploitation rates and stock status within the state. If time-series of fine-scale spatial distribution data become available that allow for spatially-explicit assessment, results could be used to determine if regional management is an effective alternative to a statewide management strategy. Current LDWF surveys and commercial landings reported through the LDWF Trip Ticket Program could form the basis for this approach, but the time-series of basin-level recreational harvest and corresponding biological sampling are still not long enough for reliable assessment of regional populations.

Spotted Seatrout in south-west LA from the Texas border to the Mermentau River are currently managed with slightly different regulations than the remainder of the state. Again, if data become available that allow for spatially-explicit assessment, results could be used to determine if current management has altered exploitation/stock status in the south-west region and, if so, used as a framework for future management. Current LDWF surveys (LA Creel, fishery-independent, and biological sampling) and commercial landings reporting through trip tickets could form the basis of this approach, but the recreational harvest and biological sampling time-series are still not long enough for reliable assessment of regional populations.

Information describing the connectivity of nearshore and inshore Spotted Seatrout populations along the Louisiana coast is currently not available. As data becomes available for spatially-explicit assessments, understanding the link between nearshore and inshore populations will become necessary.

The relationship between wetlands losses and the continuation of fishery production within Louisiana has been discussed by numerous authors. Understanding this relationship as it applies to the LA SST stock should be an ongoing priority.

This assessment highlights differing trends between fishery-independent catch-rates and fishery-dependent data sources. These differences should be evaluated further to determine which trends are truly

reflective of population abundance, or whether other factors (e.g., increasing harvest efficiencies, changing vulnerabilities of the stock, etc.) are involved.

Only limited age data are available from the LDWF marine gillnet survey. Ages of survey catches in this assessment were assigned from ALK's developed from a growth model. Age samples collected directly from the survey would allow a more accurate representation of survey age composition in future assessments.

Winterkill events were included as a sensitivity run in this assessment by time-varying M-at-age proportionally to a winter-severity index. If age-classes are affected disproportionately to cold-stun deaths this approach will introduce bias into model estimates. Investigation of the relationship between Spotted Seatrout cold-stun deaths and age-class is needed.

Winterkill events were included as a sensitivity run in this assessment by time-varying M-at-age to a winter-severity index where the scaling parameter was chosen arbitrarily. Future modeling efforts should investigate integration of Equation [30], or a similar approach, into the assessment model itself to allow estimation of the scaling parameter during model fitting or investigate alternative models that allow integration of environmental time-series.

Factors that influence year-class strength of Spotted Seatrout are poorly understood. Investigation of these factors, including inter-annual variation in seasonal factors and the influence of environmental perturbations such as the Deepwater Horizon oil spill, could elucidate causes of inter-annual variation in abundance, as well as the species stock-recruitment relationship.

Spawning potential ratio estimates may be biased if egg production does not scale linearly with female body weight and existing estimates of batch fecundity and spawning frequency are conflicting. Current management benchmarks are based on the history of the stock by requiring the stock biomass to not fall below the lowest level observed earlier in the fishery. If management strategy were to change so that benchmarks are based on the reproductive potential of the stock, unbiased estimates of SPR would be needed.

Fishery-dependent data alone is not a reliable source of information to assess status of a fish stock. Consistent fishery-dependent and fishery-independent data sources, in a comprehensive monitoring plan, are essential to understanding the status of fishery. Present monitoring programs should be assessed for adequacy with respect to their ability to evaluate stock status, and modified if deemed necessary.

With the recent trend toward ecosystem-based assessment models (NMFS 2001), more data is needed linking Spotted Seatrout population dynamics to environmental conditions. The addition of

meteorological and physical oceanographic data coupled with food web data may lead to a better understanding of the Spotted Seatrout stock and its habitat.

## 9. References

- Blanchet, R.H., J.A. Shepard, and M.J. Bourgeois. 1997. Profile, stock assessment and biological condition of Spotted Seatrout. Pages 2-14 in the 1997 Report on the Status of Spotted Seatrout. Louisiana Department of Wildlife and Fisheries Unpublished Report. Baton Rouge, Louisiana.
- Ellis, T. A., J. A. Buckel, and J. E. Hightower. 2017. Winter severity influences Spotted Seatrout mortality in a southeast US estuarine system. *Marine Ecology Progress Series* 564:145– 161.
- FAO. 2001. Second Technical Consultation on the Suitability of the CITES Criteria for Listing Commercially-exploited Aquatic Species: A background analysis and framework for evaluating the status of commercially-exploited aquatic species in a CITES context. Available: <http://www.fao.org/docrep/MEETING/003/Y1455E.html>
- Gold, J.R., and L.R. Richardson. 1998. Mitochondrial DNA diversification and population structure in fishes from the Gulf of Mexico and western Atlantic. *The Journal of Heredity* 89:404-414.
- Gold, J.R., L.R. Richardson, and C. Furman. 1999. Mitochondrial DNA diversity and population structure of Spotted Seatrout (*Cynoscion nebulosus*)
- Goodyear, C.P. 1993. Spawning stock biomass per recruit in fisheries management: foundation and current use. pp 67-81 in S.J. Smith, J.J. Hunt and D. Rivard [ed.] Risk evaluation and biological reference points for fisheries management. Canadian Special Publication of Fisheries and Aquatic Sciences. 442 pp.
- GSMFC. 2001. The Spotted Seatrout fishery of the Gulf of Mexico, United States: a regional management plan. Publication No. 87. Gulf States Marine Fisheries Commission, Ocean Springs, Mississippi, 204 pp.
- Hein, S., and J. Shepard. 1980. Spawning of Spotted Seatrout in a Louisiana estuarine ecosystem. *Proceedings of the Annual Conference Southeastern Association of Fish and Wildlife Agencies* 33:451-465.
- Herdter, E., B. Mahmoudi, E. Peebles, and S. Murawski. 2019. Spatial Variability in Size Structure, Growth, and Recruitment of Spotted Seatrout among Six Florida Estuaries. *Marine and Coastal Fisheries*. 11. 97-111.
- Ingram, G. W., Jr., W. J. Richards, J. T. Lamkin, and B. Muhling. 2010. Annual indices of Atlantic bluefin tuna (*Thunnus thynnus*) larvae in the Gulf of Mexico developed using delta-lognormal and multivariate models. *Aquat. Living Resour.* 23:35–47.
- James, T.J, G.W. Stuntz, D.A. McKee, and R.R. Vega. 2007. Catch-and-release mortality of Spotted Seatrout in Texas: effects of tournaments, seasonality, and anatomical hooking location. *North American Journal of Fisheries Management*. 27:900-907.

- LDWF. 2018. Marine Fisheries Section Independent Sampling Activities Field Manual. Louisiana Department of Wildlife and Fisheries, Baton Rouge, LA.
- Lo, N.C.H., L.D. Jacobson, and J.L. Squire. 1992. Indices of relative abundance from fish spotter data based on delta-lognormal models. *Canadian Journal of Fisheries and Aquatic Science* 49:2515–2526.
- Lorenzen, K. 1996. The relationship between body weight and natural mortality in juvenile and adult fish: a comparison of natural ecosystems and aquaculture. *Journal of Fish Biology* 49:627-642.
- Mace, P.M., and I.J. Doonan. 1988. A generalized bioeconomic simulation model for fish population dynamics. Technical Report 88, New Zealand Fisheries Assessment Resource Document.
- Murphy, M.D., R.F. Heagey, V.H. Neugebauer, M.D. Gordon, and J.L. Hintz. 1995. Mortality of Spotted Seatrout released from gill-net or hook-and-line gear in Florida. *North American Journal of Fisheries Management* 15:748-753.
- Nieland, D.L, R.G. Thomas, and C.A. Wilson. 2002. Age, growth, and reproduction of Spotted Seatrout in Barataria Bay, Louisiana. *Transactions of the American Fisheries Society* 131:245-259.
- NMFS. 2001. Marine Fisheries Stock Assessment Improvement Plan. Report of the National Marine Fisheries Service National Task Force for Improving Fish Stock Assessments. U.S. Dep. Commerce, NOAA Tech. Memo. NMFS-F/SPO-56, 69 p., 25 appendices.
- NMFS. 2018a. Annual commercial landings statistics. National Marine Fisheries Service, Fisheries Statistics and Economics Division. Available at: <https://www.st.nmfs.noaa.gov/commercial-fisheries/> [accessed 10/1/2018].
- NMFS. 2018b. Marine recreational fisheries statistical survey. National Marine Fisheries Service, Fisheries Statistics and Economics Division. Available at: <https://www.st.nmfs.noaa.gov/recreational-fisheries/> [accessed 10/1/2018].
- NOAA Fisheries Toolbox. 2013. Age Structured Assessment Program (ASAP), Version 3.0.12. Available at: <https://www.nefsc.noaa.gov/nft/>
- Porch C.E., C.A. Wilson C.A., D.L. Nieland. 2002. A new growth model for Red Drum (*Sciaenops ocellatus*) that accommodates seasonal and ontogenic changes in growth rates. *Fish Bull* 100:149–152.
- Quinn, T. J. II, and R. B. Deriso. 1999. *Quantitative fish dynamics*, 542 p. Oxford University Press, New York, NY.
- Rothschild, B.J., and M.J. Fogarty. 1989. Spawning-stock biomass: a source of error in recruitment/stock relationships and management advice. *ICES Journal of Marine Science* 45:131-135.
- SAS Institute Inc. 2008. SAS/STAT® 9.2 User's Guide. Cary, NC: SAS Institute Inc.

- SEDAR. 2006. Gulf of Mexico Vermilion Snapper SEDAR 9 Assessment Report 3. SEDAR, Charleston, SC. Available at: [https://sedarweb.org/docs/sar/SEDAR9\\_SAR3%20GOM%20VermSnap.pdf](https://sedarweb.org/docs/sar/SEDAR9_SAR3%20GOM%20VermSnap.pdf)
- SEDAR. 2006. Gulf of Mexico Red Grouper SEDAR 12 Assessment Report 1. SEDAR, Charleston, SC. Available at: <http://sedarweb.org/docs/sar/S12SAR1%20Gulf%20Red%20Grouper%20Completev2.pdf>
- Stuntz, G.W., and D.A. McKee. 2006. Catch-and-release mortality of Spotted Seatrout in Texas. *North American Journal of Fisheries Management*. 26:843-848.
- West, J., J. Adriance, M. Monk, & J.E. Powers. (2011). Assessment of Spotted Seatrout in Louisiana waters. 2011 Report of the Louisiana Department of Wildlife and Fisheries. 95 pp.
- West, J., G. Decossas, A. Melancon, S. Potts & J.E. Powers. (2014). Update assessment of Spotted Seatrout in Louisiana waters. 2014 Report of the Louisiana Department of Wildlife and Fisheries. 54 pp.
- Wieting, D.S. 1989. Age, growth, and fecundity of Spotted Seatrout (*Cynoscion nebulosus*) in Louisiana. Master's Thesis. Louisiana State University, Baton Rouge.

**10. Tables**

Table 1: Louisiana annual commercial and recreational Spotted Seatrout landings (pounds x 10<sup>6</sup>) derived from NMFS statistical records, LDWF Trip Ticket Program, MRIP, and LA Creel. Recreational landings represent harvest only.

Year	Harvest		%Commercial	%Recreational
	Commercial	Recreational		
1982	0.73	4.87	13.0	87.0
1983	1.34	4.17	24.3	75.7
1984	0.97	1.36	41.7	58.3
1985	1.16	2.90	28.6	71.4
1986	1.98	6.14	24.4	75.6
1987	1.80	4.85	27.1	72.9
1988	1.43	2.82	33.7	66.3
1989	1.49	4.55	24.6	75.4
1990	0.65	2.25	22.4	77.6
1991	1.22	6.13	16.6	83.4
1992	0.97	3.94	19.8	80.2
1993	1.14	3.68	23.6	76.4
1994	1.02	5.29	16.2	83.8
1995	0.66	5.90	10.0	90.0
1996	0.77	5.63	12.1	87.9
1997	0.55	5.43	9.2	90.8
1998	0.11	5.18	2.1	97.9
1999	0.08	7.32	1.0	99.0
2000	0.04	8.12	0.5	99.5
2001	0.11	7.19	1.5	98.5
2002	0.07	5.01	1.4	98.6
2003	0.02	5.19	0.4	99.6
2004	0.02	4.33	0.5	99.5
2005	0.02	4.56	0.4	99.6
2006	0.00	6.75	0.0	100.0
2007	0.01	5.53	0.2	99.8
2008	0.01	7.16	0.2	99.8
2009	0.00	7.82	0.0	100.0
2010	0.00	6.18	0.0	100.0
2011	0.00	8.53	0.0	100.0
2012	0.00	8.16	0.0	100.0
2013	0.00	5.62	0.1	99.9
2014	0.01	3.36	0.2	99.8
2015	0.00	4.81	0.1	99.9
2016	0.00	5.42	0.0	100.0
2017	0.00	5.80	0.1	99.9
2018	0.00	3.06	0.1	99.9

Table 2: Louisiana commercial size compositions of Spotted Seatrout landings derived from LDWF commercial landings records.

Commercial, 1981-1996		
TL, in	1981-1986	1987-1996
10	1	
11	12	
12	80	3
13	166	61
14	276	347
15	304	441
16	146	384
17	89	316
18	47	172
19	39	81
20	23	42
21	10	16
22	11	7
23	7	5
24	11	1
25	3	1
26	1	1
27		

Table 3: Annual size frequency distributions of Louisiana recreational Spotted Seatrout harvest (January-June; A+B1 catches only) taken from MRIP (1982-2013) and the LDWF Biological Sampling Program (2014-2018).

<i>Recreational, January-June 1982-1999</i>																		
<i>TL in</i>	1982	1983	1984	1985	1986	1987	1988	1989	1990	1991	1992	1993	1994	1995	1996	1997	1998	1999
6	0.01																	
7	0.00	0.00	0.01			0.01												
8	0.05	0.00		0.03	0.02	0.01								0.00			0.00	0.00
9	0.05	0.04	0.01	0.02	0.04	0.02											0.00	0.00
10	0.07	0.07	0.04	0.16	0.10	0.10	0.00			0.01	0.00	0.00	0.00	0.00	0.00	0.01		0.01
11	0.12	0.13	0.24	0.19	0.13	0.18	0.03	0.01	0.08	0.06	0.06	0.05	0.09	0.09	0.07	0.06	0.05	0.05
12	0.13	0.14	0.36	0.24	0.24	0.17	0.21	0.07	0.18	0.23	0.22	0.28	0.26	0.28	0.18	0.17	0.18	0.21
13	0.10	0.19	0.07	0.13	0.09	0.14	0.31	0.27	0.19	0.21	0.27	0.26	0.22	0.21	0.23	0.24	0.22	0.22
14	0.08	0.18	0.12	0.05	0.15	0.17	0.16	0.26	0.21	0.13	0.21	0.14	0.16	0.13	0.19	0.21	0.26	0.17
15	0.06	0.10	0.06	0.02	0.06	0.12	0.10	0.15	0.13	0.14	0.11	0.08	0.09	0.10	0.08	0.11	0.09	0.11
16	0.03	0.02	0.06	0.05	0.06	0.05	0.04	0.08	0.09	0.10	0.05	0.03	0.07	0.06	0.12	0.08	0.06	0.09
17	0.04	0.02		0.05	0.06	0.01	0.06	0.06	0.04	0.06	0.03	0.05	0.05	0.04	0.03	0.05	0.05	0.04
18	0.09	0.02	0.02	0.03	0.02	0.01	0.02	0.03	0.05	0.02	0.01	0.04	0.02	0.02	0.04	0.04	0.04	0.02
19	0.03	0.01	0.01	0.01	0.01	0.01	0.03	0.03	0.01	0.01	0.01	0.03	0.02	0.03	0.04	0.01	0.02	0.03
20	0.03	0.05		0.01	0.01	0.01	0.02	0.02	0.02	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.02
21	0.02	0.02		0.02	0.01	0.00	0.02	0.01	0.00	0.00	0.00	0.01	0.01	0.01	0.00	0.00	0.01	0.02
22	0.03	0.01		0.00		0.00		0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.01	0.00	0.00	0.01
23	0.02	0.01			0.00	0.00		0.00		0.00	0.00	0.00	0.00	0.00		0.01		0.00
24	0.02				0.00			0.00				0.00		0.00				0.00
25	0.03			0.00							0.00	0.00		0.00				0.00
26	0.00																	
27	0.00						0.00											0.00
28	0.00																	
29	0.00																	
30																		

<i>Recreational, January-June 2000-2018</i>																			
<i>TL in</i>	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018
6																			
7	0.00																		
8		0.00											0.00						
9						0.00										0.00			
10	0.00	0.00	0.00	0.00	0.00		0.00		0.00	0.00				0.00				0.00	
11	0.04	0.02	0.05	0.05	0.06	0.05	0.05	0.04	0.05	0.04	0.04	0.03	0.05	0.09	0.00	0.00	0.01	0.00	0.00
12	0.19	0.18	0.16	0.16	0.24	0.20	0.14	0.16	0.20	0.19	0.13	0.15	0.16	0.15	0.09	0.09	0.10	0.06	0.06
13	0.20	0.18	0.14	0.18	0.19	0.23	0.16	0.23	0.22	0.28	0.14	0.26	0.16	0.18	0.20	0.24	0.22	0.19	0.14
14	0.18	0.18	0.16	0.21	0.15	0.22	0.22	0.16	0.20	0.22	0.19	0.19	0.14	0.21	0.24	0.27	0.21	0.25	0.18
15	0.11	0.11	0.16	0.13	0.13	0.13	0.16	0.11	0.11	0.10	0.16	0.14	0.16	0.15	0.22	0.17	0.21	0.23	0.22
16	0.12	0.08	0.11	0.07	0.07	0.08	0.12	0.09	0.07	0.06	0.11	0.08	0.13	0.07	0.13	0.11	0.14	0.13	0.14
17	0.05	0.07	0.07	0.05	0.06	0.04	0.06	0.07	0.05	0.06	0.09	0.06	0.08	0.05	0.06	0.05	0.04	0.08	0.10
18	0.04	0.08	0.05	0.05	0.05	0.02	0.04	0.05	0.04	0.03	0.04	0.04	0.04	0.03	0.02	0.04	0.03	0.03	0.05
19	0.03	0.04	0.04	0.05	0.02	0.01	0.02	0.04	0.02	0.01	0.04	0.01	0.02	0.03	0.02	0.02	0.02	0.02	0.04
20	0.03	0.03	0.02	0.02	0.01	0.01	0.01	0.02	0.01	0.01	0.05	0.02	0.03	0.01	0.01	0.01	0.01	0.01	0.02
21	0.01	0.01	0.02	0.01	0.01	0.00	0.00	0.01	0.00	0.00	0.00	0.01	0.02	0.01	0.00	0.00	0.01	0.01	0.01
22	0.00	0.01	0.01	0.01	0.01	0.01		0.01	0.00	0.00	0.01	0.00	0.00		0.00	0.01	0.00	0.00	0.00
23	0.00	0.00	0.01	0.01	0.00		0.00	0.00	0.00	0.00	0.00	0.00	0.01		0.00	0.00	0.00	0.00	0.01
24	0.00	0.00	0.00	0.00	0.00			0.00	0.00	0.00	0.00	0.00		0.00		0.00	0.00	0.00	0.00
25		0.00		0.00	0.00						0.00	0.00				0.00	0.00	0.00	
26					0.00			0.00					0.00						
27								0.00								0.00			
28										0.00									
29																			
30																			

Table 3 (cont.): Annual size frequency distributions of Louisiana recreational Spotted Seatrout harvest (July-December; A+B1 catches only) taken from MRIP (1982-2013) and the LDWF Biological Sampling Program (2014-2018).

<i>Recreational, July-December 1982-1999</i>																		
<i>TL in</i>	1982	1983	1984	1985	1986	1987	1988	1989	1990	1991	1992	1993	1994	1995	1996	1997	1998	1999
4	0.00			0.00														
5	0.00			0.00					0.00									
6	0.00			0.00			0.00											
7	0.01	0.00		0.00	0.00							0.01						
8	0.02	0.00	0.00	0.02	0.01	0.00					0.00	0.00	0.00	0.00	0.00		0.01	
9	0.04	0.01	0.03	0.04	0.10	0.01	0.00	0.01	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.01	0.00	
10	0.04	0.04	0.03	0.13	0.19	0.08	0.00	0.01	0.01	0.00	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.00
11	0.12	0.14	0.08	0.12	0.18	0.14	0.02	0.02	0.05	0.07	0.05	0.09	0.07	0.07	0.06	0.07	0.08	0.07
12	0.18	0.11	0.12	0.20	0.18	0.20	0.12	0.11	0.23	0.29	0.31	0.27	0.26	0.27	0.17	0.30	0.27	0.29
13	0.24	0.18	0.11	0.20	0.12	0.18	0.27	0.25	0.22	0.30	0.22	0.24	0.26	0.24	0.24	0.24	0.21	0.21
14	0.16	0.23	0.15	0.14	0.09	0.18	0.19	0.23	0.16	0.13	0.17	0.15	0.15	0.16	0.18	0.15	0.17	0.16
15	0.05	0.11	0.07	0.08	0.05	0.11	0.13	0.14	0.11	0.10	0.09	0.09	0.10	0.11	0.10	0.07	0.09	0.08
16	0.04	0.09	0.07	0.03	0.04	0.05	0.11	0.09	0.10	0.05	0.06	0.06	0.05	0.04	0.10	0.05	0.07	0.07
17	0.02	0.02	0.00	0.00	0.02	0.03	0.07	0.06	0.06	0.04	0.04	0.04	0.04	0.05	0.06	0.05	0.04	0.06
18	0.03	0.06	0.18	0.01	0.01	0.01	0.03	0.04	0.02	0.01	0.02	0.01	0.02	0.01	0.04	0.02	0.03	0.03
19	0.02	0.00	0.03	0.00	0.00	0.00	0.02	0.02	0.02	0.01	0.01	0.01	0.01	0.02	0.02	0.02	0.02	0.02
20	0.01	0.00	0.00	0.00	0.00	0.00	0.01	0.01	0.01	0.00	0.01	0.01	0.01	0.01	0.00	0.01	0.01	0.01
21	0.00		0.05		0.00	0.00	0.01	0.00		0.00	0.00	0.00	0.00	0.00	0.01	0.00	0.01	0.00
22	0.00	0.00	0.05		0.00		0.01	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.01	0.00	0.00	0.00
23	0.00	0.00	0.03		0.00		0.00	0.00	0.00		0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
24	0.00				0.00		0.00	0.00				0.00	0.00	0.00	0.00	0.00	0.00	0.00
25			0.00						0.00				0.00	0.00				0.00
26			0.00									0.00	0.00	0.00				
27					0.00					0.00								0.00
28																		
29																		
30																		

<i>Recreational, July-December 2000-2018</i>																			
<i>TL in</i>	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018
4																			
5																			
6																			
7																			
8							0.00					0.00		0.00					
9	0.00	0.00				0.00	0.00	0.00	0.00				0.00	0.00	0.00		0.00		
10	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00		0.00	0.00	0.00	0.00	0.00			0.00	
11	0.05	0.05	0.04	0.08	0.09	0.08	0.07	0.07	0.06	0.07	0.05	0.03	0.06	0.05	0.01	0.01	0.00	0.01	0.00
12	0.24	0.24	0.26	0.31	0.28	0.31	0.29	0.27	0.23	0.27	0.29	0.17	0.25	0.26	0.17	0.19	0.19	0.14	0.15
13	0.21	0.20	0.23	0.21	0.23	0.21	0.22	0.27	0.24	0.23	0.30	0.20	0.23	0.28	0.24	0.24	0.30	0.23	0.27
14	0.14	0.15	0.17	0.14	0.19	0.16	0.17	0.16	0.20	0.15	0.16	0.19	0.16	0.17	0.21	0.20	0.24	0.23	0.24
15	0.10	0.12	0.11	0.10	0.09	0.10	0.09	0.09	0.12	0.11	0.10	0.15	0.10	0.09	0.16	0.16	0.13	0.16	0.16
16	0.09	0.09	0.08	0.05	0.04	0.05	0.06	0.06	0.07	0.08	0.05	0.09	0.07	0.07	0.09	0.11	0.06	0.09	0.09
17	0.05	0.06	0.04	0.03	0.03	0.04	0.04	0.04	0.04	0.04	0.02	0.05	0.06	0.04	0.06	0.06	0.03	0.09	0.04
18	0.04	0.04	0.03	0.02	0.02	0.02	0.03	0.02	0.02	0.03	0.02	0.04	0.03	0.02	0.03	0.02	0.02	0.03	0.02
19	0.03	0.02	0.01	0.02	0.02	0.02	0.02	0.01	0.01	0.01	0.01	0.04	0.02	0.01	0.01	0.01	0.01	0.01	0.01
20	0.01	0.01	0.01	0.02	0.01	0.01	0.00	0.01	0.01	0.01	0.00	0.01	0.01	0.01	0.01	0.00	0.00	0.01	0.01
21	0.01	0.01	0.00	0.01	0.00	0.00	0.00	0.01	0.00	0.00	0.00	0.01	0.01		0.00	0.00	0.00	0.00	0.00
22	0.00	0.01	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00		0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
23	0.00	0.00	0.00	0.00	0.00		0.00	0.00	0.00	0.00	0.00	0.01	0.00	0.00	0.00	0.00		0.00	0.00
24	0.00	0.00	0.00	0.00			0.00	0.00	0.00	0.00		0.00	0.00	0.00	0.00			0.00	0.00
25			0.00	0.00	0.00			0.00	0.00	0.00		0.00	0.00				0.00		
26	0.00		0.00	0.00								0.00	0.00						
27			0.00																
28																			
29																			
30																			

Table 4: FAO proposed guidelines for indices of productivity for exploited fish species.

Parameter	Productivity			Species	Score
	Low	Medium	High	Spotted Seatrout	
<i>M</i>	<0.2	0.2 - 0.5	>0.5	<b>0.3</b>	2
<i>K</i>	<0.15	0.15 - 0.33	>0.33	<b>0.36</b>	3
<i>t<sub>mat</sub></i>	>8	3.3 - 8	<3.3	<b>2</b>	3
<i>t<sub>max</sub></i>	>25	14 - 25	<14	<b>10</b>	3
<i>Examples</i>	orange roughy, many sharks	cod, hake	sardine, anchovy	<b>Spotted Seatrout Productivity Score = 2.75 (high)</b>	

Table 5: Annual sample sizes, proportion positive samples, nominal CPUEs, indices of abundance, and corresponding coefficients of variation derived from the LDWF fishery-independent marine gillnet survey. Nominal cpue and abundance indices have been normalized to their individual long-term means for comparison.

Year	1.0" mesh					1.25" mesh					1.5" mesh				
	<i>n</i>	% Positive	CPUE	Index	CV	<i>n</i>	% Positive	CPUE	Index	CV	<i>n</i>	% Positive	CPUE	Index	CV
1986	487	40.9%	0.88	1.15	0.29	--	--	--	--	--	487	22.0%	0.82	0.68	0.27
1987	475	33.1%	1.08	0.87	0.32	--	--	--	--	--	475	30.5%	1.01	1.12	0.24
1988	417	39.3%	1.19	1.34	0.30	417	49.6%	1.33	1.79	0.26	417	41.7%	1.33	2.05	0.22
1989	474	36.1%	1.04	1.15	0.31	472	46.4%	1.01	1.40	0.27	473	31.1%	1.27	1.45	0.24
1990	489	30.9%	1.00	0.81	0.32	489	37.2%	1.00	0.93	0.30	489	23.7%	1.11	0.82	0.26
1991	471	35.9%	1.48	1.32	0.31	470	39.8%	1.55	1.37	0.29	470	26.2%	1.36	1.12	0.26
1992	472	32.8%	1.37	1.10	0.32	472	40.7%	1.44	1.35	0.28	472	33.7%	1.42	1.70	0.23
1993	459	35.7%	1.09	1.05	0.31	458	41.3%	1.46	1.41	0.29	457	29.1%	1.50	1.39	0.25
1994	487	35.7%	1.11	1.05	0.31	487	38.0%	1.20	1.06	0.29	486	27.2%	1.04	1.10	0.25
1995	520	35.2%	1.60	1.13	0.31	520	37.7%	1.18	1.02	0.29	520	26.2%	1.22	1.06	0.25
1996	520	32.3%	0.94	0.84	0.32	520	41.5%	0.92	1.12	0.28	520	27.3%	1.11	1.13	0.25
1997	520	33.5%	0.94	0.85	0.31	520	32.5%	1.04	0.85	0.31	519	28.7%	1.05	1.14	0.24
1998	509	34.2%	0.99	0.89	0.31	509	34.4%	1.20	0.92	0.30	509	24.6%	1.14	0.99	0.26
1999	520	37.9%	1.18	1.14	0.30	520	37.9%	1.28	1.14	0.29	520	30.0%	1.56	1.34	0.24
2000	528	37.5%	0.81	0.94	0.30	528	43.8%	1.06	1.34	0.27	528	35.0%	1.20	1.65	0.23
2001	528	25.6%	0.74	0.55	0.34	528	31.4%	0.95	0.70	0.31	528	26.9%	1.10	1.07	0.25
2002	520	32.7%	0.72	0.73	0.31	520	34.6%	0.75	0.76	0.30	520	22.3%	0.74	0.69	0.26
2003	525	30.1%	0.90	0.70	0.32	525	27.0%	0.94	0.58	0.33	525	20.2%	0.85	0.61	0.27
2004	527	32.4%	0.85	0.78	0.32	527	29.8%	0.84	0.67	0.32	527	22.6%	0.89	0.73	0.26
2005	478	38.3%	1.24	1.18	0.30	478	37.2%	1.06	0.98	0.30	478	22.8%	0.79	0.73	0.27
2006	519	38.3%	0.97	1.11	0.30	518	37.3%	1.08	1.05	0.29	519	30.3%	1.03	1.20	0.24
2007	528	34.7%	1.01	1.12	0.31	528	37.1%	0.93	0.95	0.29	528	25.2%	0.90	0.95	0.25
2008	514	35.6%	1.23	1.20	0.30	514	36.8%	1.13	1.03	0.29	514	25.3%	0.86	0.84	0.25
2009	528	34.5%	1.01	0.92	0.31	528	32.2%	1.11	0.83	0.31	528	26.5%	1.11	1.03	0.25
2010	463	27.6%	0.98	0.80	0.33	463	26.8%	0.86	0.65	0.33	463	18.8%	0.72	0.58	0.28
2011	1202	27.5%	0.90	0.80	0.30	1202	30.0%	0.74	0.78	0.29	1202	19.1%	0.74	0.78	0.23
2012	1269	27.1%	0.67	0.73	0.30	1269	30.4%	0.77	0.86	0.28	1269	17.2%	0.69	0.71	0.23
2013	624	33.7%	1.21	1.57	0.28	624	33.0%	0.83	1.23	0.27	624	19.4%	0.87	1.10	0.25
2014	625	32.8%	0.74	1.30	0.28	625	31.5%	0.62	1.00	0.28	625	15.2%	0.80	0.78	0.27
2015	626	22.5%	0.77	0.82	0.32	626	22.2%	0.62	0.66	0.32	626	11.7%	0.59	0.50	0.29
2016	626	31.6%	0.78	1.25	0.28	626	24.8%	0.67	0.81	0.31	626	13.3%	0.71	0.66	0.28
2017	620	26.9%	0.94	1.07	0.30	620	27.1%	0.77	0.94	0.30	620	16.0%	0.77	0.84	0.26
2018	624	21.6%	0.64	0.74	0.32	624	23.7%	0.63	0.79	0.31	624	10.6%	0.71	0.47	0.30

Table 6: Probabilities of age given length used in age assignments of Spotted Seatrout landings 1982-2001 (females only).

<i>Fishery Landings 1981-2001 (January-June)</i>							<i>Fishery Landings 1981-2001 (July-December)</i>						
<i>TL in</i>	<i>Age 1</i>	<i>Age 2</i>	<i>Age 3</i>	<i>Age 4</i>	<i>Age 5</i>	<i>Age 6+</i>	<i>TL in</i>	<i>Age 1</i>	<i>Age 2</i>	<i>Age 3</i>	<i>Age 4</i>	<i>Age 5</i>	<i>Age 6+</i>
10	1.00	0.00	0.00	0.00	0.00	0.00	10	0.76	0.00	0.00	0.00	0.00	0.00
11	1.00	0.00	0.00	0.00	0.00	0.00	11	1.00	0.00	0.00	0.00	0.00	0.00
12	1.00	0.00	0.00	0.00	0.00	0.00	12	1.00	0.00	0.00	0.00	0.00	0.00
13	0.97	0.03	0.00	0.00	0.00	0.00	13	1.00	0.00	0.00	0.00	0.00	0.00
14	0.00	1.00	0.00	0.00	0.00	0.00	14	1.00	0.00	0.00	0.00	0.00	0.00
15	0.00	1.00	0.00	0.00	0.00	0.00	15	0.98	0.02	0.00	0.00	0.00	0.00
16	0.00	0.99	0.01	0.00	0.00	0.00	16	0.16	0.83	0.00	0.00	0.00	0.00
17	0.00	0.83	0.17	0.00	0.00	0.00	17	0.00	0.98	0.02	0.00	0.00	0.00
18	0.00	0.12	0.84	0.04	0.00	0.00	18	0.00	0.86	0.13	0.01	0.00	0.00
19	0.00	0.00	0.79	0.18	0.02	0.00	19	0.00	0.35	0.57	0.07	0.01	0.00
20	0.00	0.00	0.37	0.48	0.12	0.03	20	0.00	0.03	0.65	0.25	0.05	0.02
21	0.00	0.00	0.06	0.47	0.30	0.17	21	0.00	0.00	0.29	0.42	0.18	0.10
22	0.00	0.00	0.00	0.18	0.34	0.47	22	0.00	0.00	0.05	0.31	0.30	0.34
23	0.00	0.00	0.00	0.03	0.18	0.79	23	0.00	0.00	0.00	0.10	0.23	0.67
24	0.00	0.00	0.00	0.00	0.05	0.94	24	0.00	0.00	0.00	0.02	0.10	0.89
25	0.00	0.00	0.00	0.00	0.01	0.99	25	0.00	0.00	0.00	0.00	0.03	0.97
26	0.00	0.00	0.00	0.00	0.00	1.00	26	0.00	0.00	0.00	0.00	0.00	1.00
27	0.00	0.00	0.00	0.00	0.00	1.00	27	0.00	0.00	0.00	0.00	0.00	1.00
28	0.00	0.00	0.00	0.00	0.00	1.00	28	0.00	0.00	0.00	0.00	0.00	1.00

Table 7: Probabilities of age given length used in age assignments of Spotted Seatrout catches of the LDWF marine experimental gillnet survey (females only).

<i>Survey Catches (April-September)</i>						
<i>TL in</i>	<i>Age 1</i>	<i>Age 2</i>	<i>Age 3</i>	<i>Age 4</i>	<i>Age 5</i>	<i>Age 6+</i>
10	1.00	0.00	0.00	0.00	0.00	0.00
11	1.00	0.00	0.00	0.00	0.00	0.00
12	1.00	0.00	0.00	0.00	0.00	0.00
13	1.00	0.00	0.00	0.00	0.00	0.00
14	0.99	0.01	0.00	0.00	0.00	0.00
15	0.06	0.94	0.00	0.00	0.00	0.00
16	0.00	1.00	0.00	0.00	0.00	0.00
17	0.00	0.96	0.04	0.00	0.00	0.00
18	0.00	0.61	0.38	0.02	0.00	0.00
19	0.00	0.06	0.80	0.12	0.01	0.00
20	0.00	0.00	0.55	0.35	0.08	0.02
21	0.00	0.00	0.16	0.47	0.24	0.13
22	0.00	0.00	0.02	0.25	0.33	0.40
23	0.00	0.00	0.00	0.06	0.21	0.73
24	0.00	0.00	0.00	0.01	0.08	0.92
25	0.00	0.00	0.00	0.00	0.02	0.98
26	0.00	0.00	0.00	0.00	0.00	1.00
27	0.00	0.00	0.00	0.00	0.00	1.00
28	0.00	0.00	0.00	0.00	0.00	1.00

Table 8: Length at age samples used in age assignments of Spotted Seatrout landings 2002-2018 (females only).

2002 (January-June)							
TL, in	Age 1	Age 2	Age 3	Age 4	Age 5	Age 6+	Total
10							0
11							0
12	5	1					6
13	6	6					12
14	1	16					17
15		22	1				23
16	1	14	6				21
17		8	10				18
18		4	5				9
19			6	1			7
20		1	4	2			7
21			4				4
22							0
23							0
24							0
25							0
26							0
27							0
28							0
<b>Total</b>	<b>13</b>	<b>72</b>	<b>36</b>	<b>3</b>	<b>0</b>	<b>0</b>	<b>124</b>

2002 (July-December)							
TL, in	Age 1	Age 2	Age 3	Age 4	Age 5	Age 6+	Total
10							0
11							0
12		25	5	1			31
13		54	5		1		60
14		64	8	2			74
15		41	10	2			53
16		18	19	1			38
17		7	18	4			29
18		2	15	8			25
19		1	4	6	1		12
20			3	3			6
21			1	1			2
22			1	2			3
23						1	1
24							0
25							0
26							0
27							0
28							0
<b>Total</b>	<b>212</b>	<b>89</b>	<b>30</b>	<b>2</b>	<b>1</b>	<b>0</b>	<b>334</b>

2003 (January-June)							
TL, in	Age 1	Age 2	Age 3	Age 4	Age 5	Age 6+	Total
10							0
11	2						2
12	10	11	1				22
13	5	45	2				52
14	2	48	3	1			56
15		48	4				52
16		51	6				57
17		32	10				42
18		11	9	2	1		23
19		2	11	2			15
20		1	9	5	2		17
21			7	3			10
22			2	3	1		6
23				4	1		5
24			1	1			2
25				1			1
26							0
27							0
28							0
<b>Total</b>	<b>19</b>	<b>249</b>	<b>67</b>	<b>22</b>	<b>5</b>	<b>0</b>	<b>362</b>

2003 (July-December)							
TL, in	Age 1	Age 2	Age 3	Age 4	Age 5	Age 6+	Total
10							0
11	2						2
12	57	10					67
13	119	15	2				136
14	75	25					100
15	41	31	1		1		74
16	15	41	1				57
17	3	41					44
18		22	5				27
19		8	2				10
20		4	9				13
21		1	6				7
22		1	3	1			5
23			1				1
24				3			3
25						1	1
26				1		2	3
27							0
28					1		1
<b>Total</b>	<b>312</b>	<b>199</b>	<b>30</b>	<b>5</b>	<b>2</b>	<b>3</b>	<b>551</b>

2004 (January-June)							
TL, in	Age 1	Age 2	Age 3	Age 4	Age 5	Age 6+	Total
10							0
11							0
12	4	32	1				37
13	6	62	2	2			72
14		77					77
15		79					79
16		39	8				47
17		18	8				26
18		7	12	1			20
19		3	13				16
20			8	1	1	1	11
21			1	4	1		6
22				1	1		2
23		1		2			3
24						1	1
25							0
26							0
27							0
28							0
<b>Total</b>	<b>10</b>	<b>318</b>	<b>53</b>	<b>11</b>	<b>3</b>	<b>2</b>	<b>397</b>

2004 (July-December)							
TL, in	Age 1	Age 2	Age 3	Age 4	Age 5	Age 6+	Total
10							0
11	2						2
12	59	6	1				66
13	110	25					135
14	91	30	1				122
15	44	33	1			1	79
16	19	34	3				56
17	4	29	3				36
18		18	5	1			24
19		7	7				14
20		1	4	1			6
21		2	2				4
22					2		2
23				2			2
24			2			1	3
25					1		1
26							0
27							0
28							0
<b>Total</b>	<b>329</b>	<b>185</b>	<b>29</b>	<b>4</b>	<b>3</b>	<b>2</b>	<b>552</b>

Table 8 (continued):

2005 (January-June)							
TL in	Age 1	Age 2	Age 3	Age 4	Age 5	Age 6+	Total
10							0
11							0
12	10	15					25
13	12	55	2				69
14	4	105	4	1			114
15		129	6		1		136
16		57	4				61
17		31	11				42
18		9	9				18
19		5	16	1			22
20		1	14				15
21			13		1		14
22			7				7
23			1				1
24				4			4
25						1	1
26							0
27				1		1	2
28							0
<b>Total</b>	<b>26</b>	<b>407</b>	<b>87</b>	<b>7</b>	<b>2</b>	<b>2</b>	<b>531</b>

2005 (July-December)							
TL in	Age 1	Age 2	Age 3	Age 4	Age 5	Age 6+	Total
10							0
11	1						1
12	37	2					39
13	69	9	1				79
14	48	20					68
15	37	31					68
16	12	33	3				48
17	5	34	3				42
18	1	15	2				18
19		5	2				7
20		2	3				5
21			5	2	1		8
22			1	1			2
23			1				1
24			1				1
25							0
26							0
27							0
28							0
<b>Total</b>	<b>210</b>	<b>151</b>	<b>22</b>	<b>3</b>	<b>1</b>	<b>0</b>	<b>387</b>

2006 (January-June)							
TL in	Age 1	Age 2	Age 3	Age 4	Age 5	Age 6+	Total
10							0
11	3						3
12	17	11	1				29
13	17	77	2				96
14	3	140	2				145
15	1	141	5				147
16	1	79	9				89
17		28	12				40
18		15	15	1			31
19		4	11				15
20		1	11	2			14
21			8				8
22			8				8
23			1	1			2
24				1			1
25							0
26							0
27							0
28							0
<b>Total</b>	<b>42</b>	<b>496</b>	<b>85</b>	<b>5</b>	<b>0</b>	<b>0</b>	<b>628</b>

2006 (July-December)							
TL in	Age 1	Age 2	Age 3	Age 4	Age 5	Age 6+	Total
10							0
11							0
12							42
13	40	2					114
14	75	33	3				108
15	39	70					109
16	9	40	1				50
17	5	43	2				50
18	1	25	4				30
19		11	1	1			13
20		6	1				7
21			4				4
22		1		1			2
23		2	1				3
24							0
25							0
26							0
27							0
28							0
<b>Total</b>	<b>272</b>	<b>241</b>	<b>17</b>	<b>2</b>	<b>0</b>	<b>0</b>	<b>532</b>

2007 (January-June)							
TL in	Age 1	Age 2	Age 3	Age 4	Age 5	Age 6+	Total
10							0
11	1						1
12	9	11	1				21
13	4	49	2				55
14		89	1				90
15		101	7				108
16		80	18	2			100
17		29	29				58
18		16	21	3			40
19		8	13	1			22
20		3	14	3	1		21
21			4	1			5
22			4	3	1		8
23			3	1			4
24					1		1
25							0
26							0
27							0
28							0
<b>Total</b>	<b>14</b>	<b>386</b>	<b>117</b>	<b>14</b>	<b>3</b>	<b>0</b>	<b>534</b>

2007 (July-December)							
TL in	Age 1	Age 2	Age 3	Age 4	Age 5	Age 6+	Total
10							0
11	2						2
12	71	8					79
13	110	23	1				134
14	91	39	3				133
15	47	70	4	1			122
16	13	57	1				71
17	3	57	4	1			65
18	2	29	9				40
19	1	14	7				22
20		4	2	2			8
21			5	1			6
22			5				5
23			1	1			2
24							0
25			1				1
26							0
27							0
28							0
<b>Total</b>	<b>340</b>	<b>301</b>	<b>43</b>	<b>6</b>	<b>0</b>	<b>0</b>	<b>690</b>

Table 8 (continued):

2008 (January-June)							
TL in	Age 1	Age 2	Age 3	Age 4	Age 5	Age 6+	Total
10	1						1
11		1					1
12	19	40	2				61
13	5	104	2				111
14	1	106	4				111
15		87	19	1			107
16		56	24				80
17		15	34				49
18		10	31	1			42
19		3	26	1	1		31
20		1	7	4			12
21			9	3			12
22			4	1			5
23			2				2
24					1		1
25					1		1
26							0
27							0
28							0
<b>Total</b>	<b>26</b>	<b>423</b>	<b>164</b>	<b>11</b>	<b>3</b>	<b>0</b>	<b>627</b>

2008 (July-December)							
TL in	Age 1	Age 2	Age 3	Age 4	Age 5	Age 6+	Total
10							0
11	1						1
12	78	12	3				93
13	145	41	5				191
14	109	71	6	1			187
15	69	68	3	1			141
16	28	64	7				99
17	4	38	9				51
18	1	28	13				42
19		8	14				22
20		3	15	3	1		22
21		4	8	2			14
22			2	3			5
23							0
24			1				1
25			1		1		2
26							0
27							0
28							0
<b>Total</b>	<b>435</b>	<b>337</b>	<b>87</b>	<b>10</b>	<b>2</b>	<b>0</b>	<b>871</b>

2009 (January-June)							
TL in	Age 1	Age 2	Age 3	Age 4	Age 5	Age 6+	Total
10							0
11		1					1
12	21	39	1	2			63
13	4	109	6	2			121
14	1	138	4	1			144
15	2	92	16				110
16		42	18	1			61
17		30	20	2			52
18		7	29	4			40
19		4	17	3	1		25
20		1	16	6			23
21			10	3			13
22			4	2			6
23			1	4			5
24				7			7
25				2	1		3
26							0
27							0
28							0
<b>Total</b>	<b>28</b>	<b>463</b>	<b>142</b>	<b>39</b>	<b>2</b>	<b>0</b>	<b>674</b>

2009 (July-December)							
TL in	Age 1	Age 2	Age 3	Age 4	Age 5	Age 6+	Total
10							0
11	2						2
12	56	9	2				67
13	121	30	3				154
14	104	52	4				160
15	55	71	4				130
16	28	66	5				99
17	6	52	2				60
18	4	28	13	2			47
19		12	7	1			20
20		5	7	2			14
21			9	1			10
22			6	4			10
23			4	3			7
24				1	2		3
25			1	3			4
26							0
27			1				1
28							0
<b>Total</b>	<b>376</b>	<b>325</b>	<b>68</b>	<b>17</b>	<b>2</b>	<b>0</b>	<b>788</b>

2010 (January-June)							
TL in	Age 1	Age 2	Age 3	Age 4	Age 5	Age 6+	Total
10							0
11							0
12	12	18	1				31
13	6	57	4	1			68
14	1	89	3	1			94
15		88	1				89
16		55	12	1			68
17		28	18	2			48
18		9	23	2			34
19			18	2			20
20			12	3			15
21			4	1			5
22			1	1			2
23			2	1			3
24				1			1
25							0
26							0
27							0
28							0
<b>Total</b>	<b>19</b>	<b>344</b>	<b>98</b>	<b>16</b>	<b>0</b>	<b>0</b>	<b>477</b>

2010 (July-December)							
TL in	Age 1	Age 2	Age 3	Age 4	Age 5	Age 6+	Total
10							0
11	1	1					2
12	69	5					74
13	152	18	2				172
14	127	26	4				157
15	55	41	3	1			100
16	13	32	4				49
17	3	33	1				37
18	1	21	2				24
19		6	3				9
20			1	2			3
21		1	1				2
22			2		1		3
23				3			3
24							0
25							0
26							0
27							0
28							0
<b>Total</b>	<b>421</b>	<b>184</b>	<b>23</b>	<b>6</b>	<b>1</b>	<b>0</b>	<b>635</b>

Table 8 (continued):

2011 (January-June)							
TL in	Age 1	Age 2	Age 3	Age 4	Age 5	Age 6+	Total
10		1					1
11		1					1
12	12	8					20
13	28	38	2				68
14	13	66	10	1			90
15	3	109	8				120
16		80	10				90
17		52	16				68
18		10	19				29
19		2	20				22
20		1	3				4
21			4	1			5
22				1			1
23							0
24						1	1
25				1			1
26					1		1
27							0
28							0
<b>Total</b>	<b>56</b>	<b>368</b>	<b>92</b>	<b>4</b>	<b>1</b>	<b>1</b>	<b>522</b>

2011 (July-December)							
TL in	Age 1	Age 2	Age 3	Age 4	Age 5	Age 6+	Total
10							0
11	3						3
12	70	9					79
13	119	12	2				133
14	123	15	2				140
15	66	42	1				109
16	36	51	1				88
17	6	53	7				66
18	3	30	12	1			46
19		8	6	2			16
20	1	5	6	1			13
21	1	1	2	4			8
22			1	1			2
23							0
24							0
25							0
26							0
27							0
28							0
<b>Total</b>	<b>428</b>	<b>226</b>	<b>40</b>	<b>9</b>	<b>0</b>	<b>0</b>	<b>703</b>

2012 (January-June)							
TL in	Age 1	Age 2	Age 3	Age 4	Age 5	Age 6+	Total
10							0
11	1						1
12	41	17	2				60
13	41	65	10				116
14	10	114	14	2			140
15	2	209	9	1			221
16	1	173	9	1			184
17		111	20	1			132
18		46	43	4			93
19		16	37	2	1	1	57
20		2	23	7	1		33
21			13	1			14
22		1	4	4			9
23			1	1			2
24					1		1
25				2			2
26							0
27							0
28							0
<b>Total</b>	<b>96</b>	<b>754</b>	<b>185</b>	<b>26</b>	<b>3</b>	<b>1</b>	<b>1065</b>

2012 (July-December)							
TL in	Age 1	Age 2	Age 3	Age 4	Age 5	Age 6+	Total
10							0
11							0
12	35	3					38
13	66	8	1				75
14	75	11	2				88
15	31	7	2				40
16	14	15					29
17	4	21	2			1	28
18		17	1				18
19		8	2				10
20		8	1	1			10
21			1	1			2
22							0
23							0
24							0
25							0
26							0
27							0
28							0
<b>Total</b>	<b>225</b>	<b>98</b>	<b>12</b>	<b>2</b>	<b>1</b>	<b>0</b>	<b>338</b>

2013 (January-June)							
TL in	Age 1	Age 2	Age 3	Age 4	Age 5	Age 6+	Total
10							0
11							0
12	18	39	2				59
13	14	119	5				138
14	4	168	7				179
15		158	2				160
16		101	1	1			103
17		57	4				61
18		22	12				34
19		5	16	1			22
20		2	18				20
21			7	2			9
22		1	2	2	1		6
23							0
24							0
25							0
26							0
27							0
28							0
<b>Total</b>	<b>36</b>	<b>672</b>	<b>76</b>	<b>6</b>	<b>1</b>	<b>0</b>	<b>791</b>

2013 (July-December)							
TL in	Age 1	Age 2	Age 3	Age 4	Age 5	Age 6+	Total
10	1						1
11	3	1					4
12	159	12					171
13	222	19					241
14	151	31	1				183
15	84	42	1				127
16	30	43			1		74
17	8	30					38
18	8	16	2	1			27
19	1	5	1				7
20			1				1
21			2				2
22		1					1
23							0
24							0
25							0
26							0
27							0
28							0
<b>Total</b>	<b>667</b>	<b>200</b>	<b>8</b>	<b>2</b>	<b>0</b>	<b>0</b>	<b>877</b>

Table 8 (continued):

2014 (January-June)							
TL in	Age 1	Age 2	Age 3	Age 4	Age 5	Age 6+	Total
10							0
11	2		1				3
12	60	71	2				133
13	77	215	7				299
14	20	229	14	2			265
15		196	9	2	1		208
16		153	19				172
17		83	16				99
18		26	25				51
19		5	25				30
20			11	1			12
21		1	3	3	1		8
22		1	7	2			10
23			1	1			2
24						1	1
25					2		2
26							0
27						2	2
28							0
<b>Total</b>	<b>159</b>	<b>980</b>	<b>140</b>	<b>11</b>	<b>4</b>	<b>3</b>	<b>1297</b>

2014 (July-December)							
TL in	Age 1	Age 2	Age 3	Age 4	Age 5	Age 6+	Total
10							0
11	19						19
12	301	19	2				322
13	359	54	4				417
14	284	130	2				416
15	161	144	1	2			308
16	59	153	5	1			218
17	14	100	8	1			123
18	3	49	10				62
19	2	15	11	1	1		30
20	2	10	4				16
21			3	1			4
22		1	2	1			4
23			1	2			3
24							0
25							0
26							0
27							0
28							0
<b>Total</b>	<b>1204</b>	<b>675</b>	<b>53</b>	<b>9</b>	<b>1</b>	<b>0</b>	<b>1942</b>

2015 (January-June)							
TL in	Age 1	Age 2	Age 3	Age 4	Age 5	Age 6+	Total
10							0
11	2	1					3
12	93	32	1				126
13	85	172	5	2			264
14	14	353	7				374
15		361	11	1			373
16	1	272	14	2			289
17		113	44	1			158
18		25	38	1			64
19		3	34	1			38
20		1	17	5			23
21			4	3			7
22				4			4
23			3				3
24							0
25							0
26							0
27							0
28							0
<b>Total</b>	<b>195</b>	<b>1333</b>	<b>178</b>	<b>20</b>	<b>0</b>	<b>0</b>	<b>1726</b>

2015 (July-December)							
TL in	Age 1	Age 2	Age 3	Age 4	Age 5	Age 6+	Total
10	2						2
11	11	2					13
12	247	15					262
13	372	24	4				400
14	335	58					393
15	184	132	3				319
16	66	128	7	1			202
17	18	119	13	2			152
18	6	53	12	1			72
19	2	32	6	1			41
20	2	10	21				33
21		1	6	2			9
22			2	2			6
23			1		2		1
24		1					1
25							0
26							0
27							0
28							0
<b>Total</b>	<b>1245</b>	<b>575</b>	<b>75</b>	<b>9</b>	<b>2</b>	<b>0</b>	<b>1906</b>

2016 (January-June)							
TL in	Age 1	Age 2	Age 3	Age 4	Age 5	Age 6+	Total
10							0
11	1	4					5
12	96	71	3	1			171
13	115	212	8	5			340
14	23	358	5				386
15	4	404	12		1		421
16	2	282	18	2			304
17		104	32				136
18		37	37	1			75
19		8	29				37
20			21		1		22
21			11	4			15
22			4	3	1		8
23				1		1	2
24				3			3
25					1		1
26							0
27							0
28							0
<b>Total</b>	<b>241</b>	<b>1480</b>	<b>180</b>	<b>20</b>	<b>4</b>	<b>1</b>	<b>1926</b>

2016 (July-December)							
TL in	Age 1	Age 2	Age 3	Age 4	Age 5	Age 6+	Total
10							0
11	9						9
12	340	19	1	1			361
13	537	40	3				580
14	359	75	6				440
15	160	94	3				257
16	40	96	2				138
17	10	78	7	1			96
18	2	29	13				44
19	2	11	10				23
20		5	5	1	1		12
21		1	7	1			9
22			2				2
23							0
24							0
25		1					1
26							0
27							0
28							0
<b>Total</b>	<b>1459</b>	<b>449</b>	<b>59</b>	<b>4</b>	<b>1</b>	<b>0</b>	<b>1972</b>

Table 8 (continued):

2017 (January-June)							
TL in	Age 1	Age 2	Age 3	Age 4	Age 5	Age 6+	Total
10		2					2
11	4	1					5
12	77	29	4				110
13	64	163	3	1			231
14	14	281	1	2			298
15	1	314	4	1			320
16		209	9	1			219
17	1	140	19		1		161
18		44	20	1			65
19		15	18	2			35
20		3	10	1			14
21			9	1	1		11
22			3	1	1		5
23			1	2			3
24			1	2			3
25				1			1
26							0
27							0
28							0
<b>Total</b>	<b>161</b>	<b>1201</b>	<b>102</b>	<b>16</b>	<b>3</b>	<b>0</b>	<b>1483</b>

2017 (July-December)							
TL in	Age 1	Age 2	Age 3	Age 4	Age 5	Age 6+	Total
10		2					2
11		6					6
12	133	11					144
13	213	49	3				265
14	240	90	1				331
15	134	109	2				245
16	43	90		1			134
17	21	91	7	1			120
18	3	56	3	1			63
19		24	3		1		28
20	1	10	1				12
21		3	1				4
22			2	2			4
23				1			1
24				1			1
25							0
26							0
27							0
28							0
<b>Total</b>	<b>796</b>	<b>533</b>	<b>23</b>	<b>7</b>	<b>1</b>	<b>0</b>	<b>1360</b>

2018 (January-June)							
TL in	Age 1	Age 2	Age 3	Age 4	Age 5	Age 6+	Total
10							0
11	3						3
12	52	21	3				76
13	56	93	4				153
14	30	155	8	1			194
15	1	269	10				280
16		201	20		1		222
17	2	107	43	1	2		155
18		39	37	1			77
19		22	37				59
20		2	28	2	1		33
21		1	12	1			14
22			5	1			6
23			7	2	1		10
24				1	2		3
25							0
26							0
27							0
28							0
<b>Total</b>	<b>144</b>	<b>910</b>	<b>214</b>	<b>10</b>	<b>7</b>	<b>0</b>	<b>1285</b>

2018 (July-December)							
TL in	Age 1	Age 2	Age 3	Age 4	Age 5	Age 6+	Total
10							0
11	9						9
12	165	7	1				173
13	314	18	1				333
14	296	22	3				321
15	190	58					248
16	91	53					144
17	26	46	2		1		75
18	3	41	5				49
19	3	20	2				25
20		9	3				12
21			1	1			2
22			1				1
23			1	1			2
24							0
25							0
26							0
27							0
28							0
<b>Total</b>	<b>1097</b>	<b>274</b>	<b>20</b>	<b>2</b>	<b>1</b>	<b>0</b>	<b>1394</b>

Table 9: Annual survey age composition and sample sizes (female SST) derived from the LDWF experimental marine gillnet survey.

Year	1.0" mesh							1.25" mesh						
	n	Age 1	Age 2	Age 3	Age 4	Age 5	Age 6+	n	Age 1	Age 2	Age 3	Age 4	Age 5	Age 6+
1986	561	0.98	0.02	0.00	0.00	0.00	0.00	--	--	--	--	--	--	--
1987	546	0.96	0.04	0.00	0.00	0.00	0.00	--	--	--	--	--	--	--
1988	627	0.96	0.04	0.01	0.00	0.00	0.00	1075	0.91	0.08	0.01	0.00	0.00	0.00
1989	571	0.91	0.08	0.01	0.00	0.00	0.00	862	0.84	0.15	0.01	0.00	0.00	0.00
1990	486	0.94	0.05	0.01	0.00	0.00	0.00	713	0.85	0.14	0.00	0.00	0.00	0.00
1991	803	0.93	0.07	0.00	0.00	0.00	0.00	1132	0.87	0.12	0.00	0.00	0.00	0.00
1992	685	0.92	0.07	0.01	0.00	0.00	0.00	1081	0.83	0.16	0.01	0.00	0.00	0.00
1993	573	0.93	0.06	0.01	0.00	0.00	0.00	1072	0.89	0.11	0.01	0.00	0.00	0.00
1994	620	0.91	0.07	0.01	0.00	0.00	0.00	869	0.88	0.11	0.00	0.00	0.00	0.00
1995	942	0.93	0.06	0.01	0.00	0.00	0.00	903	0.87	0.12	0.01	0.00	0.00	0.00
1996	508	0.87	0.09	0.02	0.01	0.00	0.01	776	0.84	0.14	0.01	0.00	0.00	0.00
1997	529	0.88	0.09	0.02	0.01	0.00	0.00	684	0.83	0.15	0.01	0.00	0.00	0.00
1998	555	0.90	0.06	0.02	0.01	0.00	0.00	821	0.87	0.13	0.00	0.00	0.00	0.00
1999	749	0.88	0.09	0.02	0.01	0.00	0.00	984	0.81	0.17	0.01	0.00	0.00	0.00
2000	517	0.85	0.09	0.03	0.01	0.01	0.01	958	0.87	0.11	0.01	0.00	0.00	0.00
2001	321	0.83	0.12	0.03	0.01	0.00	0.01	614	0.77	0.21	0.01	0.00	0.00	0.00
2002	396	0.85	0.11	0.02	0.01	0.00	0.01	527	0.84	0.14	0.01	0.00	0.00	0.01
2003	457	0.93	0.04	0.01	0.01	0.00	0.00	522	0.89	0.10	0.01	0.00	0.00	0.01
2004	466	0.90	0.05	0.02	0.01	0.00	0.02	516	0.89	0.08	0.01	0.00	0.00	0.02
2005	730	0.93	0.06	0.00	0.00	0.00	0.00	736	0.90	0.08	0.00	0.00	0.00	0.01
2006	621	0.90	0.08	0.02	0.01	0.00	0.00	811	0.77	0.21	0.01	0.00	0.00	0.00
2007	596	0.92	0.05	0.01	0.01	0.00	0.01	709	0.86	0.11	0.01	0.00	0.00	0.00
2008	723	0.92	0.06	0.01	0.00	0.00	0.01	834	0.83	0.15	0.01	0.00	0.00	0.01
2009	590	0.91	0.05	0.01	0.01	0.01	0.01	739	0.84	0.14	0.01	0.00	0.00	0.00
2010	405	0.90	0.06	0.01	0.01	0.00	0.02	414	0.87	0.11	0.01	0.00	0.00	0.00
2011	957	0.90	0.08	0.01	0.00	0.00	0.00	1045	0.85	0.13	0.01	0.00	0.00	0.00
2012	746	0.92	0.06	0.01	0.00	0.00	0.01	1152	0.87	0.11	0.01	0.00	0.00	0.00
2013	815	0.73	0.09	0.04	0.05	0.04	0.04	666	0.82	0.15	0.02	0.01	0.00	0.01
2014	488	0.97	0.02	0.00	0.00	0.00	0.00	479	0.88	0.10	0.01	0.00	0.00	0.00
2015	351	0.91	0.03	0.02	0.01	0.01	0.01	337	0.86	0.13	0.01	0.00	0.00	0.00
2016	500	0.97	0.03	0.00	0.00	0.00	0.00	404	0.87	0.12	0.01	0.00	0.00	0.00
2017	506	0.93	0.04	0.01	0.01	0.00	0.01	504	0.84	0.15	0.01	0.00	0.00	0.00
2018	277	0.94	0.05	0.01	0.00	0.00	0.00	365	0.88	0.11	0.01	0.00	0.00	0.00

Year	1.5" mesh						
	n	Age 1	Age 2	Age 3	Age 4	Age 5	Age 6+
1986	277	0.39	0.57	0.03	0.00	0.00	0.00
1987	464	0.54	0.44	0.02	0.00	0.00	0.00
1988	733	0.77	0.21	0.01	0.00	0.00	0.00
1989	589	0.59	0.39	0.02	0.00	0.00	0.00
1990	406	0.57	0.42	0.01	0.00	0.00	0.00
1991	529	0.40	0.59	0.01	0.00	0.00	0.00
1992	714	0.50	0.48	0.01	0.00	0.00	0.00
1993	630	0.54	0.44	0.02	0.00	0.00	0.00
1994	436	0.56	0.41	0.03	0.00	0.00	0.00
1995	524	0.46	0.52	0.03	0.00	0.00	0.00
1996	497	0.47	0.49	0.03	0.00	0.00	0.00
1997	496	0.49	0.47	0.04	0.01	0.00	0.00
1998	449	0.55	0.41	0.03	0.00	0.00	0.00
1999	770	0.54	0.43	0.02	0.00	0.00	0.00
2000	703	0.57	0.37	0.05	0.01	0.00	0.00
2001	495	0.52	0.43	0.03	0.01	0.00	0.00
2002	271	0.54	0.43	0.02	0.00	0.00	0.01
2003	286	0.58	0.40	0.02	0.00	0.00	0.00
2004	334	0.61	0.34	0.02	0.01	0.00	0.02
2005	272	0.55	0.38	0.03	0.01	0.01	0.02
2006	513	0.40	0.54	0.05	0.01	0.00	0.00
2007	380	0.58	0.37	0.03	0.01	0.00	0.01
2008	352	0.51	0.42	0.04	0.01	0.01	0.01
2009	493	0.53	0.44	0.02	0.00	0.00	0.00
2010	198	0.40	0.51	0.06	0.02	0.01	0.01
2011	538	0.48	0.48	0.03	0.01	0.00	0.00
2012	474	0.40	0.55	0.04	0.01	0.00	0.00
2013	332	0.41	0.51	0.06	0.01	0.00	0.00
2014	240	0.55	0.41	0.04	0.01	0.00	0.00
2015	136	0.58	0.36	0.04	0.01	0.00	0.02
2016	186	0.49	0.43	0.06	0.01	0.00	0.00
2017	241	0.49	0.48	0.03	0.01	0.00	0.00
2018	149	0.50	0.47	0.02	0.01	0.00	0.00

Table 10: Recreational Spotted Seatrout catch-at-age and yield (females only), and ASAP base model input coefficients of variation.

Year	Recreational Catch-at-age						Yield (lbs)	CV
	Age 1	Age 2	Age 3	Age 4	Age 5	Age 6+		
1982	1,818,279	415,740	186,480	54,681	29,288	96,729	3,437,031	0.21
1983	1,694,837	641,628	94,457	52,208	22,089	22,855	3,008,300	0.21
1984	391,755	199,957	49,228	34,885	24,723	31,707	1,228,965	0.29
1985	1,501,525	208,313	46,230	18,466	8,293	7,598	1,749,025	0.19
1986	2,633,193	842,301	104,620	28,925	11,178	15,474	3,610,915	0.15
1987	2,548,528	897,532	50,771	17,580	5,494	3,273	3,507,535	0.14
1988	1,487,973	812,106	150,429	55,867	19,677	13,883	3,122,697	0.19
1989	1,476,612	979,986	137,268	43,066	15,603	20,631	3,437,101	0.16
1990	1,085,067	414,345	58,012	12,634	3,495	3,092	1,832,308	0.19
1991	3,002,943	1,070,330	114,805	24,111	9,176	11,572	4,524,888	0.17
1992	2,285,253	773,982	76,493	19,045	6,565	7,722	3,382,887	0.19
1993	1,852,853	537,393	110,829	32,450	12,661	14,908	2,815,927	0.16
1994	2,434,226	784,676	113,803	42,265	19,089	22,932	3,843,690	0.15
1995	2,797,444	718,486	137,437	47,669	20,249	30,429	4,227,036	0.23
1996	2,242,323	1,047,477	172,192	40,556	16,166	16,686	4,301,554	0.17
1997	2,401,381	1,051,553	160,089	29,997	11,778	22,891	4,139,145	0.15
1998	2,384,739	1,204,289	186,819	45,615	15,448	8,721	4,400,806	0.15
1999	3,092,437	1,463,862	238,406	89,735	36,088	36,470	5,927,097	0.15
2000	3,110,291	1,602,485	318,164	100,733	36,713	37,420	6,654,898	0.17
2001	2,603,830	1,450,127	372,252	116,122	49,827	70,476	6,297,577	0.13
2002	1,775,080	1,075,457	367,275	74,956	29,352	40,645	4,308,044	0.15
2003	1,725,470	1,565,595	297,082	52,494	21,932	33,554	4,507,858	0.17
2004	1,553,813	1,560,464	217,122	30,719	14,666	25,415	3,825,069	0.16
2005	1,682,655	1,797,790	198,893	17,619	9,322	6,658	4,097,190	0.15
2006	2,112,540	2,700,688	327,731	23,284	6,488	8,895	6,100,106	0.13
2007	1,783,613	1,848,157	344,064	51,527	20,527	26,392	4,863,160	0.15
2008	2,257,775	2,632,454	581,327	38,715	8,771	15,450	6,305,014	0.16
2009	2,271,765	3,091,355	510,436	84,305	5,234	22,585	6,743,622	0.13
2010	2,543,488	1,585,918	360,525	54,581	8,920	19,231	5,290,488	0.21
2011	2,793,364	2,331,671	439,934	79,663	28,326	57,416	7,375,588	0.16
2012	2,971,186	2,373,766	440,792	57,164	26,821	41,494	7,486,447	0.17
2013	2,395,533	1,818,577	181,464	28,578	12,817	13,176	5,001,386	0.14
2014	1,678,052	1,027,768	73,704	10,281	3,613	5,116	3,280,650	0.06
2015	2,332,965	1,252,876	132,080	15,736	3,967	4,087	4,482,312	0.05
2016	2,910,578	1,456,746	166,030	19,640	7,770	7,761	5,184,650	0.05
2017	2,266,905	2,074,560	105,611	19,126	6,942	8,135	5,560,378	0.04
2018	1,601,847	530,028	63,466	3,203	3,713	2,059	2,653,937	0.05

Table 11: Commercial Spotted Seatrout catch-at-age and yield (females only), and ASAP base model input coefficients of variation.

Year	Commercial Catch-at-age						Yield (lbs)	CV
	Age 1	Age 2	Age 3	Age 4	Age 5	Age 6+		
1982	173,155	209,659	30,100	9,249	4,466	10,569	656,097	0.10
1983	319,041	386,299	55,459	17,041	8,229	19,473	1,208,869	0.10
1984	231,613	280,441	40,262	12,371	5,974	14,137	877,600	0.10
1985	276,436	334,713	48,053	14,765	7,130	16,873	1,047,437	0.10
1986	556,589	633,781	61,952	17,790	8,463	19,977	1,810,058	0.10
1987	223,577	629,982	117,329	23,523	7,220	7,587	1,671,991	0.10
1988	177,858	501,157	93,337	18,712	5,744	6,035	1,330,085	0.10
1989	184,740	520,551	96,949	19,437	5,966	6,269	1,381,556	0.10
1990	80,484	226,783	42,237	8,468	2,599	2,731	601,889	0.10
1991	151,407	426,625	79,456	15,930	4,889	5,138	1,132,274	0.10
1992	120,542	339,655	63,258	12,682	3,893	4,090	901,454	0.10
1993	141,212	397,899	74,106	14,857	4,560	4,792	1,056,035	0.10
1994	127,019	357,908	66,658	13,364	4,102	4,310	949,897	0.10
1995	81,655	230,083	42,851	8,591	2,637	2,771	610,648	0.10
1996	96,097	270,776	50,430	10,110	3,103	3,261	718,648	0.10
1997	22,222	252,693	36,322	6,238	2,553	4,992	502,434	0.10
1998	4,703	52,118	7,941	1,837	632	340	101,930	0.10
1999	2,315	31,805	4,866	2,064	851	742	70,447	0.05
2000	4,856	13,429	2,618	827	290	273	37,358	0.05
2001	3,208	36,762	10,813	3,048	1,226	1,683	102,485	0.05
2002	3,635	21,568	9,145	1,856	844	1,053	66,750	0.05
2003	143	7,383	2,235	455	140	212	18,009	0.05
2004	13	8,570	1,872	207	160	253	18,387	0.05
2005	162	8,821	1,314	78	70	59	15,422	0.05
2006	13	1,021	172	9	3	5	1,865	0.05
2007	0	4,263	1,400	176	69	88	10,300	0.05
2008	84	4,087	1,702	98	24	47	9,360	0.05
2009	9	463	125	16	2	4	912	0.05
2010	0	0	0	0	0	0	1	0.05
2011	0	0	0	0	0	0	1	0.05
2012	1	40	10	1	0	1	92	0.05
2013	1,216	892	102	31	10	17	3,363	0.05
2014	1,878	2,237	137	25	9	13	6,237	0.05
2015	854	1,459	163	18	4	4	3,663	0.05
2016	473	934	120	9	4	4	2,226	0.05
2017	793	1,314	69	14	5	6	3,244	0.05
2018	1,235	828	122	6	7	3	3,243	0.05

Table 12: Mean weight-at-age (pounds) of recreational and commercial Spotted Seatrout landings (females only).

Recreational Mean Weight-at-age							Commercial Mean Weight-at-age						
Year	Age 1	Age 2	Age 3	Age 4	Age 5	Age 6+	Year	Age 1	Age 2	Age 3	Age 4	Age 5	Age 6+
1982	0.82	1.67	2.47	3.11	3.78	5.24	1982	1.04	1.46	2.47	3.12	3.78	4.79
1983	0.87	1.50	2.53	3.12	3.53	4.07	1983	1.04	1.46	2.47	3.12	3.78	4.79
1984	0.89	1.96	2.73	3.63	3.91	4.16	1984	1.04	1.46	2.47	3.12	3.78	4.79
1985	0.79	1.59	2.41	3.17	3.44	4.30	1985	1.04	1.46	2.47	3.12	3.78	4.79
1986	0.73	1.48	2.38	3.08	3.56	4.52	1986	1.04	1.41	2.44	3.11	3.78	4.79
1987	0.81	1.37	2.47	3.02	3.31	3.68	1987	1.20	1.59	2.37	2.95	3.44	4.36
1988	0.86	1.45	2.49	3.08	3.40	3.91	1988	1.20	1.59	2.37	2.95	3.44	4.36
1989	0.94	1.46	2.46	3.04	3.51	4.71	1989	1.20	1.59	2.37	2.95	3.44	4.36
1990	0.89	1.59	2.49	2.95	3.43	4.08	1990	1.20	1.59	2.37	2.95	3.44	4.36
1991	0.84	1.49	2.33	3.00	3.56	4.42	1991	1.20	1.59	2.37	2.95	3.44	4.36
1992	0.85	1.47	2.48	3.04	3.54	4.33	1992	1.20	1.59	2.37	2.95	3.44	4.36
1993	0.83	1.48	2.46	3.06	3.53	4.39	1993	1.20	1.59	2.37	2.95	3.44	4.36
1994	0.85	1.52	2.55	3.19	3.64	4.32	1994	1.20	1.59	2.37	2.95	3.44	4.36
1995	0.86	1.55	2.57	3.15	3.64	4.61	1995	1.20	1.59	2.37	2.95	3.44	4.36
1996	0.88	1.57	2.46	3.07	3.66	4.06	1996	1.20	1.59	2.37	2.95	3.44	4.36
1997	0.82	1.47	2.40	2.96	3.72	4.55	1997	1.17	1.36	2.30	2.91	3.72	4.50
1998	0.84	1.44	2.41	3.05	3.37	3.57	1998	1.18	1.33	2.33	3.00	3.35	3.51
1999	0.83	1.49	2.55	3.09	3.51	4.22	1999	1.18	1.36	2.48	3.08	3.47	4.03
2000	0.87	1.58	2.54	3.09	3.53	4.23	2000	1.21	1.51	2.50	3.05	3.48	4.14
2001	0.88	1.54	2.46	3.12	3.62	4.45	2001	1.21	1.41	2.38	3.02	3.53	4.46
2002	0.91	1.33	2.09	2.85	3.61	4.40	2002	1.27	1.37	2.13	3.07	3.59	4.22
2003	0.82	1.31	2.19	2.78	3.28	4.86	2003	1.09	1.40	2.18	2.58	3.33	4.69
2004	0.83	1.19	2.06	2.58	3.74	4.20	2004	1.19	1.39	2.20	3.21	3.73	4.32
2005	0.81	1.23	2.11	2.66	3.02	3.92	2005	1.08	1.35	2.10	2.20	2.96	3.98
2006	0.80	1.34	2.04	2.97	3.69	4.23	2006	1.22	1.39	2.14	2.98	3.75	4.25
2007	0.82	1.28	2.06	2.88	3.73	4.33	2007	.	1.44	2.16	2.77	3.68	4.32
2008	0.85	1.18	1.86	2.47	3.75	4.56	2008	1.19	1.31	1.96	2.81	3.76	4.51
2009	0.84	1.17	1.81	1.84	4.09	4.95	2009	1.22	1.30	1.92	2.19	3.83	4.58
2010	0.86	1.30	2.14	2.55	3.82	4.77	2010	1.20	1.45	2.24	2.60	3.82	4.77
2011	0.95	1.38	2.01	2.99	3.78	4.78	2011	1.25	1.73	2.37	3.04	4.17	4.90
2012	0.88	1.46	2.18	2.89	3.20	4.76	2012	1.17	1.48	2.42	2.68	3.74	4.34
2013	0.87	1.28	2.25	2.96	3.37	4.35	2013	1.26	1.55	2.49	2.85	3.74	4.55
2014	0.96	1.43	1.97	2.28	3.61	4.55	2014	1.26	1.54	2.12	2.21	3.71	4.42
2015	0.97	1.49	2.17	2.61	3.80	3.99	2015	1.24	1.48	2.20	2.67	3.74	3.96
2016	0.94	1.37	2.11	2.65	3.39	4.64	2016	1.20	1.43	2.23	3.09	3.27	4.58
2017	0.99	1.44	2.06	2.39	3.46	4.42	2017	1.25	1.54	2.21	2.45	3.46	4.42
2018	1.03	1.56	2.21	3.42	2.95	4.15	2018	1.26	1.62	2.33	3.34	2.97	4.15

Table 13: Summary of objective function components and negative log-likelihood values of the ASAP base model.

Objective function= 25271			
Component	Lambda	ESS	negLL
Catch_Recreational	1	--	-44
Catch_Commercial	1	--	-99
Index_1.0" mesh	1	--	-22
Index_1.25" mesh	1	--	-22
Index_1.5" mesh	1	--	-13
Catch_agecomps	--	7400	13960
Index_agecomps	--	19400	11522
Selectivity_parms_catch	20	--	1
Selectivity_parms_indices	12	--	13
Recruitment devs	1	--	-24

Table 14: Annual female Spotted Seatrout abundance-at-age and stock size estimates from the ASAP base model.

<i>Year</i>	<i>Age 1</i>	<i>Age 2</i>	<i>Age 3</i>	<i>Age 4</i>	<i>Age 5</i>	<i>Age 6+</i>	<i>Totals</i>
1982	5,508,960	1,439,010	539,603	262,145	216,190	1,182,930	9,148,838
1983	4,723,040	1,719,400	411,903	221,756	141,801	983,600	8,201,500
1984	3,110,230	1,186,480	314,555	129,194	103,936	763,823	5,608,218
1985	6,063,720	1,213,770	367,208	140,966	74,647	627,590	8,487,901
1986	7,659,270	2,382,550	386,928	167,257	82,087	509,340	11,187,432
1987	6,976,850	2,262,960	493,560	133,684	83,430	409,132	10,359,616
1988	8,218,400	2,063,440	495,179	175,302	67,482	340,263	11,360,066
1989	6,490,300	3,077,300	372,005	162,141	91,465	294,293	10,487,504
1990	6,673,470	1,833,160	289,248	87,053	73,282	268,239	9,224,452
1991	7,699,190	2,807,350	505,975	125,011	51,703	251,991	11,441,220
1992	7,133,150	2,584,730	432,919	158,356	64,406	218,672	10,592,233
1993	7,436,910	2,432,230	430,321	143,083	83,746	203,710	10,730,000
1994	8,126,190	2,726,530	453,898	147,909	76,662	206,033	11,737,222
1995	8,323,200	2,820,650	473,352	153,335	78,960	202,939	12,052,436
1996	7,682,410	2,923,700	551,434	175,822	85,787	204,383	11,623,536
1997	7,199,940	2,858,780	640,244	215,591	100,407	211,022	11,225,984
1998	8,266,030	2,819,020	715,346	274,610	129,369	228,766	12,433,141
1999	8,296,080	3,296,540	813,163	337,568	171,612	264,888	13,179,851
2000	9,110,890	3,125,400	847,492	363,310	206,183	320,408	13,973,683
2001	6,318,970	3,271,730	728,634	361,379	217,612	384,745	11,283,070
2002	5,580,080	2,072,420	615,562	278,310	206,669	436,270	9,189,311
2003	5,668,570	2,038,880	495,274	264,861	167,319	472,540	9,107,444
2004	6,330,560	1,977,410	446,706	204,861	156,633	470,639	9,586,809
2005	8,136,290	2,419,200	528,885	203,950	126,275	465,830	11,880,430
2006	7,038,000	3,466,810	822,428	272,029	132,158	445,239	12,176,664
2007	7,650,960	2,673,810	920,570	374,670	167,527	429,295	12,216,832
2008	8,245,720	3,210,030	880,355	466,254	241,221	446,543	13,490,123
2009	6,796,660	3,087,960	824,712	394,405	285,129	506,450	11,895,316
2010	6,695,150	2,172,400	562,091	311,677	224,580	572,790	10,538,688
2011	7,277,630	2,520,540	565,722	253,635	191,176	590,288	11,398,991
2012	5,960,020	2,609,220	589,895	242,131	152,163	577,252	10,130,681
2013	5,279,940	1,642,360	343,461	189,901	128,903	527,428	8,111,993
2014	5,550,860	1,323,580	175,515	99,694	96,800	471,113	7,717,562
2015	6,359,680	1,779,270	241,676	66,382	56,784	417,557	8,921,350
2016	7,472,050	1,865,860	268,164	83,158	36,341	347,742	10,073,315
2017	5,509,870	2,050,860	243,244	85,895	44,177	280,750	8,214,796
2018	7,396,120	1,205,630	162,795	60,941	41,162	232,131	9,098,779

Table 15: Annual female Spotted Seatrout age-specific, apical, and average fishing mortality rates estimated from the ASAP base model.

<i>Year</i>	<i>Age 1</i>	<i>Age 2</i>	<i>Age 3</i>	<i>Age 4</i>	<i>Age 5</i>	<i>Age 6</i>	<i>Apical F</i>	<i>Avg. F</i>
1982	0.64	0.89	0.58	0.33	0.17	0.09	0.89	0.58
1983	0.85	1.33	0.85	0.47	0.24	0.12	1.33	0.85
1984	0.41	0.81	0.49	0.26	0.13	0.06	0.81	0.44
1985	0.41	0.78	0.48	0.26	0.13	0.06	0.78	0.43
1986	0.69	1.21	0.75	0.41	0.21	0.10	1.21	0.77
1987	0.69	1.16	0.73	0.40	0.20	0.10	1.16	0.76
1988	0.45	1.35	0.81	0.37	0.15	0.06	1.35	0.62
1989	0.74	2.00	1.14	0.51	0.21	0.08	2.00	1.10
1990	0.34	0.92	0.53	0.24	0.10	0.04	0.92	0.45
1991	0.56	1.51	0.85	0.38	0.15	0.06	1.51	0.79
1992	0.55	1.43	0.80	0.35	0.14	0.06	1.43	0.76
1993	0.48	1.31	0.76	0.34	0.14	0.05	1.31	0.66
1994	0.53	1.39	0.78	0.34	0.14	0.05	1.39	0.73
1995	0.52	1.27	0.68	0.30	0.12	0.05	1.27	0.69
1996	0.46	1.15	0.63	0.28	0.11	0.04	1.15	0.63
1997	0.41	1.02	0.54	0.23	0.09	0.03	1.02	0.56
1998	0.39	0.88	0.44	0.19	0.07	0.03	0.88	0.49
1999	0.45	0.99	0.50	0.21	0.08	0.03	0.99	0.57
2000	0.50	1.09	0.54	0.23	0.09	0.03	1.09	0.61
2001	0.59	1.31	0.65	0.27	0.11	0.04	1.31	0.76
2002	0.48	1.07	0.53	0.22	0.09	0.03	1.07	0.58
2003	0.53	1.15	0.57	0.24	0.10	0.04	1.15	0.63
2004	0.43	0.95	0.47	0.20	0.08	0.03	0.95	0.51
2005	0.33	0.71	0.35	0.15	0.06	0.02	0.71	0.39
2006	0.44	0.96	0.48	0.20	0.08	0.03	0.96	0.57
2007	0.34	0.75	0.37	0.16	0.06	0.02	0.75	0.41
2008	0.45	1.00	0.49	0.21	0.08	0.03	1.00	0.56
2009	0.61	1.34	0.66	0.28	0.11	0.04	1.34	0.76
2010	0.45	0.98	0.49	0.20	0.08	0.03	0.98	0.52
2011	0.50	1.09	0.54	0.23	0.09	0.03	1.09	0.59
2012	0.76	1.66	0.82	0.35	0.14	0.05	1.66	0.94
2013	0.86	1.87	0.93	0.39	0.15	0.06	1.87	0.99
2014	0.61	1.34	0.66	0.28	0.11	0.04	1.34	0.69
2015	0.70	1.53	0.76	0.32	0.13	0.05	1.53	0.83
2016	0.76	1.67	0.83	0.35	0.14	0.05	1.67	0.90
2017	0.99	2.17	1.07	0.45	0.18	0.07	2.17	1.25
2018	0.33	0.73	0.36	0.15	0.06	0.02	0.73	0.38

Table 16: Limit and target reference point estimates for the Louisiana Spotted Seatrout stock. Spawning stock biomass units are pounds  $\times 10^6$ . Fishing mortality units are years<sup>-1</sup>.

<i>Management Benchmarks</i>		
<i>Parameters</i>	<i>Derivation</i>	<i>Value</i>
$SSB_{limit}$	<i>Lowest SSB (1982-2009)</i>	4.66
$SPR_{limit}$	<i>Equation [29] and <math>SSB_{limit}</math></i>	10.2%
$F_{limit}$	<i>Equation [29] and <math>SPR_{limit}</math></i>	0.76
$SSB_{target}$	<i>Median SSB (1982-2009)</i>	6.22
$SPR_{target}$	<i>Equation [29] and <math>SSB_{target}</math></i>	13.6%
$F_{target}$	<i>Equation [29] and <math>SPR_{target}</math></i>	0.63

Table 17: Sensitivity analysis table of proposed limit reference points. Current estimates are taken as the geometric mean of the 2016-2018 estimates. Yield and spawning stock biomass units are millions of pounds, and fishing mortality units are years<sup>-1</sup>.

<i>Model run</i>	<i>negLL</i>	<i>SPR<sub>limit</sub></i>	<i>Yield<sub>limit</sub></i>	<i>F<sub>limit</sub></i>	<i>SSB<sub>limit</sub></i>	<i>SPR<sub>current</sub></i>	<i>F<sub>current</sub>/F<sub>limit</sub></i>	<i>SSB<sub>current</sub>/SSB<sub>limit</sub></i>
<i>Base Model (h=1)</i>	25271.2	10.2%	4.96	0.76	4.66	8.5%	0.99	0.84
<i>Model 1 (h=0.95)</i>	25271.3	10.4%	4.81	0.75	4.64	9.0%	1.01	0.84
<i>Model 2 (h=0.90)</i>	25271.7	10.7%	4.64	0.73	4.61	9.5%	1.03	0.84
<i>Model 3 (h=0.85)</i>	25272.1	11.1%	4.46	0.72	4.60	10.1%	1.05	0.85
<i>Model 4 (h=0.80)</i>	25272.8	11.5%	4.26	0.70	4.59	10.8%	1.07	0.85
<i>Model 5 (Yield lambda*10)</i>	23766.2	8.3%	5.18	0.85	3.87	8.5%	0.86	1.03
<i>Model 6 (IOA lambdas*10)</i>	24457.0	10.8%	4.52	0.72	4.52	7.7%	1.21	0.71
<i>Model 7 (Winterkill index)</i>	25309.0	8.1%	5.88	0.84	4.31	6.5%	0.85	0.80
<i>Model 8 (Discard M=0.25)</i>	25119.9	9.7%	5.08	0.79	4.61	8.2%	0.99	0.84
<i>Model 9 (Growth model ALK's 1982-2018)</i>	24878.7	10.2%	4.90	0.80	4.45	7.1%	1.11	0.69
<i>Model 10 (ACAL MRIP hindcast)</i>	25036.0	9.3%	5.19	0.81	4.43	8.0%	0.95	0.86
<i>Model 11 (MRIP Size with FES/APAIS)</i>	25268.3	10.3%	4.96	0.75	4.70	8.4%	1.00	0.82

Table 18: Sensitivity analysis table of MSY related reference points. Current estimates are taken as the geometric mean of 2016-2018 estimates. Yield and spawning stock biomass units are millions of pounds, and fishing mortality units are years<sup>-1</sup>.

<i>Model run</i>	<i>negLL</i>	<i>SPR<sub>MSY</sub></i>	<i>MSY</i>	<i>F<sub>MSY</sub></i>	<i>SSB<sub>MSY</sub></i>	<i>SPR<sub>current</sub></i>	<i>F<sub>current</sub>/F<sub>MSY</sub></i>	<i>SSB<sub>current</sub>/SSB<sub>MSY</sub></i>
<i>Base Model (h=1)</i>	25271.2	--	--	--	--	8.5%	--	--
<i>Model 1 (h=0.95)</i>	25271.3	12.0%	4.82	0.69	5.43	9.0%	1.10	0.72
<i>Model 2 (h=0.90)</i>	25271.7	17.3%	4.90	0.54	8.42	9.5%	1.40	0.46
<i>Model 3 (h=0.85)</i>	25272.1	21.7%	5.24	0.45	11.85	10.1%	1.67	0.33
<i>Model 4 (h=0.80)</i>	25272.8	25.7%	5.97	0.39	16.74	10.8%	1.93	0.23

11. Figures

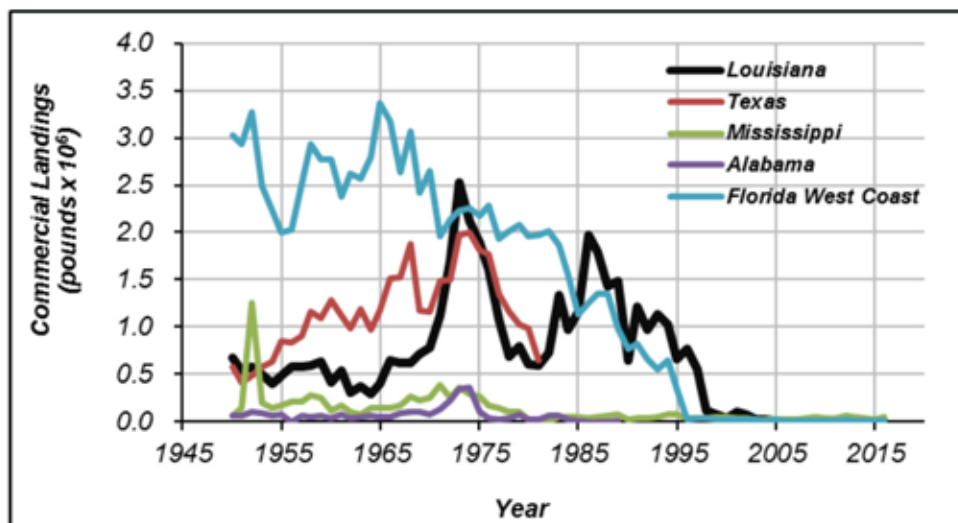


Figure 1: Reported commercial Spotted Seatrout landings (pounds x 10<sup>6</sup>) of the Gulf of Mexico derived from NMFS statistical records and the LDWF Trip Ticket Program.

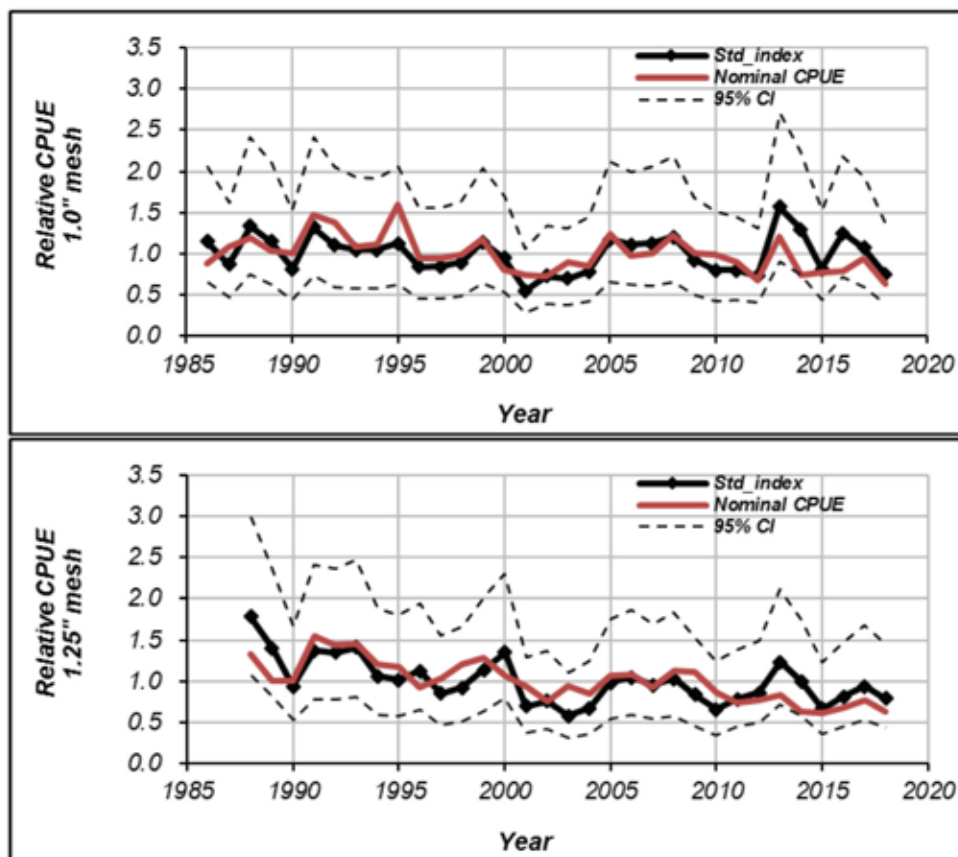


Figure 2: Standardized indices of abundance, nominal catch-per-unit-effort, and 95% confidence intervals of the standardized indices derived from the LDWF experimental marine gillnet survey. Each time-series has been normalized to its individual long-term mean for comparison.

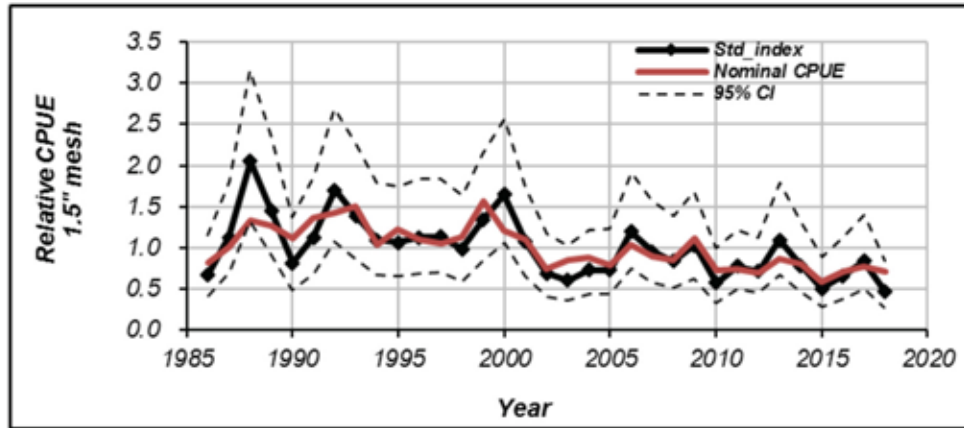


Figure 2 (continued):

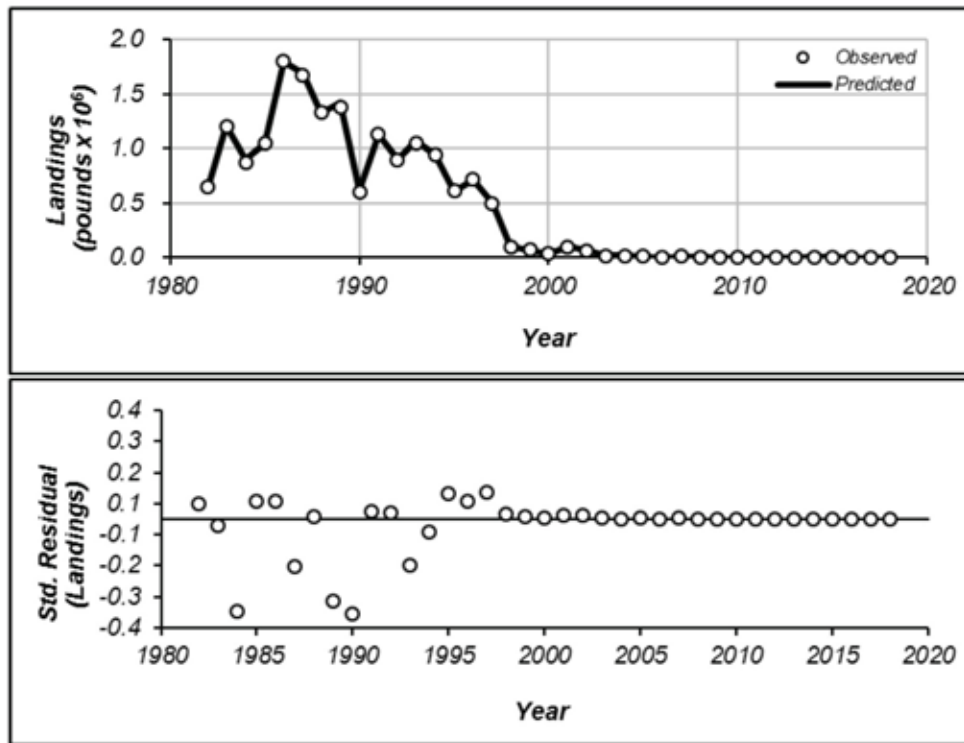


Figure 3: Observed and ASAP base model estimated commercial yield (females only; top) and standardized residuals (bottom).

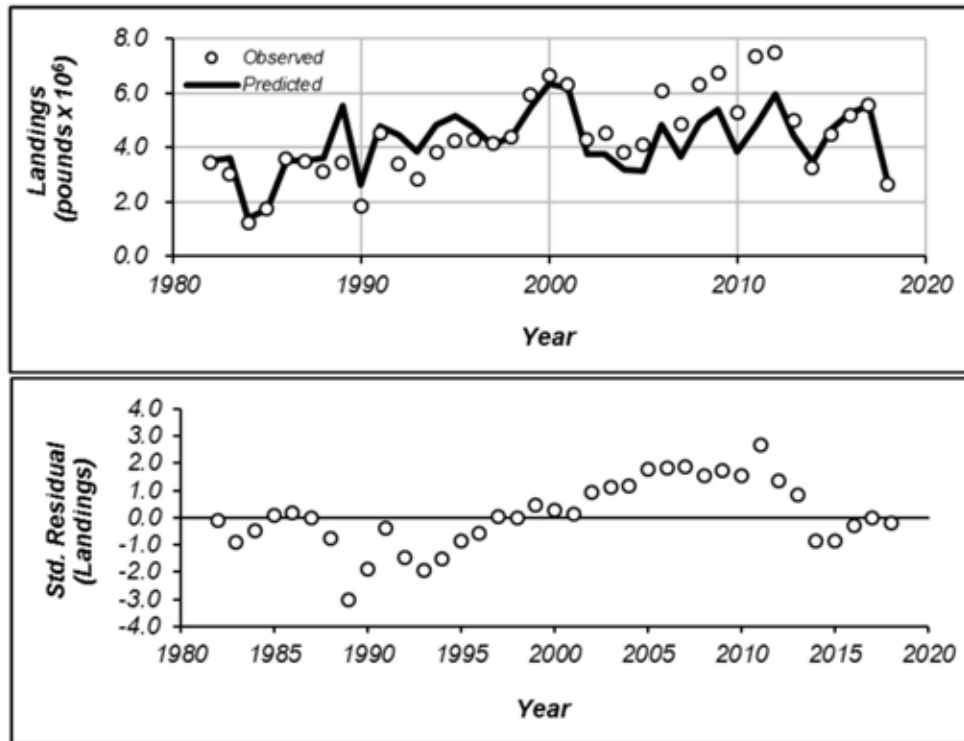


Figure 4: Observed and ASAP base model estimated recreational yield (females only; top) and standardized residuals (bottom).

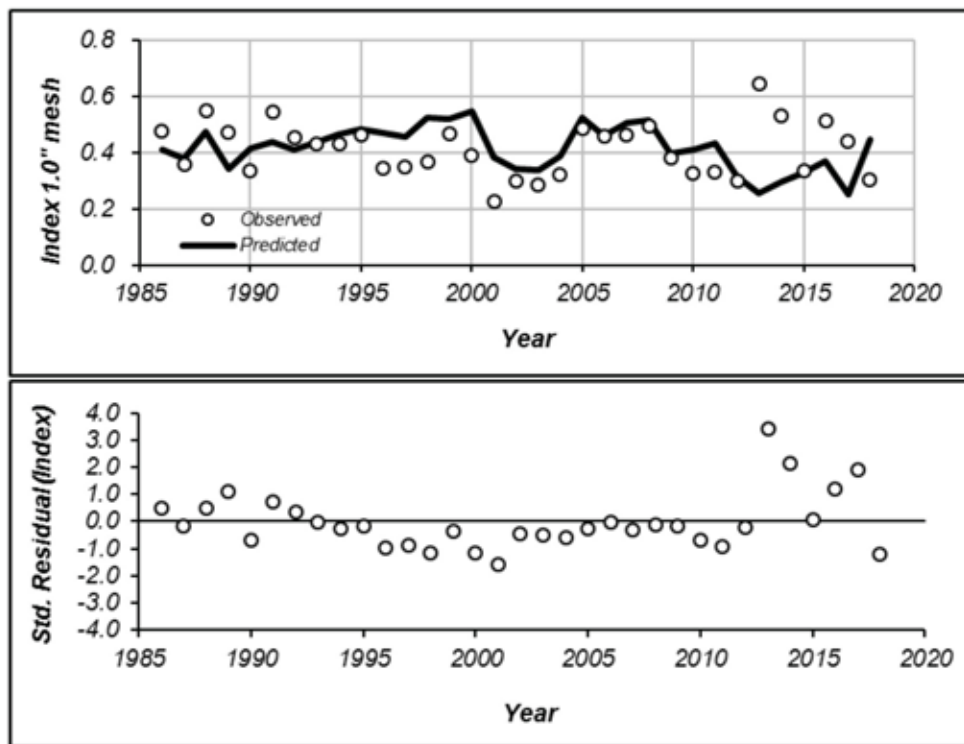


Figure 5: Observed and ASAP base model estimated survey CPUE (1.0" mesh; females only, top) and standardized residuals (bottom).

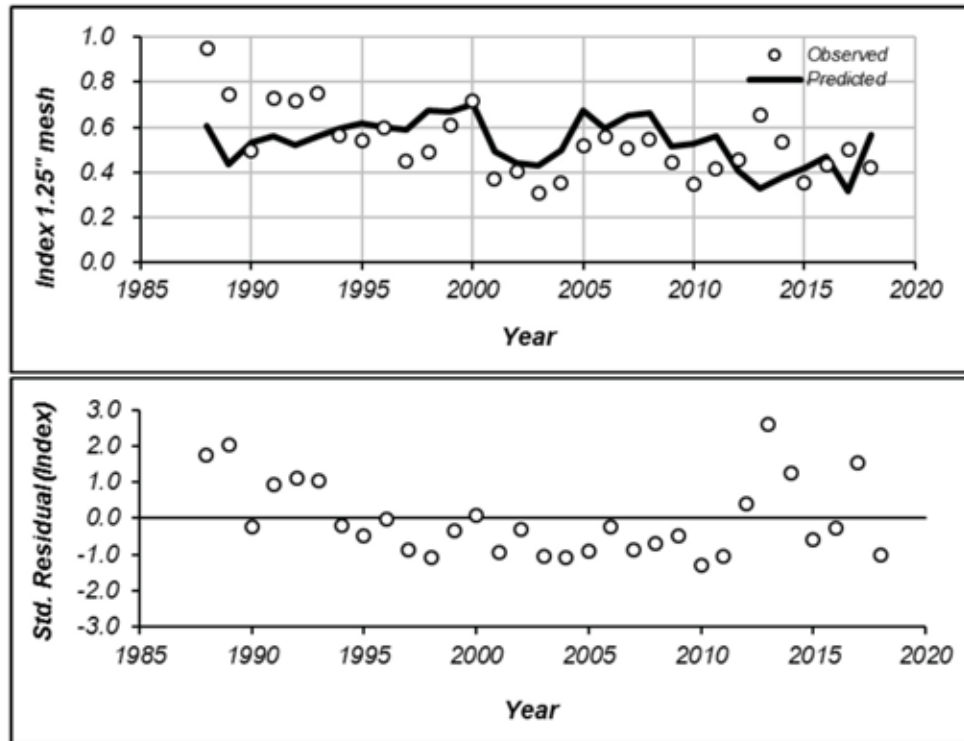


Figure 6: Observed and ASAP base model estimated survey CPUE (1.25" mesh; females only, top) and standardized residuals (bottom).

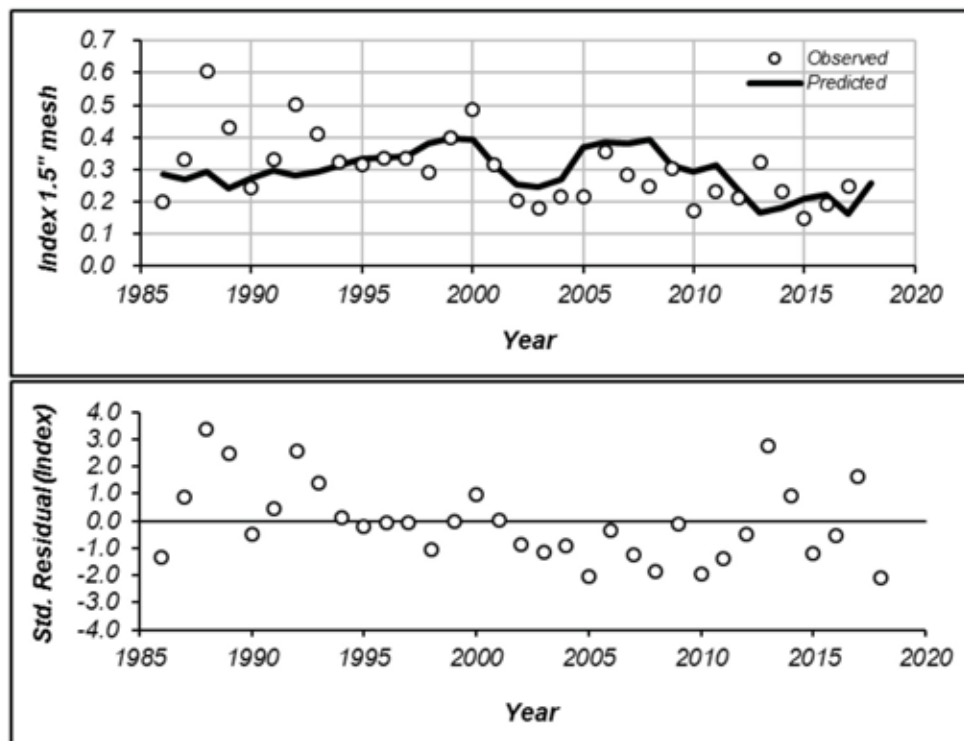


Figure 7: Observed and ASAP base model estimated survey CPUE (1.5" mesh; females only, top) and standardized residuals (bottom).

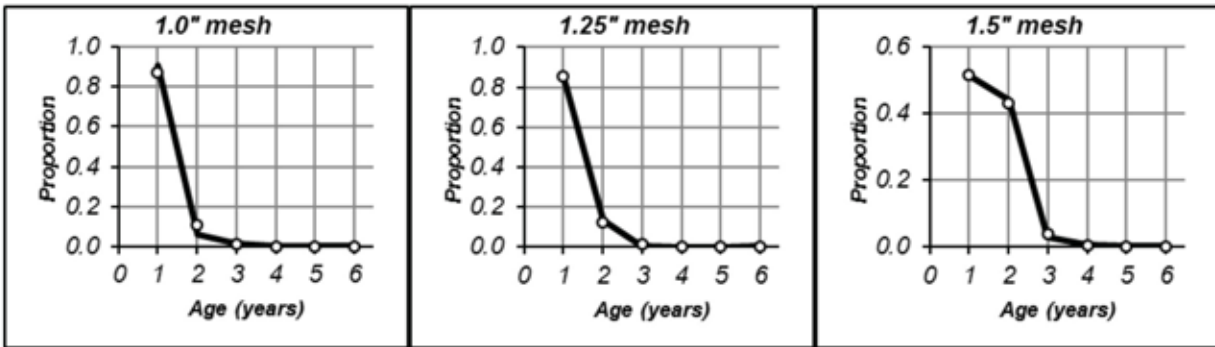


Figure 8: Overall (average) input (open circles) and ASAP estimated (bold lines) age compositions of experimental gillnet survey catches.

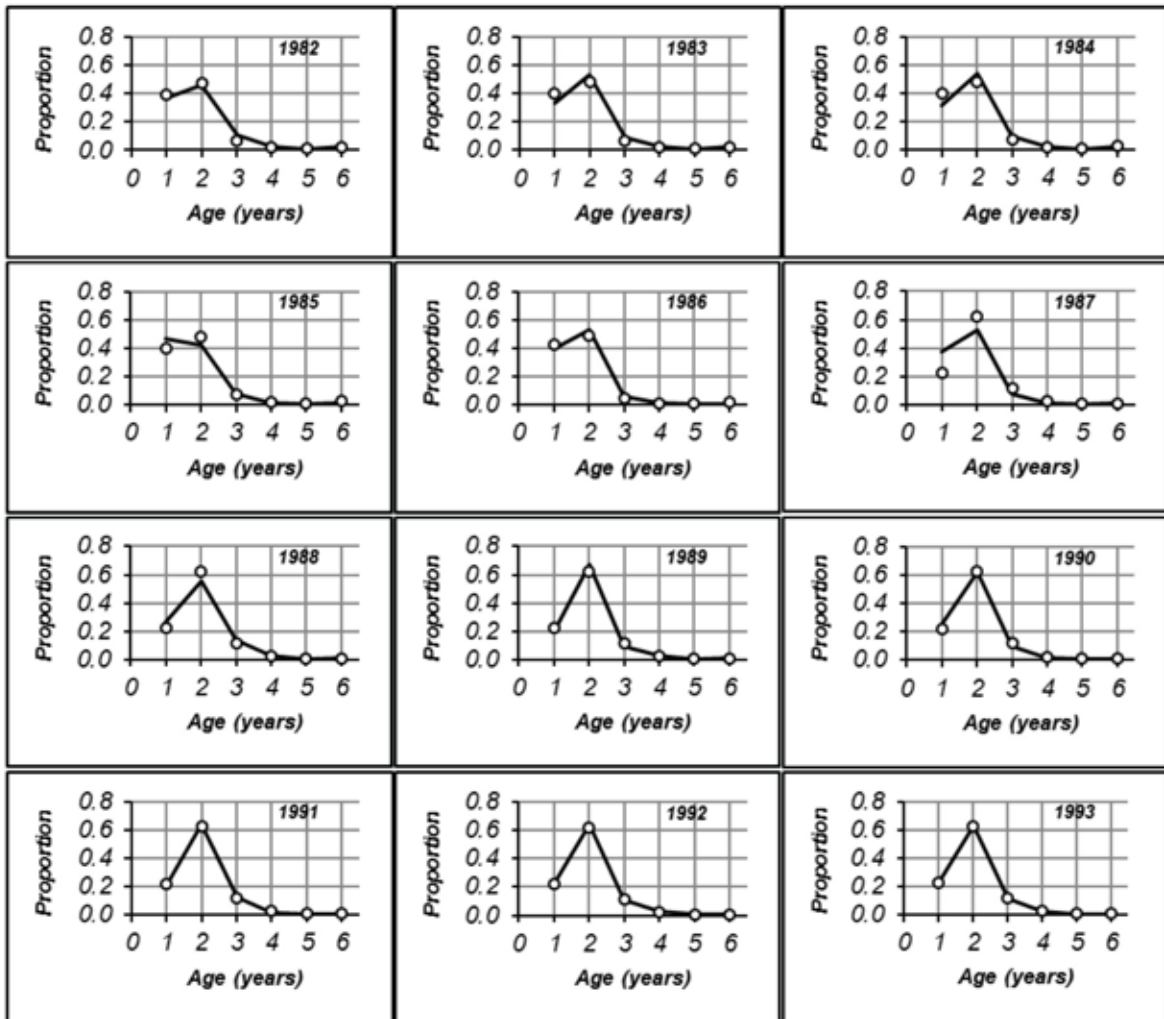


Figure 9: Annual input (open circles) and ASAP estimated (bold lines) commercial harvest age compositions.

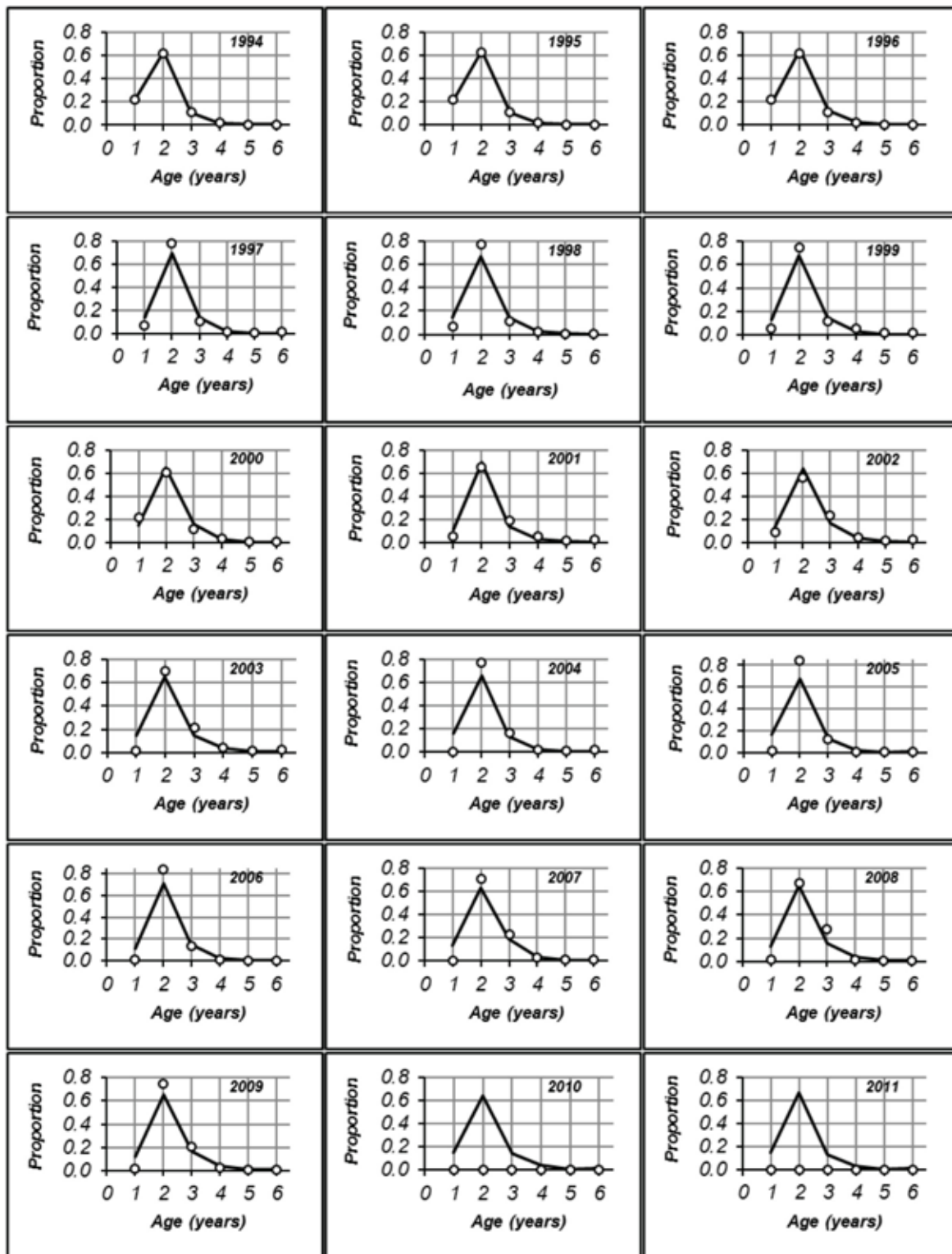


Figure 9 (continued):

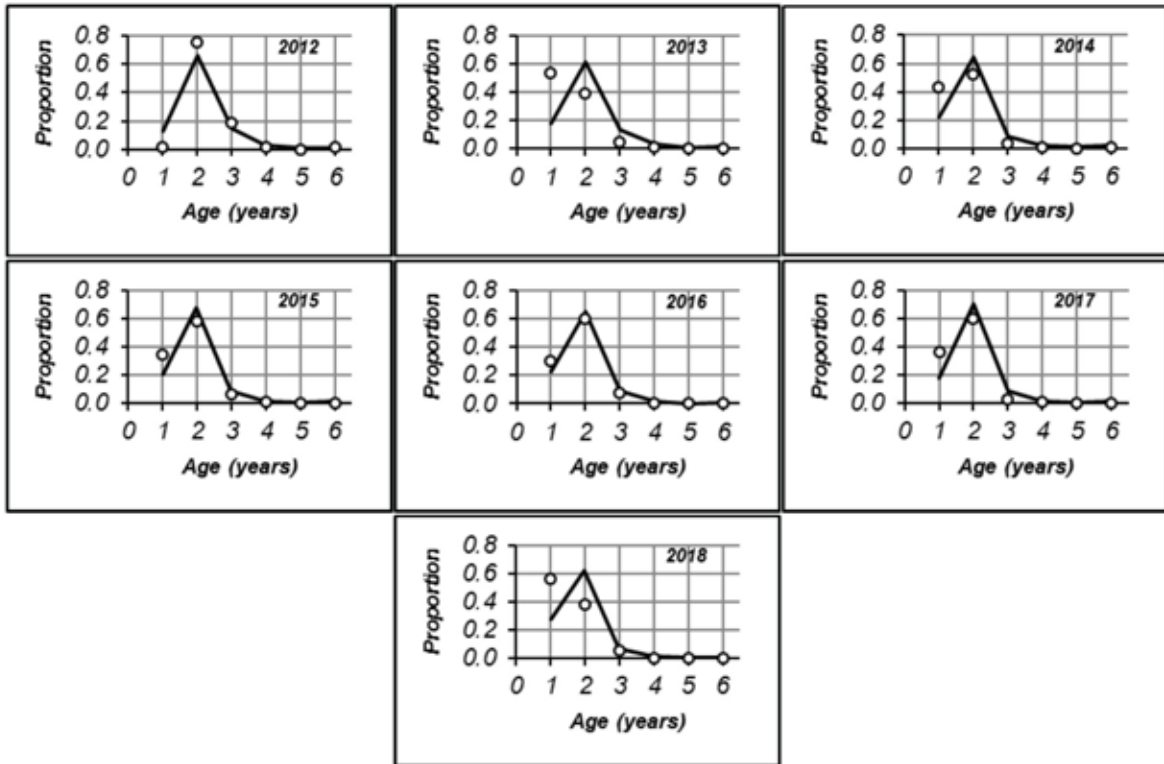


Figure 9 (continued):

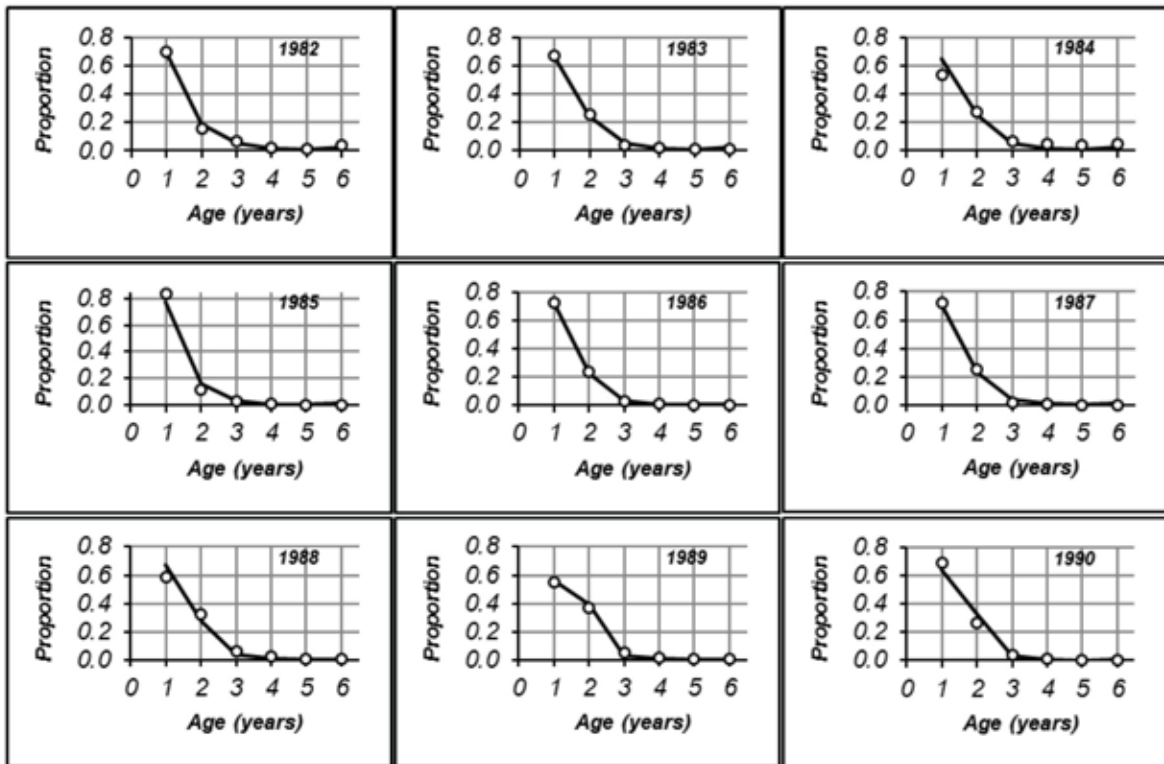


Figure 10: Annual input (open circles) and ASAP estimated (bold lines) recreational harvest age compositions.

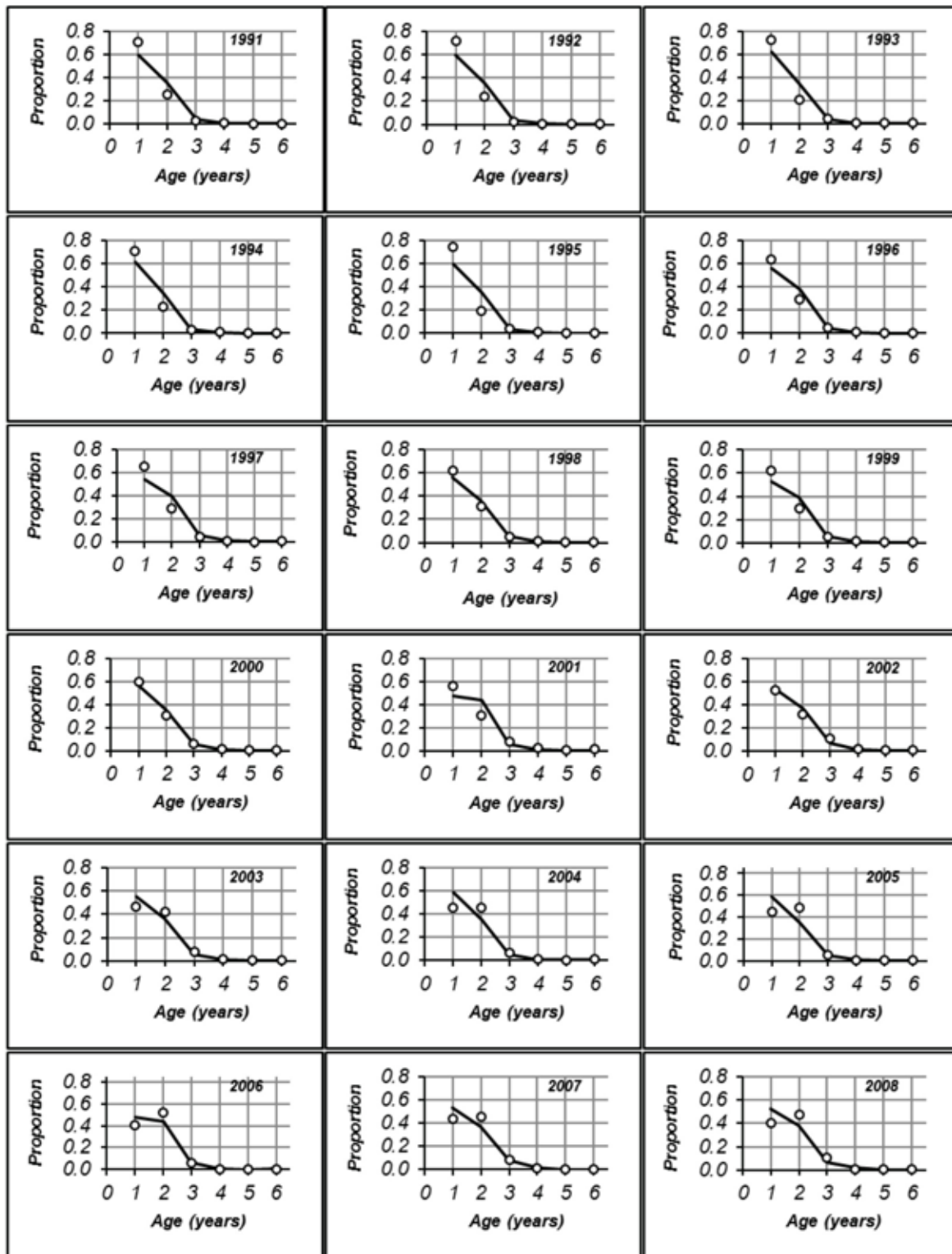


Figure 10 (continued):

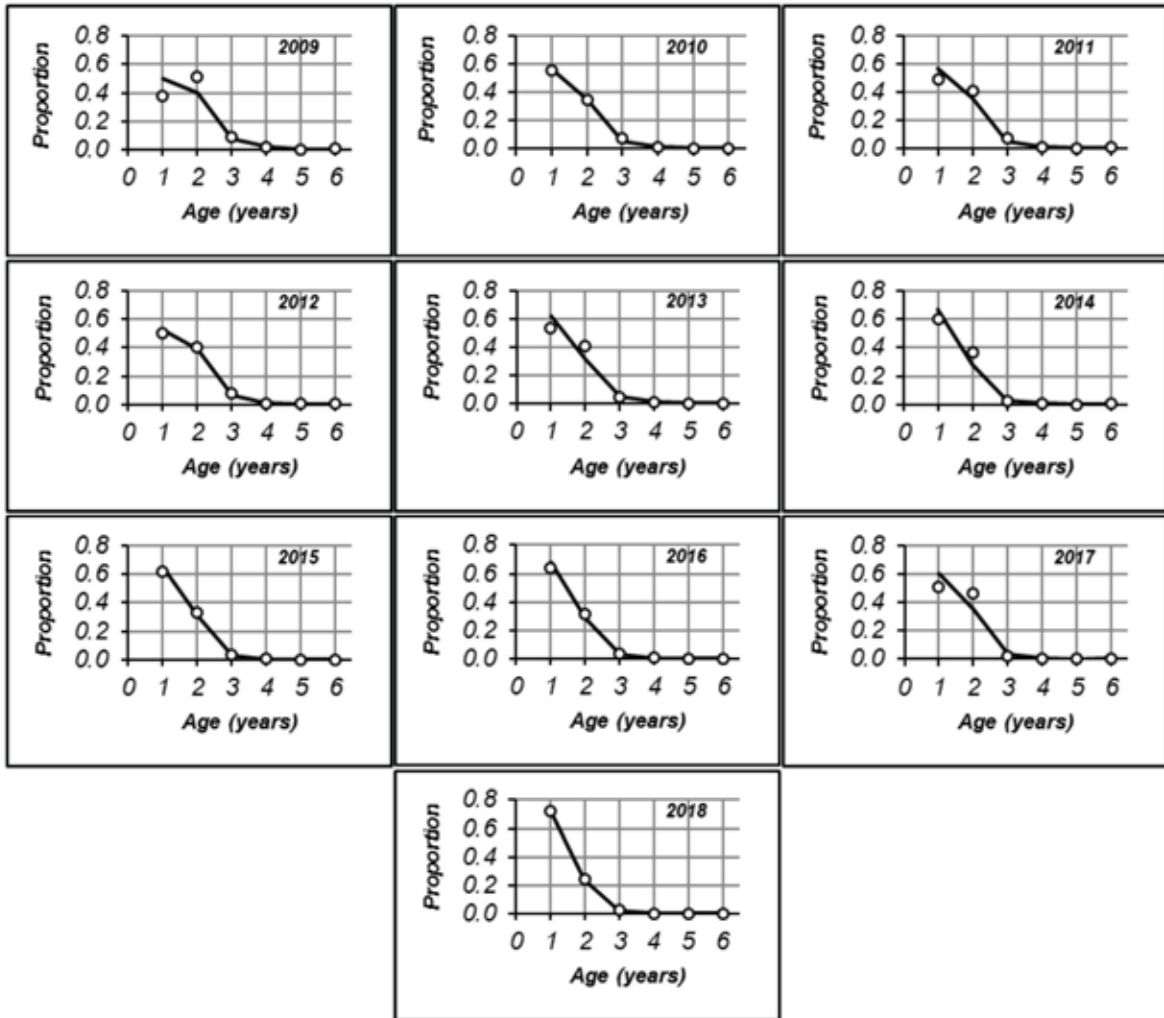


Figure 10 (continued):

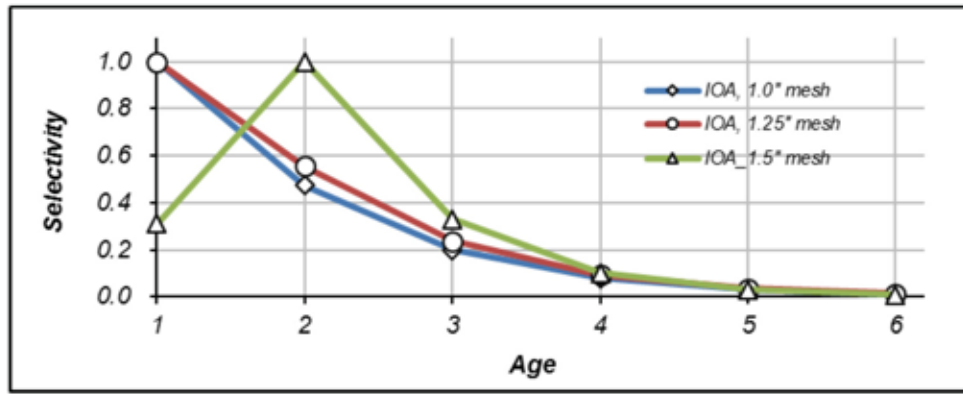


Figure 11: ASAP base model estimated survey selectivities (females only).

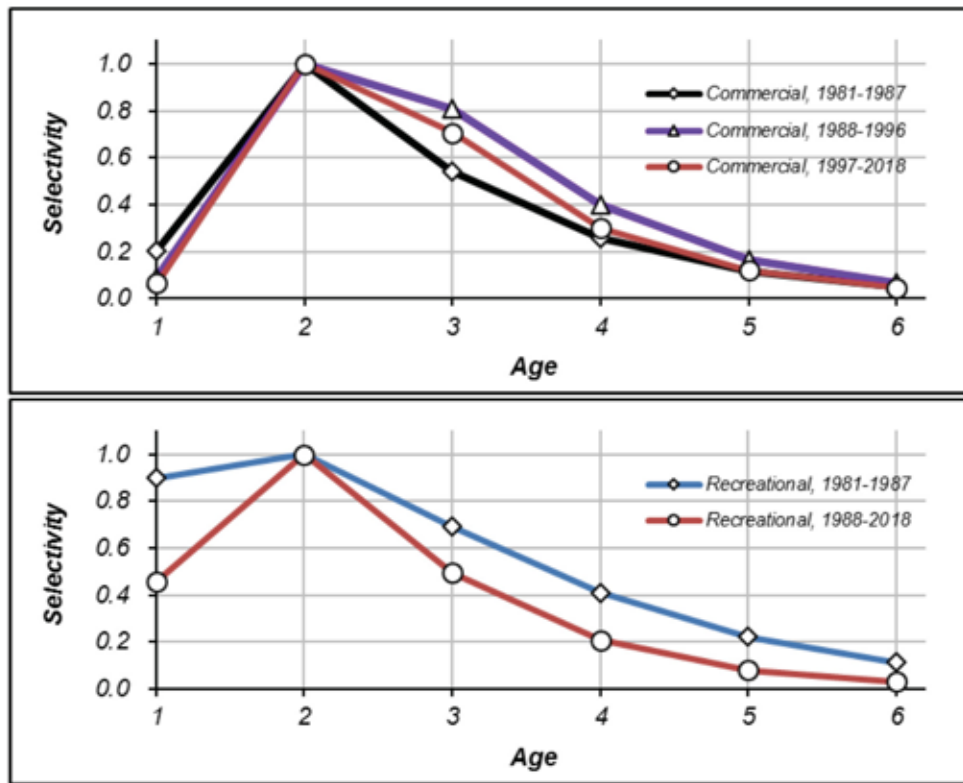


Figure 12: ASAP base model estimated fishery selectivities (females only).

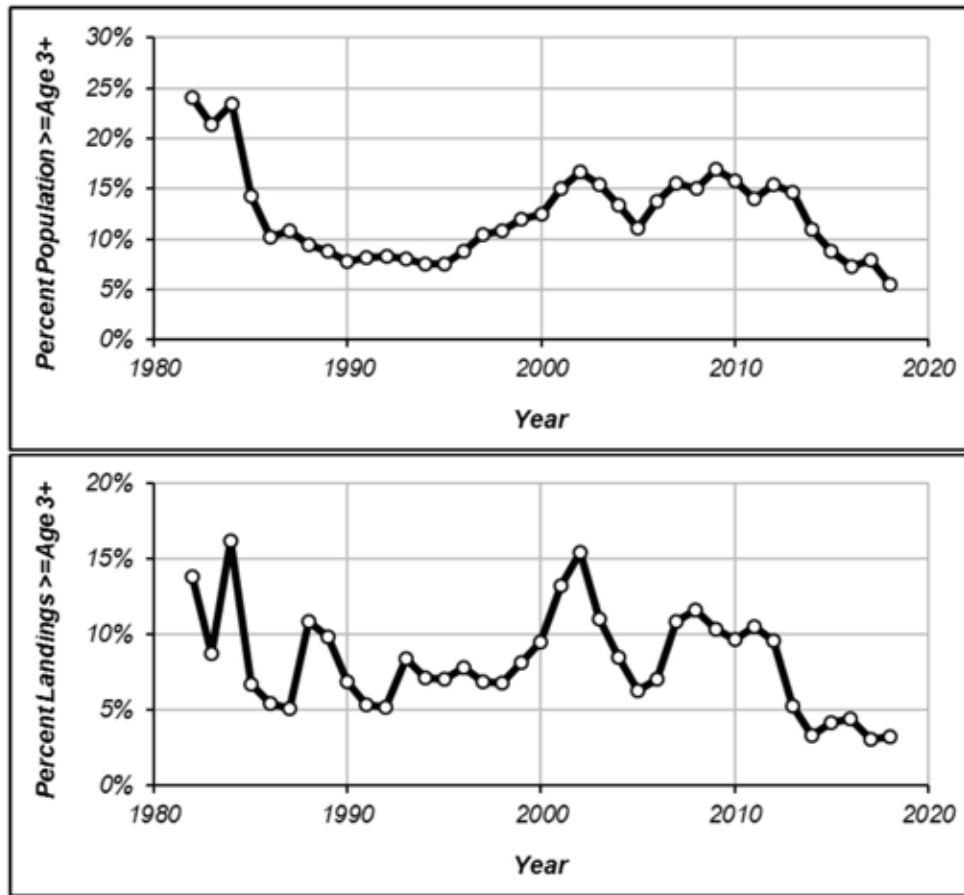


Figure 13: Proportion of the ASAP base model estimated stock  $\geq$  age-3+ (top graphic) and the proportion of observed landings (females only)  $\geq$  age-3+ (bottom graphic).

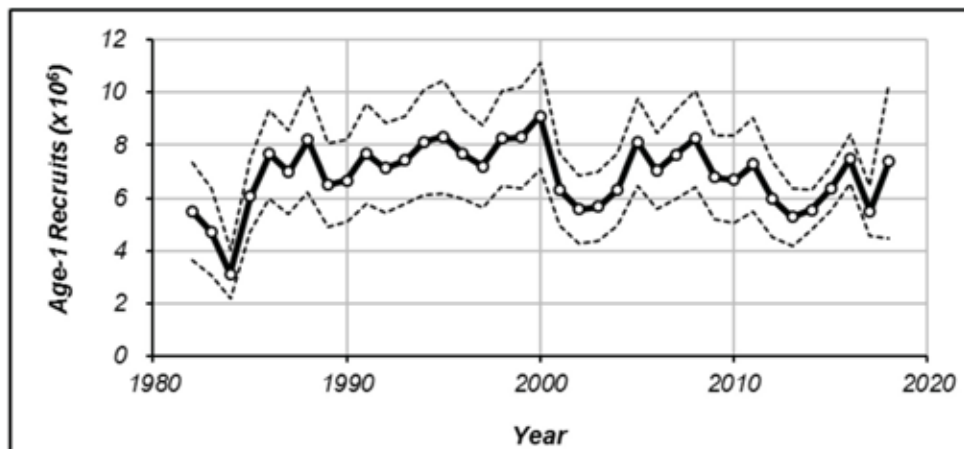


Figure 14: ASAP base model estimated recruitment (age-1 females). Dashed lines represent  $\pm 2$  asymptotic standard errors.

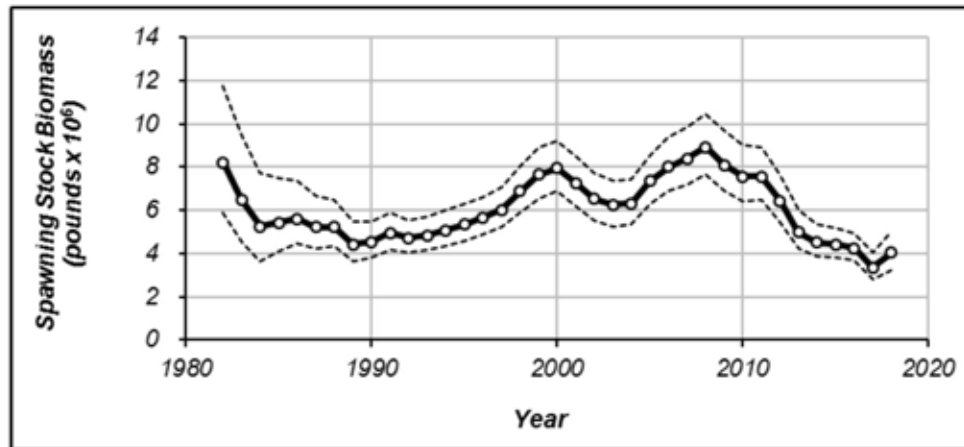


Figure 15: ASAP base model estimated female spawning stock biomass (MCMC median). Dashed lines represent 95% MCMC derived confidence intervals.

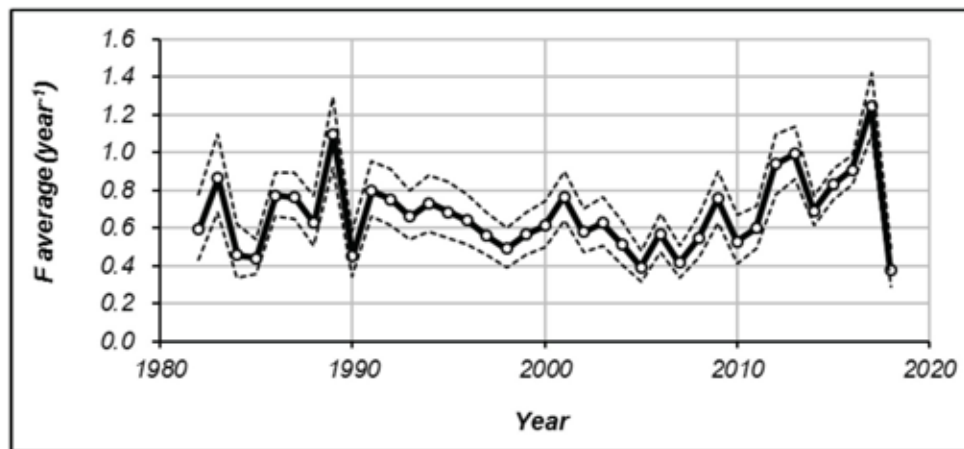


Figure 16: ASAP base model estimated average fishing mortality (MCMC median). Dashed lines represent 95% MCMC derived confidence intervals.

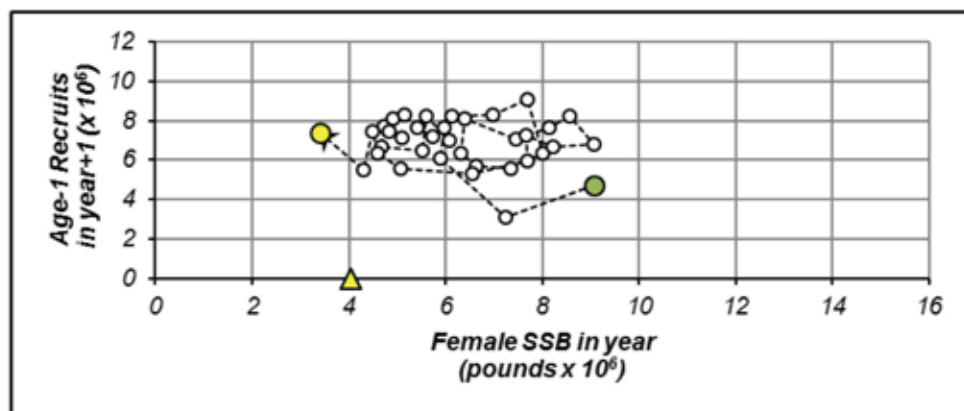


Figure 17: ASAP base model estimated age-1 recruits and female spawning stock biomass. Arrow represents direction of the time-series. The yellow circle represents the most current data pair (2018 age-1 recruits / 2017 female SSB) and the yellow triangle represents the 2018 SSB estimate. The green circle represents the first data pair (1983 age-1 recruits / 1982 female SSB).

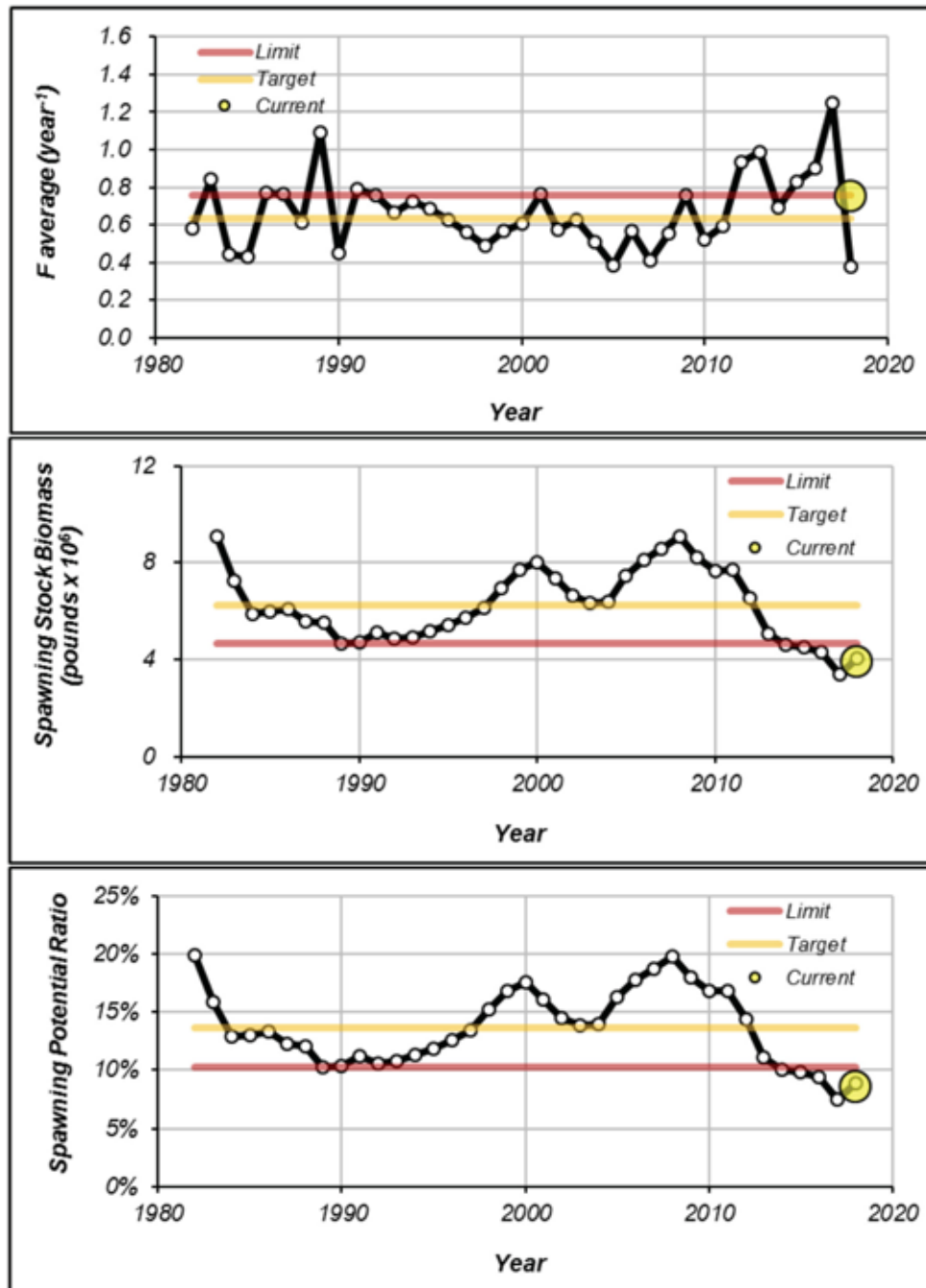


Figure 18: Time-series of ASAP base model estimated average fishing mortality rates, female spawning stock biomass, and spawning potential ratio relative to proposed limit and target reference points. Current values represent the geometric mean of the 2016-2018 estimates.

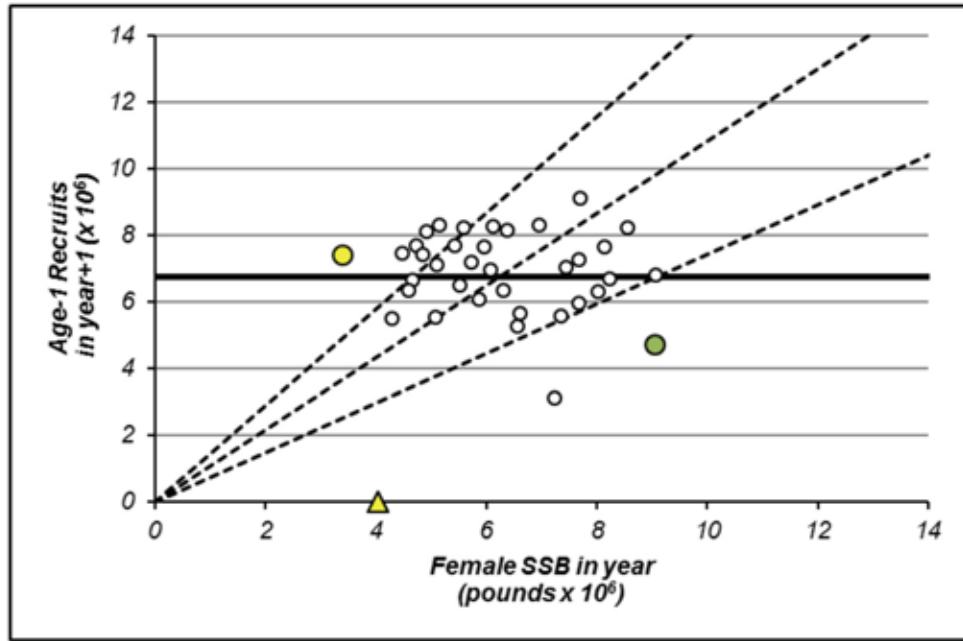


Figure 19: ASAP base model estimated age-1 recruits and female spawning stock biomass (open circles). Equilibrium recruitment is represented by the bold horizontal. The yellow circle represents the most current data pair (2018 age-1 recruits / 2017 female SSB) and the yellow triangle represents the 2018 SSB estimate. The green circle represents the first data pair (1983 age-1 recruits / 1982 female SSB). Equilibrium recruitment per spawning stock biomass corresponding with the limit and target spawning stock biomass reference point estimates and the maximum spawning stock biomass are represented by the slopes of the dashed diagonals ( $SSB_{limit}=10.2\%SPR$ ;  $SSB_{target}=13.6\%$ ; max.  $SSB=19.8\%SPR$ ).

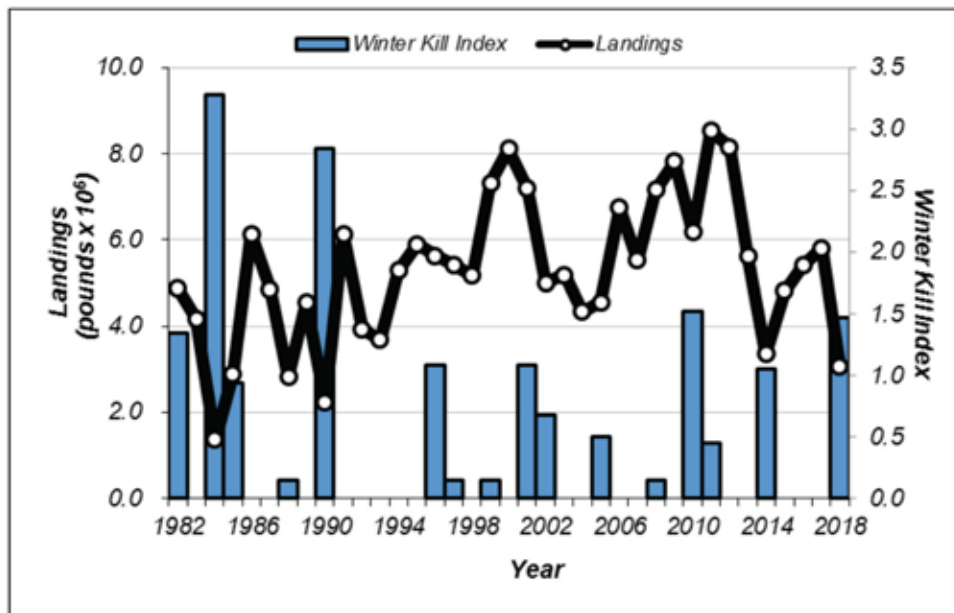


Figure 20: Spotted Seatrout landings (total) relative to winterkill index values.

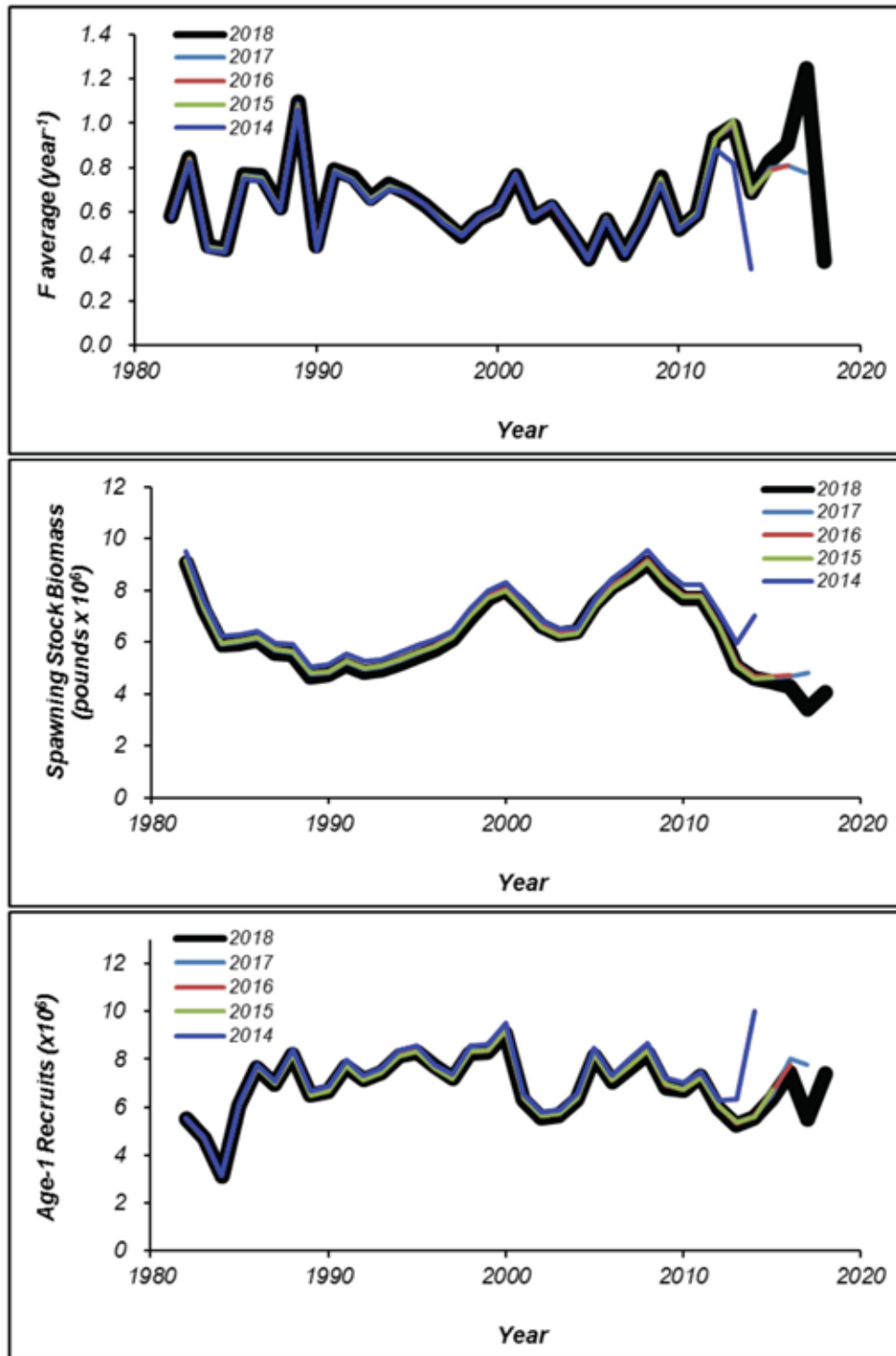


Figure 21: Retrospective analysis of ASAP base model. Top graphics depict annual average fishing mortality and female spawning stock biomass estimates. Bottom graphic depicts estimated age-1 recruits.

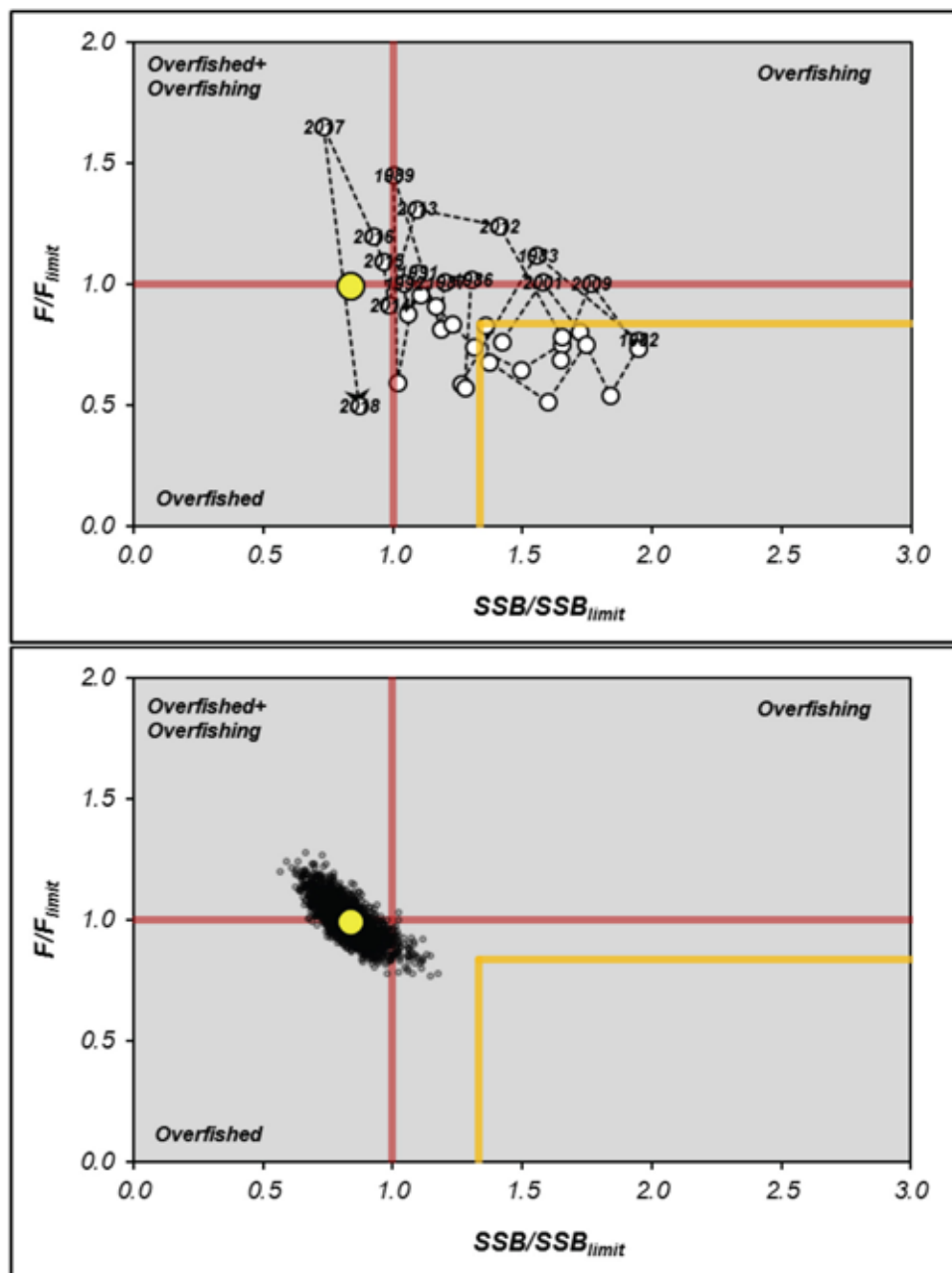


Figure 22: ASAP base model estimated ratios of annual average fishing mortality rates and female spawning stock biomass to the proposed limit reference points ( $F_{limit}$  and  $SSB_{limit}$ ). Also presented are the proposed target reference points (yellow lines). Arrow represents direction of time-series. The first and last year of the time-series are identified along with the years overfishing occurred and/or the stock was considered overfished. The yellow circle represents current status (geometric mean 2016-2018). Bottom graphic depicts current status and results of 2000 MCMC simulations relative to proposed limit and target reference points.

**Appendix 1:****LA Creel/MRIP Calibration Procedure**

Joe West and Xinan Zhang  
Office of Fisheries  
Louisiana Department of Wildlife and Fisheries  
10/8/2018

Overview

The Louisiana Department of Wildlife and Fisheries (LDWF) conducts stock assessments on important recreationally and commercially landed species. Time-series of fishery removals are critical components of these stock assessments as they provide the level of depletion of the resource through time. Beginning in 2014, LDWF started its own creel survey (LA Creel) to provide recreational landings estimates for Louisiana-specific fishery management and stock assessment purposes. Prior to 2014 recreational landings estimates were taken from the National Marine Fisheries Service's Marine Recreational Intercept Program and the earlier Marine Recreational Fisheries Statistical Survey (MRIP/MRFSS). The MRIP and LA Creel surveys were conducted simultaneously in 2015 for benchmarking purposes. Methods are now needed to calibrate MRIP landings estimates to LA Creel landings estimates for species with upcoming LDWF stock assessments.

Calibration Methodology

A ratio estimator approach is described below allowing hind-casting of LA Creel recreational harvest estimates to 1982. The calibration procedure to hind-cast LA Creel discard estimates is presented in the Appendix of this document.

Concurrent harvest rate estimates of LA Creel and MRIP are only available for the single year (2015) both surveys were conducted simultaneously. Effort estimates, however, are available from both surveys for multiple years (2015-2017). The reliability of this calibration procedure could be greatly improved with more comparison years of the surveys.

Note: MRIP private fishing effort is distributed across the various fishing modes (shore, inshore, and offshore) by applying the observed distribution of those modes from the dockside survey. In 2016 and 2017, the MRIP effort estimation process required additional estimations, as the dockside portion of that survey was not conducted in Louisiana. NOAA Fisheries applied the proportions of trips by fishing mode observed in 2015 to the effort data collected in 2016 and 2017 to obtain estimates of angler trips by fishing mode. While this method is clearly not optimal, it does allow comparison of effort over additional years.

The LA Creel survey provides estimates for four fishing modes (FM): private inshore (PI), private offshore (PO), charter inshore (CI), and charter offshore (CO). The MRIP survey provides estimates for five fishing modes: private boat (PR), shore (SH), PO, CI, and CO. For calibration purposes, LA Creel estimates are transformed into a fifth fishing mode equivalent to the MRIP surveys SH mode by separating the PI mode into PR and SH modes. Additionally, the inshore/offshore fishing modes of each survey are collapsed into overall private (P) and charter (C) fishing modes for the species included in this report that support predominantly inshore fisheries.

Fishing effort (E) estimates of the two surveys are calibrated separately by collapsed fishing mode (P and SH only) and bimonthly period (w). Because the charter fishing effort frame used by the LA Creel and MRIP surveys are functionally equivalent, charter fishing effort and corresponding variance estimates of the two surveys are assumed equivalent and not adjusted. Harvest rates and corresponding variance estimates of the MRIP and LA Creel surveys for the species included in this report are also assumed equivalent and not adjusted. Calibrated effort estimates of the shore and private fishing modes are then combined with unadjusted MRIP harvest rate estimates to provide time-series of recreational harvest estimates for species with upcoming LDWF stock assessments as described below.

### *Fishing Effort*

To allow hind-casting of LA Creel effort estimates to the historic MRIP effort time-series, fishing effort calibration factors are calculated as the ratio of mean fishing effort (2015-2017) from each survey by fishing mode (P and SH only) and bimonthly period as:

$$\hat{R}_{E,FM,w} = \frac{\bar{E}_{LAcreel,FM,w}}{\bar{E}_{MRIP,FM,w}} \quad [1]$$

Note: MRIP effort estimates in Equation [1] are based on the FES and APAIS methodologies.

Survey-specific mean fishing effort (angler trips) and calibration factors for the P and SH fishing modes by bimonthly period are presented below.

#### Abbreviations used in this document:

E	- Fishing effort
FM	- Fishing mode
C	- charter
CI	- charter inshore
CO	- charter offshore
P	- private
PI	- private inshore (LA Creel)
PO	- private offshore
PR	- private boat (MRIP)
SH	- shore (MRIP)
H	- Harvest
HR	- Harvest rate
D	- Discards
DR	- Discard rate
PSE	- Percent standard error
R	- Ratio
V	- Variance
y	- Year
w	- Bimonthly period
wk	- Week of year

FM	w	$\bar{E}_{LAcreel}$	$\bar{E}_{MRIP}$	$\hat{R}_F$
P	1	141,988	683,741	0.208
P	2	229,436	539,929	0.425
P	3	425,433	913,075	0.466
P	4	349,345	1,131,685	0.309
P	5	284,077	898,045	0.316
P	6	277,228	865,312	0.320
SH	1	50,377	692,050	0.073
SH	2	80,580	588,099	0.137
SH	3	151,142	865,279	0.175
SH	4	73,203	1,056,573	0.069
SH	5	105,286	1,115,605	0.094
SH	6	64,342	902,530	0.071

The hind-cast LA Creel fishing effort estimates (1982-2013) are then calculated by fishing mode and bimonthly period as:

$$\hat{E}_{y,w,FM,\hat{R}} = \hat{R}_{E,FM,w} \hat{E}_{y,w,FM,MRIP} \quad [2]$$

Note: MRIP effort estimates in Equation [2] have been calibrated to the FES and APAIS design changes (FCAL).

Variances of the hind-cast LA Creel fishing effort estimates from Equation [2] are approximated by fishing mode and bimonthly period as:

$$\hat{V}(\hat{E}_{y,w,FM,\hat{R}}) = \hat{E}_{y,w,FM,MRIP}^2 \hat{V}(\hat{R}_{E,FM,w}) + \hat{R}_{E,FM,w}^2 \hat{V}(\hat{E}_{y,w,FM,MRIP}) - \hat{V}(\hat{R}_{E,FM,w}) \hat{V}(\hat{E}_{y,w,FM,MRIP}) \quad [3]$$

where

$$\hat{V}(\hat{R}_{E,FM,w}) = \hat{R}_{E,FM,w}^2 \left[ \frac{\hat{V}(\bar{E}_{LAcreel,FM,w})}{\bar{E}_{LAcreel,FM,w}^2} + \frac{\hat{V}(\bar{E}_{MRIP,FM,w})}{\bar{E}_{MRIP,FM,w}^2} - 2 \frac{Cov(\bar{E}_{LAcreel,FM,w}, \bar{E}_{MRIP,FM,w})}{\bar{E}_{LAcreel,FM,w} \bar{E}_{MRIP,FM,w}} \right]$$

Effort variances  $\hat{V}(\hat{E}_{y,w,FM,MRIP})$  in Equation [3] are post-calibration (i.e. after applying a mean fishing effort variance ratio estimator  $\frac{\hat{V}(\bar{E}_{LAcreel,FM,w})}{\hat{V}(\bar{E}_{MRIP,FM,w})}$  to the MRIP variance estimates).

### Harvest

The hind-cast LA Creel harvest estimates (1982-2013) by fishing mode (P and SH only) for the species included in this report are then calculated as:

$$\hat{H}_{y,FM,\hat{R}} = \sum_w \hat{E}_{y,w,FM,\hat{R}} \hat{H}R_{y,w,FM,MRIP} \quad [4]$$

Note: MRIP harvest rate estimates in Equation [4] are FCAL estimates and represent A+ B1 landings only.

Variances of the calibrated harvest estimates are then calculated as:

$$\hat{V}(\hat{H}_{y,FM,\hat{R}}) = \sum_w \left[ \hat{E}_{y,FM,w,\hat{R}}^2 \hat{V}(\hat{H}R_{y,FM,w,MRIP}) + \hat{H}R_{y,FM,w,MRIP}^2 \hat{V}(\hat{E}_{y,FM,w,\hat{R}}) - \hat{V}(\hat{E}_{y,FM,w,\hat{R}}) \hat{V}(\hat{H}R_{y,FM,w,MRIP}) \right] \quad [5]$$

Percent standard errors of the calibrated harvest estimates are then calculated as:

$$PSE(\hat{H}_{y,FM,\hat{R}}) = 100 \times \frac{\sqrt{\hat{V}(\hat{H}_{y,FM,\hat{R}})}}{\hat{H}_{y,FM,\hat{R}}} \quad [6]$$

The MRIP (FCAL) and hind-cast LA Creel harvest estimate time-series and corresponding PSEs by fishing mode for species with upcoming LDWF stock assessments are presented below.

Year	Black Drum						Red Drum						Sheepshead						Southern Flounder						Spotted Seatrout																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																			
	MRIP			LA Creel			MRIP			LA Creel			MRIP			LA Creel			MRIP			LA Creel			MRIP			LA Creel			MRIP			LA Creel																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																										
	Harvest	PSE	1982	Harvest	PSE	1983	Harvest	PSE	1984	Harvest	PSE	1985	Harvest	PSE	1986	Harvest	PSE	1987	Harvest	PSE	1988	Harvest	PSE	1989	Harvest	PSE	1990	Harvest	PSE	1991	Harvest	PSE	1992	Harvest	PSE	1993	Harvest	PSE	1994	Harvest	PSE	1995	Harvest	PSE	1996	Harvest	PSE	1997	Harvest	PSE	1998	Harvest	PSE	1999	Harvest	PSE	2000	Harvest	PSE	2001	Harvest	PSE	2002	Harvest	PSE	2003	Harvest	PSE	2004	Harvest	PSE	2005	Harvest	PSE	2006	Harvest	PSE	2007	Harvest	PSE	2008	Harvest	PSE	2009	Harvest	PSE	2010	Harvest	PSE	2011	Harvest	PSE	2012	Harvest	PSE	2013																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																												
FM = Private	1,106,821	27.1	426,166	31.2	3,046,664	12.0	925,323	21.4	511,387	34.3	184,011	40.4	497,263	19.5	190,801	23.4	9,160,786	16.2	3,111,188	23.8	1,659,509	34.3	595,673	38.8	4,758,470	32.7	1,542,955	41.7	1,064,824	38.1	334,974	43.8	610,002	58.6	7,402,179	20.0	2,660,990	25.0	362,104	26.0	138,699	29.8	2,976,458	38.9	960,611	40.8	548,364	47.5	176,510	39.5	213,064	23.0	73,394	28.5	2,503,426	29.8	790,913	33.0	356,406	30.0	115,179	34.5	2,563,074	14.5	865,588	21.9	340,142	32.1	114,127	35.8	431,284	24.5	150,115	27.3	5,947,072	15.2	2,109,649	22.2	918,541	24.1	317,533	28.9	2,635,843	10.0	843,830	21.1	252,644	15.5	84,282	23.6	483,555	47.8	14,077,720	7.8	4,947,892	16.4	683,049	25.6	237,415	30.7	2,602,974	23.0	876,900	30.6	320,702	33.7	87,926	33.0	147,601	25.2	52,016	27.6	11,023,715	10.1	4,053,139	15.6	344,681	15.4	115,234	22.3	1,160,955	20.2	349,965	26.3	349,965	26.3	90,608	28.5	358,099	13.2	123,628	18.1	6,890,452	14.3	2,511,864	21.3	227,336	20.4	76,002	25.3	2,015,801	12.6	676,453	24.5	789,892	49.3	254,087	50.2	341,489	25.9	111,900	29.0	8,082,318	11.9	2,753,203	18.0	231,168	22.9	79,940	26.9	1,469,547	16.8	481,003	25.0	270,726	27.1	104,809	31.1	805,964	23.6	264,106	26.8	4,881,711	13.7	1,640,863	21.0	183,005	19.4	62,265	26.3	1,824,768	20.0	582,125	33.1	402,935	32.6	138,862	35.4	694,466	16.1	248,442	20.6	13,468,560	9.9	4,744,596	18.2	333,217	23.9	119,606	28.4	2,807,145	8.7	936,586	15.5	563,816	25.3	182,360	27.9	615,928	14.6	172,218	17.6	10,680,755	9.3	3,584,240	20.0	246,588	17.6	88,970	24.2	2,581,130	9.9	880,530	16.3	885,380	26.7	320,661	35.5	500,023	14.8	175,907	18.0	7,577,436	12.1	2,655,102	18.2	234,272	16.9	79,717	24.5	2,311,786	9.5	778,462	16.4	508,883	17.8	170,439	24.2	578,264	21.0	216,551	26.3	10,418,883	10.5	3,481,640	17.6	335,507	18.4	109,385	22.1	3,842,177	8.7	1,269,660	19.6	920,809	20.4	274,232	26.3	398,528	14.0	146,807	19.4	12,135,672	13.2	3,937,329	27.0	414,798	12.9	137,386	20.9	3,197,497	9.0	1,120,688	16.0	760,607	21.7	243,914	29.8	416,737	11.4	148,322	15.5	10,306,475	11.3	3,488,899	20.1	477,705	16.1	161,196	20.3	2,861,918	9.6	987,223	16.3	1,005,406	18.2	318,972	22.9	445,579	11.7	155,574	18.2	10,415,118	11.9	3,599,696	17.9	920,933	14.6	311,906	20.5	2,762,600	8.0	955,164	15.1	1,138,280	15.6	358,340	25.5	393,018	13.8	148,318	18.2	10,005,379	8.7	3,578,852	18.8	681,905	11.9	236,111	18.6	3,459,681	6.9	1,208,361	14.4	793,093	16.2	246,697	26.4	758,946	10.4	272,110	16.0	14,037,235	8.5	4,731,081	18.3	1,017,717	12.8	352,152	18.8	4,249,272	6.9	1,474,223	16.0	769,653	28.0	246,219	34.0	670,295	13.3	246,882	18.4	15,977,551	7.7	5,264,946	19.6	765,815	13.7	259,288	20.5	4,322,843	7.7	1,456,752	14.4	567,945	15.8	193,751	22.4	427,914	12.2	155,260	16.0	12,618,114	8.0	4,269,752	15.9	908,616	12.6	315,701	19.5	3,445,574	8.2	1,168,322	15.9	1,249,437	18.7	408,449	30.9	443,758	18.8	173,052	23.0	9,816,916	10.3	3,441,381	16.8	659,209	14.7	229,521	22.3	2,977,090	7.4	1,014,320	17.2	1,257,175	23.2	396,409	28.7	647,034	15.7	250,097	18.7	10,528,223	9.6	3,662,095	20.0	546,776	12.0	183,643	18.3	2,605,118	8.1	898,352	15.2	1,722,589	24.9	586,483	33.7	408,006	12.6	148,846	17.3	9,728,915	10.5	3,334,545	18.8	461,775	13.0	156,509	21.3	2,236,920	9.4	772,472	15.8	962,130	23.6	302,340	30.7	286,521	12.9	108,654	15.8	10,699,116	8.5	3,616,229	17.8	354,910	14.3	117,386	19.2	2,385,907	10.7	812,152	16.3	430,504	25.3	125,365	32.5	285,429	11.9	98,401	15.3	13,779,620	8.7	5,016,008	16.0	415,104	15.7	142,698	18.7	3,049,990	8.3	1,045,909	15.6	320,952	21.9	95,855	25.9	355,606	19.0	123,052	23.8	11,790,003	8.3	3,967,935	18.2	668,820	12.8	224,335	20.6	3,336,041	7.9	1,155,421	14.9	623,988	17.6	205,809	26.8	239,893	10.9	88,186	16.8	15,551,638	9.5	5,347,885	19.1	908,297	13.6	308,638	19.6	3,414,547	8.2	1,187,696	16.4	1,055,358	22.6	315,386	32.0	398,573	14.6	140,011	19.7	15,667,348	8.8	5,452,613	16.8	697,188	14.5	231,949	19.1	5,128,842	8.0	1,797,454	14.5	753,414	22.4	261,214	29.3	571,870	14.4	198,755	17.6	17,697,003	9.6	5,977,076	23.5	679,614	15.1	232,721	20.6	4,548,266	8.3	1,584,573	14.9	1,425,042	35.5	525,042	44.9	544,173	14.7	198,755	17.6	17,697,003	9.6	5,977,076	23.5	694,257	12.8	241,481	18.1	3,458,029	8.8	1,210,182	15.5	577,843	16.7	175,722	24.4	524,239	14.8	184,915	17.5	17,938,248	8.9	6,201,433	19.0	528,084	14.3	172,534	20.4	4,523,043	8.7	1,512,033	15.4	311,155	16.9	95,381	24.0	930,394	13.1	317,618	25.0	12,928,606	9.4	4,374,563	17.4

Year	Black Drum						Red Drum						Sheepshead						Southern Flounder						Spotted Seatrout							
	MRIP			LA Creel			MRIP			LA Creel			MRIP			LA Creel			MRIP			LA Creel			MRIP			LA Creel				
	Harvest	PSE	LA Creel	Harvest	PSE	MRIP	Harvest	PSE	LA Creel	Harvest	PSE	MRIP	Harvest	PSE	LA Creel	Harvest	PSE	MRIP	Harvest	PSE	LA Creel	Harvest	PSE	MRIP	Harvest	PSE	LA Creel	Harvest	PSE	MRIP	Harvest	PSE
1982	880,444	22.8	113,540	38.2	2,388,907	23.1	293,698	36.1	66,012	30.5	834,940	21.4	103,180	36.3	2,787,818	23.5	296,866	35.0														
1983	500,922	29.9	62,566	38.0	1,351,640	25.0	123,385	34.4	276,981	40.7	327,205	34.7	31,100	37.4	2,927,094	47.2	2,58,452	45.3														
1984	536,866	34.1	51,163	46.2	660,866	35.0	57,459	34.8	85,083	40.5	112,657	45.9	9,755	45.9	331,308	40.5	32,117	42.3														
1985	181,986	27.0	16,397	32.7	618,693	30.8	46,417	33.4	51,856	35.9	284,046	29.1	23,081	33.1	500,629	27.9	43,400	33.5														
1986	469,638	52.0	39,289	48.9	243,647	45.9	18,934	47.8	57,566	79.5	189,325	42.5	18,019	48.7	1,815,727	55.4	142,905	52.4														
1987	260,971	52.0	26,358	51.9	665,407	54.3	49,467	55.0	4,878	52.4	185,090	37.3	14,954	38.7	965,130	44.3	112,992	58.7														
1988	429,974	36.6	48,607	46.1	237,418	45.6	18,170	48.4	57,664	53.5	90,283	40.5	8,305	40.6	398,803	39.6	41,221	48.1														
1989	484,955	58.2	47,183	67.1	472,062	35.4	45,444	43.7	16,156	43.5	127,388	33.6	12,077	38.8	402,794	68.4	30,056	67.0														
1990	122,352	47.4	15,821	63.4	627,617	29.6	54,607	36.3	7,631	52.3	238,834	24.9	22,144	31.2	1,178,966	28.6	120,340	42.6														
1991	80,287	38.8	7,830	45.0	497,827	35.7	39,572	39.7	8,166	45.0	617,776	26.6	69,562	37.3	1,611,329	29.8	190,451	48.5														
1992	266,722	39.0	24,559	43.7	535,731	21.7	57,486	31.8	111,109	64.6	197,948	31.2	17,703	32.4	1,622,752	18.8	160,534	25.9														
1993	332,409	38.4	32,083	46.0	1,058,829	26.2	102,231	30.1	34,539	38.3	152,286	34.8	14,994	35.2	1,262,891	19.3	139,848	32.3														
1994	111,090	26.4	12,000	35.3	973,065	30.5	86,198	33.8	27,751	51.7	245,182	26.2	26,246	30.4	2,585,733	32.7	225,016	34.0														
1995	122,762	40.4	10,791	37.0	747,219	23.9	61,587	28.3	33,177	41.4	56,558	30.7	5,970	40.2	1,432,447	21.4	141,769	30.2														
1996	529,054	58.3	42,278	55.7	864,227	22.6	85,059	27.2	54,497	42.0	134,402	31.1	14,417	42.1	2,327,551	27.4	272,968	42.0														
1997	123,564	39.8	14,500	55.8	347,632	21.5	33,897	27.2	28,012	31.1	307,330	23.1	31,614	33.0	1,905,584	21.5	196,046	32.0														
1998	86,575	34.3	11,850	53.2	397,083	31.2	39,546	33.4	34,658	37.6	128,645	26.4	15,533	39.9	2,415,887	30.1	316,704	52.1														
1999	385,329	39.6	34,484	42.0	492,350	25.7	58,215	38.6	17,647	34.4	641,276	32.9	57,671	36.5	3,530,688	27.9	302,816	33.9														
2000	625,217	26.3	55,444	30.4	822,698	21.3	74,515	25.1	18,710	49.9	136,953	43.0	13,647	44.9	2,697,901	36.0	235,416	36.6														
2001	675,474	30.1	74,021	37.8	621,324	23.2	56,647	29.7	46,027	53.6	305,296	67.4	40,328	72.5	2,657,545	28.5	284,780	35.3														
2002	399,178	23.6	39,488	28.7	945,520	31.8	86,759	37.0	77,666	40.1	323,826	31.2	35,596	40.3	923,988	31.5	104,622	40.0														
2003	288,546	23.4	29,030	28.5	280,366	33.2	26,439	34.2	108,655	37.5	199,400	38.3	17,629	37.0	945,730	42.3	70,559	43.3														
2004	137,240	36.0	13,664	36.9	559,991	19.0	53,877	26.8	49,237	39.0	395,552	36.1	39,848	47.2	1,303,971	45.1	186,126	62.8														
2005	138,758	28.0	13,443	36.2	704,981	30.9	57,698	36.6	52,206	36.7	450,207	38.7	35,117	45.5	632,798	30.7	54,561	34.2														
2006	261,544	30.8	25,308	39.5	389,280	25.4	35,566	35.1	44,987	35.3	335,766	29.1	34,011	31.9	788,193	22.7	75,533	29.7														
2007	286,213	35.5	28,210	37.6	187,726	25.1	17,832	35.4	27,901	42.7	348,752	28.0	38,995	36.9	771,812	27.5	84,196	35.4														
2008	247,234	25.5	22,539	32.8	374,463	27.9	30,507	30.4	113,710	33.3	260,865	36.4	23,363	33.9	1,140,758	33.3	131,023	47.6														
2009	100,842	26.9	10,221	33.5	123,122	28.0	12,120	33.8	62,220	56.4	470,681	44.6	39,588	45.3	611,298	25.2	62,519	33.2														
2010	184,668	41.2	16,865	42.9	531,708	32.4	50,704	34.5	46,001	39.1	94,348	29.4	8,854	31.9	584,064	43.3	45,383	43.2														
2011	380,669	21.7	36,537	27.0	983,461	22.1	96,717	27.3	124,632	55.1	430,717	40.0	39,973	40.9	651,281	27.8	67,792	37.1														
2012	283,508	22.6	26,638	30.9	279,299	36.1	23,109	38.3	54,144	43.8	155,170	30.6	15,176	33.3	727,577	29.5	80,824	39.4														
2013	471,823	13.0	36,871	21.6	849,762	9.3	80,731	27.2	48,095	25.1	573,922	18.3	51,029	30.3	2,682,372	11.4	241,359	21.8														

FM = Shore

Appendix (Discard Hindcast):

A ratio estimator approach is described below allowing hind-casting of LA Creel recreational discard estimates to 1982. Concurrent discard estimates of the LA Creel and MRIP surveys are not available.

Analogous to the procedure to hind-cast LA Creel harvest estimates, the hind-cast LA Creel effort estimates of the shore and private fishing modes are combined with unadjusted MRIP discard rate estimates to provide time-series of recreational discard estimates for species with upcoming LDWF stock assessments as described below. Discard estimates of the charter fishing mode for the LA Creel and MRIP surveys are assumed equivalent and not adjusted.

*Discards (1982-2013)*

The hind-cast LA Creel discard estimates (1982-2013) are calculated by collapsed fishing mode (P and SH only) and bimonthly period as:

$$\widehat{D}_{y,FM,\widehat{R}} = \sum_w \widehat{E}_{y,w,FM,\widehat{R}} \widehat{DR}_{y,w,FM,MRIP} \quad [1a]$$

Note: MRIP discard rate estimates in Equation [1a] are FCAL estimates and represent B2 landings only. The calibrated effort estimates are taken from Equation [2].

Variances of the calibrated discard estimates from Equation [1a] are then calculated as:

$$\widehat{V}(\widehat{D}_{y,FM,\widehat{R}}) = \sum_w \left[ \widehat{E}_{y,FM,w,\widehat{R}}^2 \widehat{V}(\widehat{DR}_{y,FM,w,MRIP}) + \widehat{DR}_{y,FM,w,MRIP}^2 \widehat{V}(\widehat{E}_{y,FM,w,\widehat{R}}) - \widehat{V}(\widehat{E}_{y,FM,w,\widehat{R}}) \widehat{V}(\widehat{DR}_{y,FM,w,MRIP}) \right] \quad [2a]$$

Percent standard errors of the calibrated discard estimates are then calculated as:

$$PSE(\widehat{D}_{y,FM,\widehat{R}}) = 100 \times \frac{\sqrt{\widehat{V}(\widehat{D}_{y,FM,\widehat{R}})}}{\widehat{D}_{y,FM,\widehat{R}}} \quad [3a]$$

*Discards (2014-2016)*

Discard estimates of the LA Creel survey are only available from week 19 of 2016 to present. Discard estimates prior to week 19 of 2016 are imputed by fishing mode (P, SH, and C) and week of year (wk) by calculating discard to harvest ratios from the LA Creel estimates from week 19 of 2016 to week 18 of 2017 as:

$$\widehat{R}_{D/H,FM,wk} = \frac{\widehat{D}_{LAcreel,FM,wk}}{\widehat{H}_{LAcreel,FM,wk}} \quad [4a]$$

The imputed LA Creel discard estimates are then calculated by fishing mode from week 1 of 2014 to week 18 of 2016 as:

$$\widehat{D}_{y,wk,FM,\widehat{R}_{D/H}} = \widehat{R}_{D/H,FM,wk} \widehat{H}_{y,wk,FM,LAcreel} \quad [5a]$$

Variances of the imputed LA Creel discard estimates from Equation [5a] are approximated by fishing mode and week of year as:

$$\widehat{V}(\widehat{D}_{y,wk,FM,\widehat{R}_{D/H}}) = \widehat{H}_{y,wk,FM,LAcreel}^2 \widehat{V}(\widehat{R}_{D/H,FM,wk}) + \widehat{R}_{D/H,FM,wk}^2 \widehat{V}(\widehat{H}_{y,wk,FM,LAcreel}) - \widehat{V}(\widehat{R}_{D/H,FM,wk}) \widehat{V}(\widehat{H}_{y,wk,FM,LAcreel}) \quad [6a]$$

where

$$\hat{V}(\hat{R}_{D/H,FM,wk}) = \hat{R}_{D/H,FM,wk}^2 \left[ \frac{\hat{V}(\hat{D}_{LAcreel,FM,wk})}{\hat{D}_{LAcreel,FM,wk}^2} + \frac{\hat{V}(\hat{H}_{LAcreel,FM,wk})}{\hat{H}_{LAcreel,FM,wk}^2} \right]$$

Harvest variances  $\hat{V}(\hat{H}_{y,wk,FM,LAcreel})$  in Equation [6a] are post-calibration (i.e. after applying a discard to harvest variance ratio estimator  $\frac{\hat{V}(\hat{D}_{LAcreel,FM,wk})}{\hat{V}(\hat{H}_{LAcreel,FM,wk})}$  to the LA Creel harvest variance estimates).

The MRIP (FCAL) and hind-cast/imputed LA Creel discard estimate annual time-series and corresponding PSEs by fishing mode for species with upcoming LDWF stock assessments are presented below.

Year	Black Drum						Red Drum						Sheepshead						Southern Flounder						Spotted Seatrout					
	MRIP			LA Creel			MRIP			LA Creel			MRIP			LA Creel			MRIP			LA Creel			MRIP			LA Creel		
	Discards	PSE	Discards	PSE	Discards	PSE	Discards	PSE	Discards	PSE	Discards	PSE	Discards	PSE	Discards	PSE	Discards	PSE	Discards	PSE	Discards	PSE	Discards	PSE	Discards	PSE	Discards	PSE		
1982	818,734	54.5	345,860	60.5	274,870	40.0	94,664	41.5	515,459	44.8	200,681	47.1	1,083,668	45.5	415,439	50.2	1,654,868	35.7	609,681	39.2										
1983	671,251	47.1	224,549	50.1	793,805	34.3	265,412	40.0	833,079	71.7	268,324	76.4	145,644	54.4	50,553	55.2	2,092,864	42.4	754,795	47.4										
1984	284,254	68.2	93,240	65.6	346,317	56.3	111,489	56.2	309,986	35.6	93,467	45.2	65,411	64.9	21,520	65.9	197,040	21.8	64,439	30.9										
1985	291,106	38.5	95,314	41.4	243,413	40.1	91,863	46.5	317,951	28.8	109,302	37.0	61,785	68.0	19,987	66.6	1,709,137	23.1	579,765	29.5										
1986	448,236	20.4	152,135	27.7	451,777	15.3	162,385	19.5	393,569	19.8	127,427	29.5	367,830	40.1	162,331	43.1	4,745,760	10.2	1,630,190	19.8										
1987	300,153	41.9	93,694	44.6	2,360,122	24.5	759,753	32.9	2,107,127	21.2	74,868	25.8	10,809	42.4	4,341	46.5	6,980,249	12.7	2,367,280	21.1										
1988	350,541	29.1	118,251	29.1	3,062,822	16.2	1,010,542	22.4	398,058	25.6	135,054	32.6	375,399	58.9	119,109	60.9	5,610,284	10.4	2,077,053	16.1										
1989	228,012	35.0	75,276	40.5	2,998,273	20.9	986,135	30.8	483,464	37.6	174,497	44.9	260,401	93.8	84,574	91.5	5,656,036	14.2	1,879,166	20.3										
1990	653,511	28.7	214,860	36.2	1,880,922	19.7	575,989	24.4	408,363	25.1	146,133	30.3	334,821	40.3	107,726	42.4	4,750,794	18.0	1,566,570	24.0										
1991	389,398	26.0	130,884	32.2	7,412,013	11.2	2,413,187	27.7	272,267	26.1	100,654	28.7	114,636	37.5	35,343	33.6	12,341,402	9.3	4,316,171	17.6										
1992	559,417	33.2	179,758	38.0	5,753,237	9.1	1,845,345	17.5	440,289	16.8	142,247	23.5	42,988	21.4	14,876	24.2	8,795,484	8.4	2,994,762	16.4										
1993	710,873	18.2	235,327	23.6	4,143,002	11.2	1,394,760	19.0	758,778	20.8	261,093	28.4	45,686	33.2	16,234	35.7	6,905,906	11.3	2,294,599	17.5										
1994	440,825	29.8	144,491	33.2	4,086,816	12.5	1,292,596	19.6	608,190	19.3	200,928	25.0	34,050	29.6	11,832	31.0	7,780,829	9.7	2,545,253	17.4										
1995	816,070	17.5	288,067	20.8	4,248,542	15.4	1,356,682	22.3	558,424	25.6	180,589	31.0	59,357	34.4	21,731	33.3	7,603,172	11.0	2,469,940	22.8										
1996	525,560	20.4	180,919	27.4	3,312,106	11.9	1,066,067	18.3	878,282	23.1	280,982	30.9	80,897	23.0	28,339	27.1	8,055,743	10.2	2,790,011	17.6										
1997	1,057,203	18.5	357,381	27.0	5,150,476	11.3	1,623,792	20.9	1,138,193	23.4	388,364	33.4	98,494	29.1	32,249	32.9	10,917,063	19.7	3,714,497	25.0										
1998	1,439,547	24.7	488,061	28.2	5,753,271	10.8	1,852,465	18.5	1,056,926	17.9	341,063	28.4	99,007	29.1	32,096	32.3	9,977,400	9.3	3,525,435	17.2										
1999	820,371	13.6	272,222	19.4	5,477,613	9.4	1,855,481	17.3	699,825	18.9	218,048	29.4	84,447	20.8	29,392	26.0	11,688,515	8.8	3,900,534	18.2										
2000	1,833,450	16.2	636,903	21.0	6,018,948	8.2	2,015,680	18.4	586,993	21.9	204,594	28.9	121,790	28.3	37,513	29.7	11,091,619	7.9	3,696,143	17.1										
2001	1,781,293	17.4	641,432	22.0	6,184,966	9.5	1,893,106	18.7	816,650	16.4	289,672	22.4	88,936	21.8	33,827	26.2	7,365,829	11.2	2,385,033	19.6										
2002	1,670,431	17.1	549,754	23.8	6,266,166	10.8	2,051,328	21.1	854,311	17.0	278,770	22.5	90,982	26.1	32,596	28.9	6,778,238	11.5	2,325,982	18.2										
2003	1,172,837	17.8	408,312	22.5	5,286,909	10.2	1,707,282	22.5	930,576	20.8	286,148	31.2	172,327	23.4	67,664	27.1	10,682,302	9.5	3,656,768	20.8										
2004	1,155,649	17.0	384,622	24.5	3,841,642	10.1	1,251,295	17.5	701,938	19.9	253,961	27.9	149,844	27.6	53,175	29.8	9,847,326	11.5	3,329,014	17.7										
2005	954,552	24.2	324,774	29.3	3,505,968	11.8	1,125,035	19.3	770,173	15.0	252,100	25.9	87,557	25.3	31,613	26.7	10,903,988	9.7	3,699,324	17.6										
2006	699,933	16.3	227,542	20.8	4,124,647	11.7	1,352,670	19.7	616,668	30.1	179,470	34.3	41,784	27.7	14,147	30.4	11,930,250	9.1	4,253,200	16.1										
2007	818,643	15.4	279,976	19.3	4,630,404	11.5	1,534,744	20.7	308,039	21.2	101,638	25.6	78,231	25.8	28,165	30.1	9,924,934	8.4	3,345,776	18.0										
2008	1,320,182	14.8	447,658	22.4	5,074,358	8.1	1,704,655	15.5	609,401	23.6	193,005	30.6	50,063	26.0	17,325	28.4	13,158,192	9.4	4,628,268	17.0										
2009	1,788,575	14.5	598,396	22.8	6,242,208	9.6	2,046,201	20.1	744,464	19.5	224,182	27.5	89,961	28.4	32,910	34.0	13,919,234	10.0	4,655,798	17.8										
2010	1,813,254	14.9	636,963	18.6	7,335,948	10.2	2,585,291	15.8	711,836	21.9	248,894	26.2	111,912	23.5	40,129	23.3	9,190,616	12.6	3,180,901	22.2										
2011	1,390,360	14.9	475,469	19.2	4,744,947	9.7	1,532,673	16.4	259,735	17.7	86,064	22.2	85,027	24.1	31,745	26.9	10,091,732	9.5	3,443,856	16.2										
2012	1,136,427	13.3	373,501	18.6	5,374,152	8.9	1,776,461	17.9	422,968	13.4	136,234	19.8	152,363	24.3	53,417	25.2	13,175,745	8.7	4,524,702	18.2										
2013	1,709,164	12.2	586,398	18.1	6,088,863	9.9	2,013,792	17.0	398,767	14.8	130,785	21.7	197,844	21.3	72,578	23.8	13,404,945	10.3	4,608,071	16.5										
2014			330,955	24.0			1,609,006	11.8			148,454	38.3			44,345	56.6			2,316,191	11.3										
2015			295,893	21.4			1,486,227	10.3			98,800	30.3			30,296	41.4			3,440,509	12.3										
2016			161,733	21.0			1,096,370	6.4			47,135	25.6			29,612	24.3			3,643,636	8.6										

Year	Black Drum						Red Drum						Sheepshead						Southern Flounder						Spotted Seatrout					
	MRIP			LA Creel			MRIP			LA Creel			MRIP			LA Creel			MRIP			LA Creel			MRIP			LA Creel		
	Discards	PSE	PSF	Discards	PSE	PSF	Discards	PSE	PSF	Discards	PSE	PSF	Discards	PSE	PSF	Discards	PSE	PSF	Discards	PSE	PSF	Discards	PSE	PSF	Discards	PSE	PSF			
1982	149,995	64.4	19,897	80.7	364,343	26.2	52,316	41.6	89,674	57.7	11,246	70.6	128,975	30.5	15,915	45.2	386,524	48.1	49,802	62.2										
1983	69,276	40.0	6,493	59.5	15,283	79.9	1,470	73.4	25,959	61.6	2,914	58.8	3,384	99.3	319	100.5	7,794	83.8	1,361	89.1										
1984	285,887	32.0	20,494	39.5	83,103	84.6	5,758	89.8	12,248	103.2	2,139	105.1	12,292	79.8	881	80.3	59,529	52.1	4,864	50.1										
1985	138,851	42.9	12,304	55.2	32,336	53.0	2,919	51.6	155,985	38.0	11,628	41.9	11,853	75.8	1,010	78.1	603,943	44.5	47,922	44.9										
1986	107,212	49.6	7,822	51.3	19,379	65.3	1,723	60.3	473,615	72.5	34,777	72.6	11,853	75.8	1,010	78.1	267,044	41.3	22,713	38.7										
1987	102,949	71.9	8,596	74.4	352,180	47.9	26,897	48.2	36,133	89.7	3,410	94.8	13,517	87.5	1,198	89.8	642,898	37.9	64,120	42.0										
1988	185,774	51.5	16,072	60.9	329,574	30.8	28,447	35.6	116,937	36.7	10,973	40.9	7,726	52.0	616	56.8	205,385	41.4	24,387	50.9										
1989	61,484	38.9	5,723	46.1	1,080,247	72.5	128,194	83.5	115,300	39.3	11,720	45.4	49,549	66.9	3,586	66.6	311,869	36.9	27,571	40.1										
1990	96,587	44.0	13,477	59.9	327,612	37.7	28,235	45.2	18,485	89.3	1,318	92.6	783,955	82.6	72,564	86.6	736,838	34.5	65,803	38.9										
1991	237,878	30.6	24,906	36.8	1,544,560	43.0	124,239	43.5	207,958	30.7	14,829	39.1	91,471	44.6	10,241	47.2	1,902,261	22.7	219,559	37.7										
1992	860,902	31.0	76,139	32.3	1,833,394	25.8	167,249	28.7	514,453	32.0	41,930	37.4	49,674	57.6	4,587	56.0	1,468,815	20.7	142,809	28.3										
1993	1,345,395	39.9	110,604	41.5	1,630,396	23.1	171,511	31.8	1,109,224	51.0	86,564	51.4	51,220	62.5	3,860	64.5	2,544,151	26.7	323,743	45.9										
1994	947,564	31.5	99,539	33.8	2,220,435	25.8	190,194	29.9	690,548	35.8	54,745	36.3	27,765	64.3	2,143	65.9	2,280,973	19.3	214,069	27.3										
1995	602,888	40.5	48,383	40.0	942,643	25.9	86,408	28.5	72,571	30.1	8,839	38.7	18,216	63.3	1,309	62.8	1,617,673	19.6	162,345	29.9										
1996	493,436	28.1	52,883	32.7	1,516,179	39.1	120,897	39.3	295,818	49.5	24,464	47.5	123,621	57.8	16,558	74.1	2,271,614	31.3	308,086	52.8										
1997	1,032,761	51.8	90,230	49.3	1,179,933	27.3	100,418	31.4	199,864	33.2	17,257	35.4	71,388	41.3	8,442	48.4	2,076,029	22.6	207,557	32.1										
1998	1,033,214	43.8	84,752	44.3	2,262,074	26.0	204,593	31.1	207,500	34.3	20,284	40.9	39,280	40.3	3,276	42.0	1,721,873	25.1	220,941	47.8										
1999	532,125	37.2	45,165	42.1	1,281,413	23.5	130,179	31.6	51,091	32.2	4,474	39.5	68,459	49.6	7,292	57.3	4,103,241	23.1	371,893	29.8										
2000	955,854	28.8	73,538	36.4	1,948,980	22.8	182,824	29.6	265,642	61.1	21,463	56.0	24,518	50.4	2,069	53.3	2,552,559	34.6	207,540	35.3										
2001	1,404,055	37.8	143,215	44.1	1,702,671	23.4	159,705	28.0	627,865	66.9	49,516	64.4	267,359	75.6	37,792	76.1	2,252,160	31.5	187,174	32.3										
2002	559,039	30.6	45,914	33.0	1,187,635	24.6	99,572	27.3	192,094	28.9	16,154	33.4	132,712	47.7	11,419	48.6	1,035,758	30.9	94,081	34.7										
2003	1,024,308	33.3	104,601	38.7	744,196	31.1	73,392	36.7	114,932	46.8	11,660	47.4	299,436	63.4	31,155	65.2	1,546,106	34.1	119,188	35.8										
2004	477,328	44.0	37,608	44.0	944,587	31.1	83,721	31.6	83,683	37.1	9,645	45.2	24,033	55.8	1,683	59.3	1,547,223	44.2	179,206	58.2										
2005	793,236	24.4	78,009	30.6	1,986,884	22.7	197,746	37.7	322,768	29.1	27,129	33.4	127,575	57.7	10,772	59.1	895,780	34.2	88,581	36.9										
2006	1,085,517	44.4	94,206	40.6	2,355,407	21.3	246,212	35.5	670,528	47.6	51,507	48.7	109,904	38.3	14,722	53.3	1,144,271	28.0	114,481	33.4										
2007	464,018	30.3	53,814	41.9	1,109,367	20.9	108,758	29.6	256,654	49.1	23,186	43.8	96,680	53.7	16,221	68.5	929,550	25.0	101,536	36.6										
2008	901,587	24.4	79,859	28.4	1,912,635	19.8	158,866	23.6	248,799	29.8	18,285	34.4	12,748	60.9	1,302	65.4	1,377,270	27.7	120,320	31.0										
2009	417,567	31.0	39,805	30.9	1,414,008	28.6	126,475	32.2	384,706	30.4	37,443	32.7	87,082	93.5	6,332	93.7	927,737	30.0	109,736	43.9										
2010	572,004	29.7	56,545	30.2	1,506,818	23.6	154,439	35.8	583,189	30.2	46,495	32.6	74,678	40.5	7,726	48.6	828,375	54.9	63,464	53.8										
2011	1,434,105	21.3	134,468	28.0	1,860,121	22.2	162,394	25.3	249,435	48.1	22,119	43.9	103,717	65.2	7,384	66.2	719,286	25.7	64,218	31.8										
2012	1,263,476	24.4	132,282	31.2	977,186	35.2	90,057	34.4	175,964	43.2	13,443	45.1	52,159	45.4	6,074	56.4	674,174	31.1	75,140	37.8										
2013	2,271,755	9.7	195,413	19.6	3,675,890	9.3	327,093	18.3	939,354	18.9	77,379	32.1	41,427	37.2	3,162	40.7	5,525,367	8.1	504,444	24.1										
2014			79,920	38.8			375,249	12.4			51,901	55.7			9,346	53.3			594,294	15.1										
2015			76,780	21.4			378,245	11.5			23,835	34.1			9,300	45.9			727,719	12.3										
2016			50,106	21.9			275,986	8.7			24,951	66.9			9,495	37.5			892,875	11.4										

Year	Black Drum			Red Drum			Sheepshead			Southern Flounder			Spotted Seatrout			
	MRIP Discards	PSE	LA Creel Discards	MRIP Discards	PSE	LA Creel Discards	MRIP Discards	PSE	LA Creel Discards	MRIP Discards	PSE	LA Creel Discards	MRIP Discards	PSE	LA Creel Discards	
1982													7,252	32.4		
1983													121,816	54.1		
1984	182	112.8											116	101.5		
1985				25	55.4		1,166	78.8					42,739	26.9		
1986				2,597	42.5		587	107.7					16,514	42.5		
1987	2,752	45.9		1,561	59.4		266	97.1					64,522	30.1		
1988	5	106.1		26,854	45.6		2,484	64.6					59,254	37.7		
1989	298	63.1		30,305	40.5		1,199	62.5		1,401	106.9		190,285	38.2		
1990	6,449	56.2		46,366	44.7		16,177	94.7		445	57.1		39,578	32.1		
1991	3,258	52.2		63,966	35.7		1,641	52.5		280	82.8		144,689	30.9		
1992	7,421	46.7		58,230	19.2		3,664	55.2		225	61.5		91,373	31.5		
1993	410	71.7		70,705	32.6		1,123	61.4					155,919	30.0		
1994	329	100.1		198,687	34.0		1,654	110.7					243,186	36.3		
1995	2,606	72.8		113,101	28.6		406	56.1					300,673	31.6		
1996	4,776	74.9		157,816	23.0		19,422	46.2		843	103.1		223,999	36.0		
1997	20,581	37.1		138,650	25.5		8,030	44.8		490	68.4		260,983	23.5		
1998	18,161	43.4		105,462	22.3		5,944	40.9		647	48.0		199,955	31.8		
1999	12,980	33.2		108,340	13.2		1,739	48.3		520	57.8		277,771	21.3		
2000	10,335	28.4		203,577	19.3		12,615	31.6		259	59.4		175,694	15.8		
2001	13,566	28.8		138,601	17.2		4,954	29.6		1,224	72.4		211,516	15.0		
2002	9,657	30.9		129,125	18.5		16,306	53.2		1,248	50.0		104,977	25.3		
2003	25,831	34.0		105,936	14.2		10,370	38.8		982	53.9		170,658	26.6		
2004	13,050	32.7		53,333	25.0		3,190	61.4		503	55.6		221,275	16.5		
2005	5,692	45.0		144,300	48.0		10,206	71.3					263,044	26.2		
2006	30,916	38.8		178,892	21.5		23,101	34.4		486	60.6		464,015	26.8		
2007	13,350	37.3		198,411	16.5		30,031	55.1		1,197	59.3		238,335	19.0		
2008	31,830	33.1		332,961	19.7		16,588	52.9		98	71.3		323,315	17.3		
2009	62,094	27.2		151,250	23.0		10,938	36.4		69	107.9		356,216	17.4		
2010	38,261	33.5		203,917	17.0		5,021	34.4		640	62.2		167,473	21.6		
2011	29,517	38.0		153,584	17.6		5,844	46.6		2,353	48.7		149,933	27.4		
2012	21,344	30.0		281,131	7.2		48,342	11.3		12,017	15.1		205,441	22.7		
2013	83,501	7.5											222,879	7.6		
2014			14,093			353,243			2,706		442				316,892	29.4
2015			14,464		403,525	403,525			16,575		553				413,119	18.4
2016			16,975		338,910	338,910			10,778		497				439,247	9.6

## Appendix 2:

### Louisiana Spotted Seatrout Growth

Joe West and Xinan Zhang  
Office of Fisheries

Louisiana Department of Wildlife and Fisheries

#### Overview

In an earlier assessment of the Louisiana Spotted Seatrout stock (West *et al.* 2011), a standard three-parameter von Bertalanffy growth model was used to describe female Spotted Seatrout growth and construct age-length-keys for age assignments of fishery and survey catches. Due to the rapid growth exhibited in younger Spotted Seatrout and the relatively slower growth of older fish, the standard von Bertalanffy growth model overestimated the predicted length-at-age of younger ages and underestimated the predicted length-at-age of older ages. To overcome this lack of fit, the influence of younger ages was down-weighted during model fitting.

#### New Model

A different growth model has been developed that accounts for decreasing growth rates with age (Porch *et al.* 2002), rather than the constant growth rate across ages inherent to the standard von Bertalanffy growth model. The new model also allows age-specific growth rates to vary seasonally. Length-at-age is calculated with the new model, excluding the seasonal component, as:

$$l_t = l_\infty(1 - e^{\beta - k_0(t-t_0)})$$

$$\beta = \frac{k_1}{\lambda}(e^{-\lambda t} - e^{-\lambda t_0})$$

where  $k = k_0 + k_1 e^{-\lambda t} \geq 0$  (i.e., assuming fish will not shrink with age). The  $\lambda$  parameter is a damping coefficient allowing growth rates to decline with age.

#### Results

The damped growth model was fit to the same dataset of female Spotted Seatrout length-at-age observations from the earlier assessment (West *et al.* 2011) with the SAS nonlinear regression fitting procedure (PROC NLIN; SAS 2008) using the Newton iterative method (Figure 1). With the seasonal component included, the model failed to adequately fit the dataset. Parameter estimates and corresponding approximate standard errors of the damped growth model are reported in Table 1.

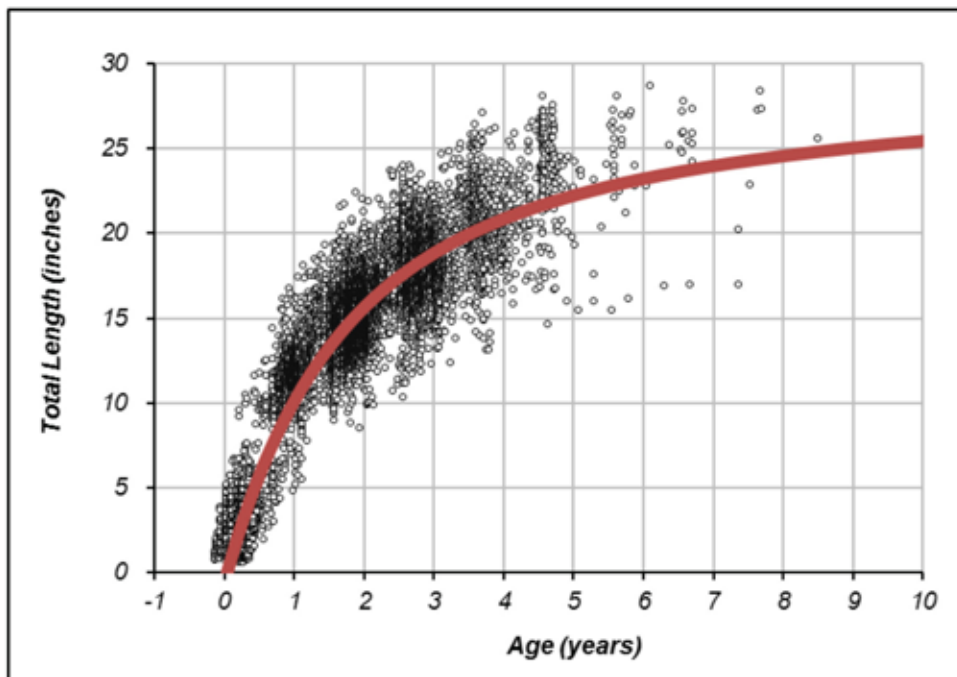
#### Literature Cited

- Porch C.E., C.A. Wilson C.A., D.L. Nieland. 2002. A new growth model for Red Drum (*Sciaenops ocellatus*) that accommodates seasonal and ontogenic changes in growth rates. *Fish Bull* 100:149–152.
- SAS Institute Inc. 2008. SAS/STAT® 9.2 User's Guide. Cary, NC: SAS Institute Inc.

Table 1: Parameter estimates and corresponding approximate standard errors of the damped growth model.

<i>Parameter</i>	<i>Estimate</i>	<i>SE</i>
$l_{\infty}$	28.1	1.86
$k_0$	0.113	0.0397
$t_0$	0.0373	0.00303
$k_1$	0.414	0.0239
$\lambda$	0.329	0.0609

Figure 1: Female Spotted Seatrout total length-at-age observations and predicted total length-at-age from the damped growth model.



## APPENDIX II. LA R.S. 56:638.1-5. Fish Conservation, Management and Sustainability: Legislative Intent, Findings, Purposes, Policy and Fishery Standards

The legislative intent, findings, purposes, policy and standards for the conservation and management of all species of fish in Louisiana are defined in LA R.S. 56:638.1-5, which functions similarly to those found in the federal MSA.

### LA R.S. 56:638.1. Fish Conservation, Management and Sustainability; Legislative Intent

Recognizing that there are ever-increasing numbers of both sport and commercial fishermen utilizing the waters of the state for recreational and commercial pursuits resulting in conflicts over limited space and competition for the same fish, and acknowledging that both the sport and commercial fishing industries are vital to the economy of the coastal region and the entire state, the fishery standards for conservation, management, and sustainability of all species of fish are hereby declared to be fair and in the best interest of the state.

### LA R.S. 56:638.2. Findings

The state of Louisiana recognizes that:

1. Its fish resources are of great value and are renewable. These fish resources make many contributions to the state, including but not limited to the food supply, economy, and health of the state and recreational opportunities. With proper regulations of the harvest by fishermen, coupled with protection and enhancement of their freshwater, saltwater, and estuarine habitat, Louisiana's fish resources should be available to provide these benefits to the state indefinitely.
2. As a consequence of increased fishing pressure or other factors and because of the limitations of fish conservation, management, and sustainability practices, certain stocks of fish may have been or will become overfished.
3. The future productivity of renewable fish resources and their supporting habitats may be seriously jeopardized as a consequence of the continued loss of Louisiana coastal wetlands, or because of human actions affecting the functionality and value of the state's renewable fish resources and their supporting habitats.
4. Both commercial and recreational fishing constitute a major source of employment and contribute significantly to the economy of the state. Many coastal areas are dependent upon such fishing and related activities and their economies have been damaged by pollution, habitat degradation, or overfishing.
5. Fish resources are finite but renewable. If timely placed under sound management, the fisheries can be conserved and maintained so as to provide optimum and sustainable yields on a continuing basis.
6. A strong state program for the wise conservation, management, and sustainability of the fish resources of Louisiana is necessary to maintain plentiful fish populations, to prevent overfishing, to rebuild reduced stocks, to ensure conservation, and to realize their full potential.
7. The safe development or improvement of fisheries that are not fully or properly utilized by the Louisiana commercial and recreational fishermen and fishing industries should help to ensure that Louisiana benefits from the employment, food supply, recreation, and social and economic benefit that could be maintained or generated thereby, if pursued in such a fashion that is socially, scientifically, economically, anthropologically, and biologically sound for the state, the species, any related species, and their supporting habitats.
8. A strong state program is necessary to advocate the importance of the functionality and value of Louisiana's waters and coastal wetlands as estuary and habitat for fish resources, the social and economic value of these resources to the state and the nation, and the need to actively seek to avoid any net loss of this functionality and value.

### LA R.S. 56:638.3. Purposes

- A. In order to implement the objectives and purposes of this Subpart, the commission shall:
  1. Take timely action to conserve, manage, protect, and sustain fish species.
  2. Promote the use of sound conservation, management, and sustainability principles in the regulation of commercial and recreational fishing.
  3. Actively advocate, on behalf of the fish constituency, improvement of or no net loss of the functionality and value of the fisheries' habitat and estuary.
  4. Provide for the preparation and implementation of fish management plans, including plans for habitats, estuaries, and their supporting ecosystems, in accordance with this policy that will prevent overfishing and will achieve and maintain plentiful fish populations to ensure, on a continuing basis, the optimum yield from each fishery while ensuring its sustainability.
  5. Recognize that fish populations are subject to both natural and man-induced increases and decreases, and that changes in harvest levels may need to be recommended. If changes are required, these increases and decreases should be distributed among all fishermen in a fair and equitable manner that considers among other factors historical usage, ensuring that no historical user groups will be arbitrarily excluded.
- B. A sustainable fishery is one that is scientifically monitored and actively managed to be viable today and in the future, conserving fish and their environment and supporting the communities and economies that depend upon these resources.

### LA R.S. 56:638.4. Policy

The policy of the state of Louisiana is hereby declared to be the following:

Stewardship of the state's renewable fish resources shall have as its utmost concern the continued health and abundance of the resource and its habitat, shall provide for optimum sustained benefits to the state, shall be responsive to the needs of interested and affected citizens, shall ensure the proper and fair utilization of these resources for the citizens of the state in present and future generations, shall preserve the state's exclusive right to manage the fisheries within or beyond its jurisdiction, shall be based on the best scientific and technical information available. In addition, such stewardship of the state's fish resources shall draw upon federal, state, and academic capabilities and promote efficiency in carrying out research, administration, management, and enforcement.

### LA R.S. 56:638.5. Fishery Standards

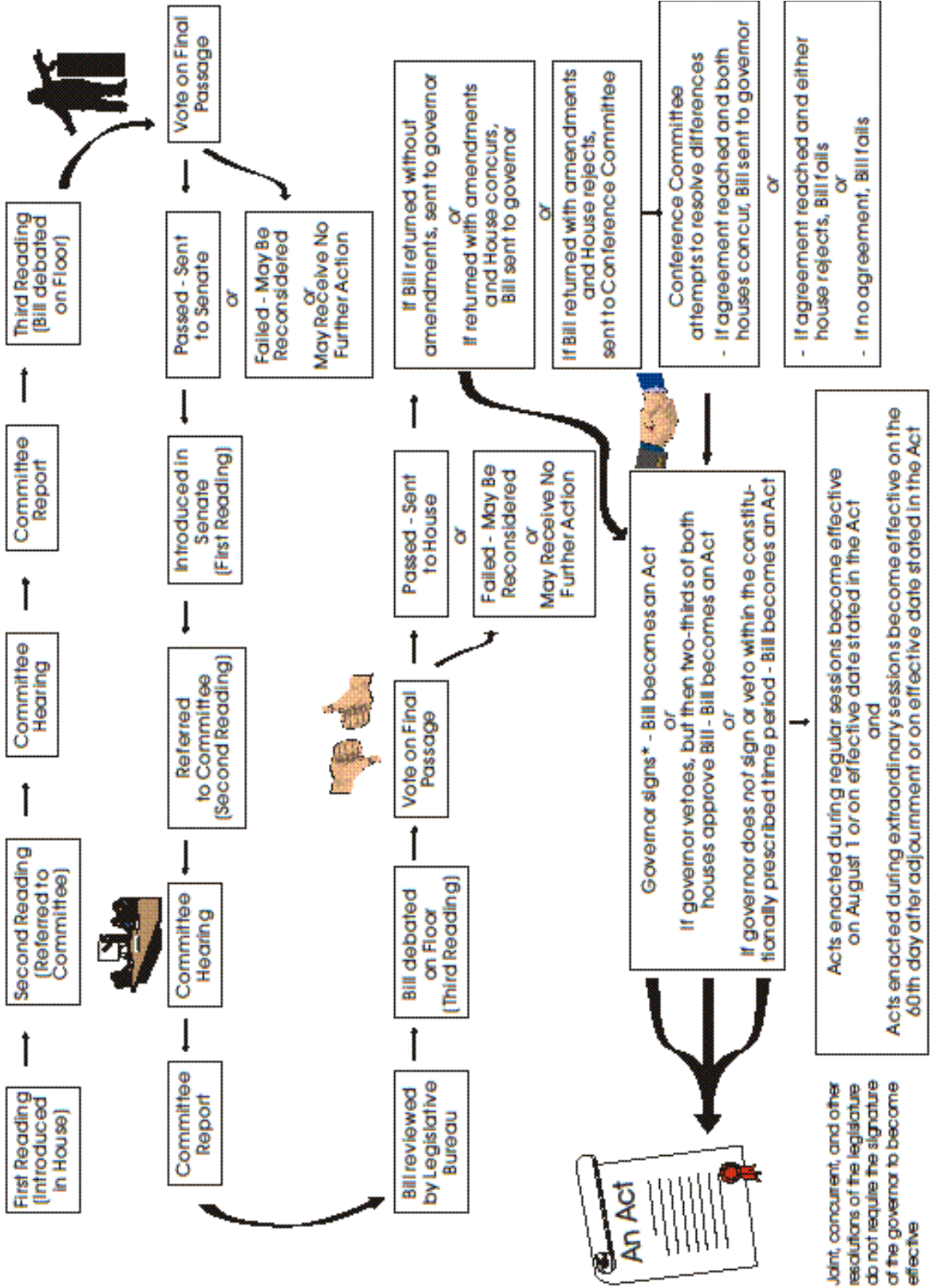
The commission shall adopt such rules and regulations consistent with the authority granted by this Chapter and in accordance with the Administrative Procedure Act, for the harvesting, conservation, management, and sustainability of all species of fish, in accordance with the following standards:

1. Conservation, management, and sustainability measures shall prevent overfishing while achieving, on a continuing basis, the optimum yield while maintaining healthy, plentiful stocks. In fact, every effort will be made at all times to prevent a harvest from exceeding the safe upper limit of harvests which can be taken consistently year after year without diminishing the stocks so that the stock is truly inexhaustible and perpetually renewable.
2. Conservation, management, and sustainability measures shall be based upon the best scientific, economic, biological, anthropological, and sociological information available.
3. To the extent practicable, an individual stock or unit of fish shall be managed as a unit throughout its range within the state's jurisdictional authority and interrelated stocks of fish and other renewable fish resources shall be managed in close coordination while considering their supporting habitats.
4. If it becomes necessary to allocate or assign fishing privileges among various fishermen, such allocations to the extent practicable shall be:
  - a. Fair and equitable to all such fishermen.
  - b. Reasonably calculated to promote conservation.
  - c. Carried out in such a manner that no particular individual, corporation, or other legal entity acquires an excessive share of such privileges.
  - d. In the best interest of the citizens of Louisiana.
5. Conservation, management, and sustainability measures shall, where practicable, promote efficiency in the conservation, management, and sustainability of fish resources; except that no such measure shall have economic allocation as its sole purpose.
6. Conservation, management, and sustainability measures shall, where practicable, minimize costs and avoid unnecessary duplication.
7. Conservation, management, and sustainability measures may take into account and allow for variations among, and contingencies in, fisheries, resources, and catches.

Acts 1991, No. 708, §1; Acts 2014, No. 553, §1.

# APPENDIX III. Louisiana Legislative Process

## How a Bill Becomes a Law



\* Joint, concurrent, and other resolutions of the legislature do not require the signature of the governor to become effective

## APPENDIX IV. Authorities and Duties of the Louisiana Wildlife and Fisheries Commission

According to LA R.S. 56, the Commission's authorities and duties related to Spotted Seatrout include:

### LA R.S. 56:2 Supervision and Direction of the Commission

The Commission has general control, management, supervision, and direction of itself. The Commission is a policy-making and budgetary-control board, with no administrative functions. The Commission has sole authority to establish definite management programs and policies, approve and accept all contracts at its discretion, make studies and investigations as it thinks necessary, formulate policies, and determine the wisdom and efficacy of its policies, plans, rules, regulations and proceedings.

### LA R.S. 56:3 Ownership of Fish

The ownership and title to all wild birds, and wild quadrupeds, fish, other aquatic life, the beds and bottoms of rivers, streams, bayous, lagoons, lakes, bays, sounds, and inlets bordering on or connecting with the Gulf of Mexico within the territory or jurisdiction of the state, including all oysters and other shellfish and parts thereof grown thereon, either naturally or cultivated, and all oysters in the shells after they are caught or taken therefrom, are and remain the property of the state, and shall be under the exclusive control of the Wildlife and Fisheries Commission except as provided in R.S. 56:4 (Authority of Department of Natural Resources over navigable water bottoms).

### LA R.S. 56:6 Special Powers and Duties

The Commission, through its secretary, shall:

- Adopt rules and regulations for the comprehensive control of finfish
- Improve, enlarge, and protect the natural oyster reefs of the state
- Enforce all law relative to the protection, propagation, and sale of all species of fish in the state
- Have full power and control over all fish within the state's waters
- Assist in protecting all leases of private oyster bedding grounds in the enjoyment of their rights
- Promulgate rules and regulations to set seasons, times, places, size limits, quotas, daily take, and possession limits based upon biological and technical data for all fish
- Impose a fee for nonresident recreational fishing licenses
- Provide for a program of dissemination of fisheries information and education in Louisiana.

### LA R.S. 56:22 Rules and Regulations

The Commission may entirely prohibit the taking of any species of fish in any part of the state for not more than a three-year period.

### LA R.S. 56:25 Fish and Wildlife Restoration and Management Projects

The Commission is authorized, empowered, and directed to perform acts as may be necessary to conduct and establish cooperative fish restoration projects as defined in the Dingell-Johnson Sport Fish Restoration Act, in compliance with said act and rules and regulations promulgated by the Secretary of Interior thereunder.

### LA R.S. 56:40.2

The Commission shall adopt rules to establish guidelines for determining the value of injured or destroyed fish based upon recommendations of department staff and other relevant factors.

### LA R.S. 56:301.5 Commission Rules and Regulations

The Commission may promulgate rules and regulations concerning any aspect of licensing not specifically provided for.

### LA R.S. 56:313 Control of Fisheries

The Commission has exclusive control of fish having a game or commercial value in the state.

### LA R.S. 56:315 Sanctuaries and Propagating Places

The Commission may operate and maintain hatcheries, sanctuaries and propagating places for the protection and propagation of fish and may restrict fishing in any manner it deems advisable.

### LA R.S. 56:325.1 Size and Possession Limits for Recreational Saltwater Finfish

The Commission may set by rule daily take, possession, and size limits for saltwater finfish caught recreationally in Louisiana territorial waters, based on biological and technical data.

### LA R.S. 56:325.3. Spotted Sea Trout Commercial Taking; Annual Quota; Red Drum Commercial Taking, Possession or Landing Prohibited

- A. (1) The commission shall establish a maximum annual quota for the commercial harvest of spotted sea trout taken within Louisiana waters or landed in Louisiana which shall not exceed one million pounds nor shall it be less than five hundred thousand pounds. The commercial taking or harvesting of spotted sea trout shall be prohibited within Louisiana waters west of Mermentau River. The Louisiana Wildlife and Fisheries Commission shall establish an open season for the commercial harvest of spotted sea trout which shall run from the second day of January each year until the maximum annual quota is reached. The commercial harvest or taking of spotted sea trout is prohibited during the period from sunset on Friday through sunrise on Monday, and there shall be no possession of spotted sea trout in excess of the recreational limit during the period between 10:00 p.m. and 5:00 a.m. However, when not on a commercial fishing trip, a person holding a permit for the commercial

taking or possessing of spotted sea trout may take or possess an amount not to exceed the legal recreational limit of spotted sea trout between the hours of 10:00 p.m. and 5:00 a.m. during the open season and at any time during the closed season if that person also possesses a basic recreational fishing license and a saltwater fishing license. Only a rod and reel shall be used for the commercial harvest of spotted sea trout. The provisions of this Section are subject to quotas and size limits as established by law and rules and regulations of the commission. Fish taken under recreational licenses shall not be sold, bartered, traded, or exchanged. (3) Nothing in this Section shall be deemed to prohibit the possession of fish legally taken prior to the closure order.

- B. The commercial taking or landing of Red Drum in Louisiana is prohibited. No vessel possessing or fishing any seine net, gill net, trammel net, or hoop net shall have a Red Drum aboard the vessel, whether caught within or without the waters of the state. Violation of the provisions of this Subsection constitutes a class 5-B violation. Aquaculturally raised fish, as defined by LA R.S. 56:356, shall be exempt from the provisions of this Section.
- C. The commercial taking or sale by a commercial fisherman of spotted sea trout is prohibited except by special permit issued by the Department of Wildlife and Fisheries at a cost of one hundred dollars for residents of this state and four hundred dollars for those who are nonresidents. No person shall purchase spotted sea trout from any commercial fisherman who does not possess a spotted sea trout permit. No person shall qualify for a charter boat fishing guide license and a spotted sea trout permit during the same licensure period.
- D. (1) No person shall be issued a license or permit for the commercial taking of spotted sea trout unless that person meets all of the following requirements:
  - a. The person shall provide proof that he purchased a valid Louisiana commercial saltwater gill net license in any two of the years 1995, 1994, and 1993.
  - b. The person shall provide copies of unamended, original income tax returns, including Schedule C from the federal form 1040, which show that the person derived more than 50% of his earned income from the capture and sale of seafood species in any two of the years 1995, 1994, and 1993.
  - c. The applicant shall not have been convicted of any fishery-related violations that constitute a class three or greater violation.
 (2) The commission shall adopt rules and regulations for the entry of commercial fishermen into the commercial spotted sea trout fishery. Such rules shall include the provisions of Paragraph (1) of this Subsection as minimum requirements.
- E. The department shall not issue nor shall any person receive more than one permit or license to commercially take spotted sea trout.
- F. (1) Violation of any provision of this Section, except Subsection B, or of any Wildlife and Fisheries Commission regulation pertaining to spotted sea trout fishery, shall constitute a Class 6 violation. The offender shall also be penalized as follows:
  - a. For a first offense, the offender shall forfeit any spotted sea trout permit or commercial fisherman's license issued to him and shall be barred from obtaining a spotted sea trout permit or a commercial fisherman's license for

the remainder of the period for which it was issued plus one year, during which the offender shall be barred from participating in any spotted sea trout fishery.

- b. For a second offense, the offender shall forfeit any spotted sea trout permit or commercial fisherman's license issued to him and shall be barred from obtaining a spotted sea trout permit or a commercial fisherman's license for the remainder of the period for which it was issued plus two years, during which the offender shall be barred from participating in any spotted sea trout fishery.
- c. For a third offense, the offender shall forfeit any spotted sea trout permit or commercial fisherman's license issued to him and shall be forever barred from obtaining a spotted sea trout permit or a commercial fisherman's license and from participating in the spotted sea trout fishery.
  - (2) Any person who participates in the spotted sea trout fishery while barred shall be penalized under the provisions of a Class 7-B violation.

### LA R.S. 56:326 Size and Possession Limits; Commercial Fish

The Commission shall have the authority to set seasons, regulate the type of gear used, and set possession limits for Spotted Seatrout and other estuarine fish in Calcasieu Lake, located in Calcasieu and Cameron Parishes, where it is clearly demonstrated that intense fishing competition exists, or if pollution levels exceed accepted standards, or if biological studies indicate the need.

#### LA R.S. 56:326.1 Size Limits

The Commission shall have the authority to set size limits for all saltwater fish for which no limits have been set by law.

#### LA R.S. 56:326.3 Possession Limits; Size Limits, Seasons, Quotas, Times and Daily Take Limits

The Commission may set possession limits, quotas, places, seasons, times, size limits, and daily take limits based upon biological and technical data, for all saltwater finfish taken or possessed in Louisiana waters.

#### LA R.S. 56:326.4 Staggered and Split Seasons

The Commission may split, stagger or otherwise arrange seasons and quotas for fishing in such a manner as to maximize the availability of popular fish for serving in Louisiana restaurants throughout the year.

#### LA R.S. 56:327 Sale or Purchase of Freshwater or Saltwater Game Fish Prohibited; Commercial Sales and Purchases, Commercial License Required; Commercial Fingerlings and Certified Mariculture and Aquaculture Fish Excepted; Penalties

The Commission shall hold public hearings to determine areas in which the saltwater fish resources of the state must be allocated between the competing sport and commercial interests and shall promulgate rules and regulations defining such areas and the manner in which the saltwater fish resources shall be allocated.

## **APPENDIX V. Authorities and Duties of the Secretary and the Louisiana Department of Wildlife and Fisheries**

According to LA R.S. 56 and LAC 76, the Secretary and LDWF's authorities and duties related to Spotted Seatrout include:

### **LA R.S. 56:6.1 Emergency Closures**

The Secretary, in an emergency, may declare a closed season on any or all species of fish found or existing in the waters of the state or may restrict fishing in the closed season in any manner deemed advisable.

### **LA R.S. 56:17 Permits**

The director may take fish of any kind in any manner or place for the purpose of science and cultivation and distribution and may grant permits to other persons for the same purpose.

### **LA R.S.56:301.4 Records; Confidentiality**

The Department shall draft regulations, prescribing procedures to preserve the confidentiality of all fisheries dependent data, information, or statistics submitted or collected pursuant to the provisions of this Section (licensing), for approval by the Wildlife and Fisheries Commission and promulgation in accordance with the Administrative Procedure Act. These regulations shall provide for compliance with all procedures set forth by the United States Department of Commerce, or any of its agencies or instrumentalities, for the confidentiality of fishing statistics collected from individuals or firms by that department, its agencies, or instrumentalities.

### **LA R.S.56:313 Control of Fisheries; Duty of the Department**

The Department shall enforce the provisions of the law regulating fish having game or commercial value in the state. The Department through its authorized agents shall confiscate all fish taken, possessed, or transported, contrary to the provisions of LA R.S. 56:313

### **LA R.S. 56:318 Permits**

The Department may take fish of any kind when, where, and in such manner as may be deemed necessary for scientific or educational purposes and for propagation and distribution.

The Secretary may issue permits to any persons to take fish for scientific or educational purposes or for propagation or distribution.

### **LA R.S. 56:327 Sale or Purchase of Freshwater or Saltwater Game Fish Prohibited; Commercial Sales and Purchases, Commercial License Required; Commercial Fingerlings and Certified Mariculture and Aquaculture Fish Excepted; Penalties**

The Secretary shall have authority to set seasons, regulate type of gear used, and set possession limits for estuarine fish where it is clearly demonstrated that intense fishing competition exists or if pollution levels exceed adopted standards or if biological studies indicate the need.

### **LA R.S. 56:579.1(B) Mariculture Permits**

The Secretary may issue permits for mariculture projects within the coastal zone and exempt permittees from statutory limitations to the kind, number or size of fish which may harvested or as to the method of harvesting or taking fish, seasons or other limitations.

### **LA R.S. 56:640.3 Right to Fish**

The Department shall recommend the elimination or restriction of any fishing gear currently in use or which may be used in recreational or commercial fisheries in implementing its management responsibilities or in response to any emergency situation. While elimination or restriction may have uneven impacts on different groups of fishermen, the proposed measures should be applicable to all people of the state. In addition to acquiring the best available biological data, the Department shall use all practicable means to collect all relevant social and economic data in support of such allocation decision making efforts.

## APPENDIX VI. Other States' Commercial Spotted Trout Fishing Regulation

State	Licensing	Seasons	Size Limits	Harvest Limits	Gear Restrictions & Requirements	Limited Entry	Professionalism	Other
<b>TX</b>	Commercial Finfish Fishermans License (\$360 residential, \$1,440 nonresidential)	Take Prohibited	Take Prohibited	Take Prohibited				
<b>MS</b>	Commercial Saltwater License (\$100 resident, varies nonresident) Spotted Seatrout Endorsement (\$10)	Closed Nov. 1 - Jan. 31	14-inch minimum TL	50,000 pound annual quota	Legal gear: hook and line, trotline, bow, spear, gig, cast net, Brill net, small mesh beach seine, trammel net or gillnet; area, size, mesh size, and material restrictions on nets and seines	Yes	None	Spotted Seatrout Endorsement with income from commercial fishing activity provisions
<b>AL</b>	Commercial Saltwater Fishing License (\$121 resident, \$241 nonresident); gear license (fee varies by type)	Take Prohibited	Take Prohibited	Take Prohibited				
<b>FL</b>	Saltwater Products License (\$50 resident, \$100 nonresident), Restricted Species Endorsement (\$0)	Varies by region	15- to 24-inch TL slot limit	50 per person or per vessel, 100 per vessel when 1 or more licensed fishermen aboard	Allowable gear: cast net and hook and line	None	None	Sale and possession allowed only 30 days after regional closure
<b>GA</b>	Commercial Fishing License (\$25 resident, \$205 nonresident)	Year-round	14-inch minimum TL	15 fish per fishermen per day		None	None	Commercial possession restricted to recreational bag and size limits
<b>SC</b>	Commercial Saltwater License (\$25 resident, \$300 nonresident); gear license (fee varies by type)	Sale Prohibited	Sale Prohibited	Sale Prohibited				
<b>NC</b>	Standard Commercial Fishing License (\$400 resident, nonresident varies by state)	Year-round	14-inch minimum TL	75 fish per trip	Nets, other commercial gear prohibited in certain areas/times; requirements for gillnets: mesh size, buoy markings, length; limits on finfish possession for trawlers; purse seines prohibited; permit required for pound nets	None	None	None
<b>VA</b>	Commercial Fisherman Registration License (\$190); gear licenses (fee varies by type)	Varies by gear	14- to 24-inch TL slot limit, with one over 24 allowed	Varies by gear with total annual quota of 51,104 pounds	Restriction on gill nets and trotlines in certain areas and times; gill net mesh size and tending restrictions, hook and line, pound net	None	None	None
<b>DE</b>	Commercial Fishing License (fee not available)	None	12-inch minimum TL limit	None	Areas closed to gill nets, gill net mesh size restrictions	None	None	None
<b>MD</b>	Finfish Hook and Line License (\$37.50) or Finfish Harvester All Gears (\$100)	Year-round	14-inch minimum TL	150 pounds per day or trip, whichever is longer	Restrictions on gill nets in certain areas and times; mesh restrictions in trawls and gill nets	None	None	None
<b>NJ</b>	Gear license (varies by gear)	Varies by gear	13-inch minimum TL	100 pounds per day	Restrictions on gill nets, pound nets and other trawls in certain times; mesh restrictions in trawls and gill nets	Gear Restrictions	None	None

## APPENDIX VII. Other States' Recreational Spotted Trout Fishing Regulations

State	Licensing	Seasons	Size Limits	Harvest Limits	Gear Restrictions & Requirements	Other
<b>TX</b>	Fishing License and Saltwater Fishing Endorsement (package \$35 resident, \$63 nonresident)	None (provisions for closures during freeze events)	15- to 25-inch slot limit, with one over 25 inches allowed	5 per person per day	Legal gear: pole and line only for gamefish (includes rod and reel)	Gamefish Status
<b>MS</b>	Saltwater Fishing License (\$10 resident, \$30 nonresident)	None	15-inch TL minimum size limit	15 per person per day	Legal gear: hook and line, trotline, bow, spear, gig, cast net, brill net, small-mesh beach seine, trammel net or gill net; area, size, mesh size, and material restrictions on nets and seines	
<b>AL</b>	Saltwater Fishing License (\$23.50 resident, varies by state for nonresident)	None	15- to 22-inch slot limit, with one over 22 inches allowed	6 per person per day	Legal gear: hook and line only for sportfish	Sportfish Status
<b>FL</b>	Saltwater Fishing License (\$17 resident, \$47 nonresident)	Varies by region from year round to one month closures	15- to 19-inch slot limit, with one over 19 allowed	Varies by region from 2 to 5 per person per day	Legal gear: hook and line and cast net	
<b>GA</b>	Fishing License (\$15 resident, \$50 nonresident); SIP permit required when fishing saltwater (No fee)	None	14-inch TL minimum size limit	15 per person per day	Legal gear: hook and line and seine; seines not to be used like gillnets	
<b>SC</b>	Fishing License (\$10 resident, \$35 nonresident)	No harvest by gig from Dec. 1 - Feb. 28	14-inch TL minimum size limit	10 per person per day	Legal gear: hook and line, gig (time/area restrictions)	Gamefish Status
<b>NC</b>	Fishing License (\$16 residents, \$32 nonresident)	None (provisions for closures during freeze events)	14-inch TL minimum size limit	4 per person per day		
<b>VA</b>	Fishing License (\$17.50 resident, \$25.00 nonresident)	None	14- to 24-inch slot limit, with one over 24 inches allowed	5 per person per day	Legal gear: hook and line, handline, spear, gig, cast net, and eel pots	
<b>DE</b>	Fishing License (\$8.50 resident, \$20 nonresident)	None	12-inch TL minimum size limit	None		
<b>MD</b>	Chesapeake Bay and Coastal Sport Fishing License (\$15 resident, \$22.50 nonresident)	None	14-inch TL minimum size limit	4 per person per day	Legal gear for tidal waters: bait traps, hook and line/rod and reel/handlines, jugs, nets (cast, seine, dip, landing), bow/gig/spear/spear gun, hand and noodling	
<b>NJ</b>	No saltwater license (Registration with the New Jersey Saltwater Recreational Registry Program required)	None	13-inch TL minimum size limit	1 per person per day	Legal gear: handline or rod and reel	

## APPENDIX VIII. Federal Management Institutions

The following list of federal management institutions was adapted from a similar list in GSMFC 2001.

The Spotted Seatrout fishery operates almost exclusively in state waters; landings occasionally come from federal waters. Federal agencies do not directly manage Spotted Seatrout, and Gulf Council has not developed a fishery management plan for Spotted Seatrout. However, through their administration of laws, regulations, and policies, certain federal agencies may influence the Spotted Seatrout resource and fishery and management thereof.

### Regional Fishery Management Councils

Under the MSA, federal authorities are responsible for monitoring and managing fisheries resources in federal waters (from the seaward boundary of state waters to 200 nautical miles offshore). Federal management is based on fishery management plans developed by regional fishery management councils, including the Gulf Council. Each council prepares plans for each fishery requiring management within its geographical area of authority and amends such plans as necessary. Plans are implemented as federal regulation through the U.S. Department of Commerce. As there is no significant fishery for Spotted Seatrout in federal waters of the Gulf, the Gulf Council has not developed a management plan for Spotted Seatrout.

### U.S. Department of Commerce

The Secretary of U.S. Department of Commerce (Secretary of Commerce), acting through National Marine Fisheries Service, has the ultimate authority to approve or disapprove all fishery management plans prepared by regional fishery management councils. Where a council fails to develop a plan, or to correct an unacceptable plan, the Secretary of Commerce may do so.

### National Oceanic and Atmospheric Administration's National Marine Fisheries Service (NMFS)

The National Oceanic and Atmospheric Administration's National Marine Fisheries Service (NMFS) collects data and statistics on fisheries and fishermen. It performs research and conducts management authorized by international treaties. NMFS has the authority to enforce the MSA and the Lacey Act and is the federal trustee for living and nonliving natural resources in coastal and marine areas under U.S. jurisdiction. NMFS exercises no management jurisdiction with respect to Spotted Seatrout in the Gulf. It conducts some research and data collection programs and comments on all projects that affect marine fishery habitat.

### National Oceanic and Atmospheric Administration's Office of Ocean and Coastal Resource Management

The National Oceanic and Atmospheric Administration's Office of Ocean and Coastal Resource Management (OCRM), in conjunction with coastal states, administers the National Estuarine Research Reserve and National Marine Sanctuaries Programs as authorized under Section 315 of the Coastal Management Act of 1972. Under these programs, OCRM establishes protected areas which serve to provide suitable habitat for estuarine and marine species and serve as sites for research and education activities related to coastal management issues. These areas are managed under specific management plans that may include restrictions on harvest and use of marine and estuarine species. Such plans could directly affect harvest of Spotted Seatrout.

OCRM may also influence fishery management for Spotted Seatrout indirectly through administering the Coastal Zone Management Program and by setting standards and approving funding for state coastal zone management programs. These programs often affect estuarine habitat on which Spotted Seatrout depend.

### Department of the Interior's National Park Service

Under the Department of the Interior, the National Park Service may regulate fishing activities within park boundaries. Such regulations could affect Spotted Seatrout harvest if implemented within a given park area. For example, the National Park Service requires commercial fishermen to have a permit to fish commercially in Jean Lafitte National Historical Park and Preserve.

### Department of the Interior's U.S. Fish and Wildlife Service

The Department of the Interior's U.S. Fish and Wildlife Service (USFWS) has little direct management authority over Spotted Seatrout. However, commercial fishing is prohibited in USFWS's coastal National Wildlife Refuges. USFWS may also affect the management of Spotted Seatrout through the Fish and Wildlife Coordination Act, under which USFWS and NMFS review and comment on proposals for projects such as dredging, filling, and marine construction that could affect Spotted Seatrout and their habitat.

### U.S. Environmental Protection Agency

Through its administration of the Clean Water Act (CWA) and the National Pollutant Discharge Elimination System (NPDES), the U.S. Environmental Protection Agency (EPA) provides protection for Spotted Seatrout and their habitat. The EPA may disapprove or add conditions to applications for permits to discharge pollutants into estuarine waters to protect these marine resources.

Under Section 312 of the CWA, the EPA regulates the equipment that treats or holds sewage (marine sanitation devices) and establishes areas in which the discharge of sewage from vessels is not allowed (No Discharge Zones, or NDZs) to help protect human health and the aquatic environment from disease-causing microorganisms that may be present in sewage from vessels and boats. An individual state can petition the EPA to officially designate an NDZ to: (1) to protect aquatic habitats where pump-out facilities are available, (2) to protect special habitats or species, and/or (3) to protect human drinking water intake zones. Once a designation is official, the state and the U.S. Coast Guard, if applicable, enforce the limits of the NDZ. This means that the discharge of untreated and treated sewage is strictly forbidden and subject to fine if violated. Also, the U.S. Coast Guard can board vessels in an NDZ to verify that they have adequate facilities. Currently, the EPA can only designate areas associated with oyster harvesting as NDZs when there are sufficient pump-out facilities in the area to service vessel traffic.

The EPA and a local sponsor jointly administer the National Estuary Program. This program evaluates estuarine resources, local protection, and development of policies, and seeks to develop future management plans. Numerous user groups including industry, environmentalists, recreational and commercial interests, and policymakers provide input on these plans. The Barataria-Terrebonne estuarine complex in Louisiana became a National Estuary in 1990.

### **U.S. Army Corps of Engineers**

Spotted Seatrout populations may be influenced by the U.S. Army Corps of Engineers' (Corps) responsibilities pursuant to the CWA and Section 10 of the Rivers and Harbors Act. Under these laws, the Corps issues or denies permits to individuals and other organizations for proposals to dredge, fill, and construct in wetland areas and navigable waters. The Corps is also responsible for planning, construction, and maintenance of navigation channels and other projects in aquatic areas; these projects could affect Spotted Seatrout and their habitat.

### **U.S. Coast Guard**

The U.S. Coast Guard is responsible for enforcing fishery management regulations adopted by the DOC pursuant to management plans developed by the Gulf Council. The U.S. Coast Guard also enforces laws regarding marine pollution and marine safety, and they assist commercial and recreational fishing vessels in times of need. Although no regulations have been promulgated for Spotted Seatrout in the EEZ, enforcement of laws affecting marine pollution and fishing vessels could influence Spotted Seatrout populations.

### **U.S. Food and Drug Administration**

The U.S. Food and Drug Administration (FDA) directly regulates the harvest and processing of seafood through its administration of the Food, Drug, and Cosmetic Act and other regulations that prohibit the sale and transfer of contaminated, putrid, or otherwise potentially dangerous foods. The FDA reserves the right and authority to enforce the Food, Drug, and Cosmetic Act and other regulations if the states fail to do so.

## APPENDIX IX. Federal Laws, Regulations and Policies

The following federal laws, regulations, and policies may directly and/or indirectly influence the quality, abundance, and ultimately the management of Spotted Seatrout. This list was adapted from a similar list in GSMFC 1993.

### Fishery Conservation and Management Act of 1976 (later renamed the Magnuson Fishery Conservation and Management Act and then the Magnuson-Stevens Fishery Conservation Act), and subsequent reauthorizations

The Magnuson-Stevens Fishery Conservation Act (MSA) extended U.S. jurisdiction from 12 nautical miles offshore to 200 nautical miles and established regional fishery management councils. The MSA mandates the councils to prepare fishery management plans for important fisheries resources within federal waters. These plans must comply with certain conservation and management requirements laid out in the MSA, including national standards for sustainable fisheries management. Congress has reauthorized the MSA twice, once in 1996 and again in 2007. The 1996 reauthorization strengthened requirements to prevent overfishing and rebuild overfished fisheries; added definitions for overfishing, overfished, and fishing communities; added three new national standards to address fishing vessel safety, fishing communities, and bycatch and also revised several existing standards; and addressed needs for improved fishery monitoring, enhanced research, greater consideration of fishing communities, identification of essential fish habitat, formation of constituent advisory panels, and analysis of fishing capacity, among other activities. The 2006 reauthorization featured a number of new requirements to prevent overfishing by establishing annual catch limits and accountability measures; promote market-based management strategies, including limited access privilege programs, such as catch shares; strengthen the role of science through peer review, the councils' Scientific and Statistical Committees, and the Marine Recreational Information Program; and enhance international fisheries sustainability by addressing illegal, unregulated, and unreported fishing and bycatch.

### Interjurisdictional Fisheries Act of 1986

The Interjurisdictional Fisheries Act established a program to promote and encourage state activities in support of management plans, to promote and encourage management of interjurisdictional fisheries resources throughout their range, and to promote and encourage research in preparation for the implementation of the use of ecosystems and interspecies approaches to the conservation and management of interjurisdictional fisheries resources throughout their range. The enactment of this legislation repealed the Commercial Fisheries Research and Development Act.

### Federal Aid in Sport Fish Restoration Act, commonly called the Dingell-Johnson Act or the Wallop-Breaux Act

The Federal Aid in Sport Fish Restoration Act provides funds to states, the U.S. Fish and Wildlife Service (USFWS), and the Gulf States Marine Fisheries Commission (GSMFC) to conduct research, planning, and other programs for enhancing and restoring marine sportfish populations.

### Marine Protection, Research, and Sanctuaries Act of 1972 (Titles I and III) and the Shore Protection Act of 1988

The Marine Protection, Research, and Sanctuaries Act provides protection of fish habitat through establishing and maintaining marine sanctuaries. This act and the Shore Protection Act regulate ocean transportation and dumping of dredged materials, sewage sludge, and other materials. Criteria for issuing permits for such activities include considering effects of dumping on the marine environment, ecological systems, and fisheries resources.

### Federal Food, Drug and Cosmetic Act of 1938

The Federal Food, Drug, and Cosmetic Act prohibits the sale, transfer, or importation of "adulterated" or "misbranded" products. Adulterated products may be defective, unsafe, filthy, or produced under unsanitary conditions. Misbranded products may have false, misleading, or inadequate information on their labels. In many instances, this act also requires U.S. Food and Drug Administration (FDA)-approval for distribution of certain products.

### Federal Water Pollution Control Act of 1948, the Clean Water Act of 1972, and Amendments

The Federal Water Pollution Control Act was the first major U.S. law to address water pollution. It was significantly amended in 1972 and became commonly known as the Clean Water Act (CWA). The CWA's National Pollutant Discharge Elimination System (NPDES) program regulates point sources that discharge pollutants into waters of the United States. Any facility that discharges directly into U.S. waters must have an NPDES permit issued by the U.S. Environmental Protection Agency (EPA). Discharges of pollutants into rivers and estuaries that empty into the Gulf can harm or kill marine fisheries resources and alter habitats. The EPA has authorized the State of Louisiana to implement its own NPDES program to monitor program compliance and control water pollution.

Section 404 of the CWA regulates the placement of dredged or fill material into wetlands, lakes, streams, rivers, estuaries and certain other types of waters to avoid and minimize losses to wetlands and other waters and to compensate for unavoidable loss through mitigation and restoration. The EPA and the U.S. Army Corps of Engineers (Corps) jointly administer Section 404. The Corps issues Section 404 permits and monitors compliance with the issued permits. Both the Corps and EPA are responsible for on-site investigations and enforcement of unpermitted discharges under Section 404. USFWS and NMFS evaluate impacts of federally permitted projects on fish and wildlife.

The CWA prohibits discharge of oil or hazardous substances to U.S. waters or their adjoining shorelines in quantities that may be harmful to the public health or welfare or the environment. Owners and operators of non-transportation-related oil facilities must make and implement plans to prevent oil discharges. Some oil storage facilities and vessels must also prepare and submit plans for responding to discharges of oil and hazardous substances. If a facility or vessel discharges oil to navigable

waters or adjoining shorelines, the owner/operator is required to follow certain federal reporting requirements. National and area response plans must also be developed. EPA regional personnel periodically conduct inspections to ensure compliance with these regulations.

### **International Convention for the Prevention of Pollution from Ships**

The International Convention for the Prevention of Pollution from Ships (MARPOL) is the main international convention that covers prevention of pollution of the marine environment by ships from operational or accidental causes. MARPOL is divided into annexes, each of which regulates a particular group of ship emissions including oil and oily water, bulk noxious liquid substances, harmful substances carried by sea in packaged form, sewage, garbage, and air pollution. As a signatory to MARPOL, the United States implemented the Act to Prevent Pollution from Ships to comply with the provisions of this convention. The Marine Plastic Pollution Research and Control Act later amended the Act to Prevent Pollution from Ships.

### **Clean Vessel Act of 1992, as Amended**

Congress passed the Clean Vessel Act (CVA) to help reduce pollution from vessel sewage discharges. The CVA was created to provide a viable alternative to the overboard disposal of recreational boater sewage. All recreational vessels must have access to pump-outs funded under the CVA. The CVA made grants available to the states on a competitive basis for the construction and/or renovation, operation and maintenance of pump-out and portable toilet dump stations. States may sub-grant to public and private marinas to install pump-outs. The USFWS administers this grant program. The CVA also provides a portion of its total funding for educational outreach regarding the effects of boater sewage and how boaters can avoid improper sewage disposal.

### **Coastal Zone Management Act of 1972, as Amended**

Under the Coastal Zone Management Act (CZMA), states receive federal assistance grants to maintain federally-approved planning programs for enhancing, protecting, and using coastal resources. These are state programs, but the CZMA requires that federal activities must be consistent with the respective states' coastal zone management programs. Depending upon the individual state's program, the CZMA provides the opportunity for considerable protection and enhancement of fisheries resources by regulation of activities and by planning for future development in the least environmentally damaging manner.

### **Endangered Species Act of 1973, as Amended**

The Endangered Species Act (ESA) provides for the listing of plant and animal species that are threatened or endangered. Once listed as threatened or endangered, a species may not be taken, possessed, harassed, or otherwise molested. It also provides for a review process to ensure that projects authorized, funded or carried out by federal agencies do not jeopardize the existence of these species or result in destruction or modification of habitats that are determined by the Secretary of the U.S. Department of the Interior to be critical.

### **National Environmental Policy Act of 1970**

The National Environmental Policy Act (NEPA) requires that all federal agencies recognize and give appropriate consideration to environmental amenities and values in the course of their decision-making. To create and maintain conditions under which man and nature can exist in productive harmony, NEPA requires that federal agencies prepare an environmental impact statement (EIS) prior to undertaking major federal actions that significantly affect the quality of the human environment. Within these statements, federal agencies must carefully assess alternatives to the proposed action that may better safeguard environmental values.

### **Fish and Wildlife Coordination Act of 1958**

Under the Fish and Wildlife Coordination Act, USFWS and NMFS review and comment on fish and wildlife aspects of proposals for work and activities sanctioned, permitted, assisted, or conducted by federal agencies that take place in or affect navigable waters, wetlands, or other critical fish and wildlife habitat. The review focuses on potential damage to fish, wildlife, and their habitat; therefore, it serves to provide some protection to fisheries resources from activities that may alter critical habitat in nearshore waters. This Act is important because federal agencies must give due consideration to the recommendations of USFWS and NMFS.

### **Fish Restoration and Management Projects Act of 1950**

Under this act, DOI is authorized to provide funds to state fish and game agencies for fish restoration and management projects. Funds for protection of threatened fish communities that are located within state waters could be made available under this Act.

### **Lacey Act of 1981, as Amended**

The Lacey Act prohibits import, export, and interstate transport of illegally taken fish and wildlife. As such, the Act provides for federal prosecution for violations of state fish and wildlife laws. The potential for federal convictions under this Act has probably reduced interstate transport of illegally possessed fish and fish products.

### **Comprehensive Environmental Response, Compensation, and Liability Act of 1980, commonly called Superfund**

The Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA) names NMFS as the federal trustee for living and nonliving natural resources in coastal and marine areas under U.S. jurisdiction. It could provide funds for cleanup of fishery habitat in the event of an oil spill or other polluting event.

### **Fish and Wildlife Act of 1956**

This Act provides assistance to states in the form of law enforcement training and cooperative law enforcement agreements. It also allows for disposal of abandoned or forfeited property with some equipment being returned to states. The Act prohibits airborne hunting and fishing activities.

## APPENDIX X. Commercial and Recreational Spotted Seatrout Fishery Regulations - Detailed Text

In general, Spotted Seatrout management and conservation is covered in state law through LA R.S. Title 56 and rules promulgated by Commission within LAC Title 76. These regulations are listed below.

### COMMERCIAL SPOTTED SEATROUT REGULATIONS

#### LICENSING

##### Commercial Fisherman's License

- A commercial fisherman taking fish, including bait species, from state waters or possessing fish in the state must purchase a commercial fisherman's license. LA R.S. 56:303(A)(1)
- The cost of the commercial fisherman's license is \$55 for residents and \$460 for nonresidents. LA R.S. 56:303(B)
- A commercial fisherman's license is valid for one year, beginning on Jan. 1 of each calendar year and expiring on Dec. 31 of the same calendar year. LA R.S. 56:303.1(A)
- A commercial fisherman's license may be purchased at any time of the year for the current license year and from Nov. 15 for the immediately following license year. LA R.S. 56:303.1(B)
- The person in charge of the operation of each vessel engaged in commercial fishing must have, in his possession and in his name, a valid, original commercial fisherman's license. This person must also have in his possession a gear license indicating that the applicable gear fee has been paid and, if applicable, a vessel license. LA R.S. 56:303.2(A)
- A resident of this state who is seventy years of age or older may obtain a senior commercial fishing license for an annual fee of \$20. The senior commercial fishing license shall be valid from Jan. 1 of each calendar year until Dec. 31 of the same calendar year. The license may be purchased at any time for the current license year and may be purchased after Nov. 15 for the following license year. The license shall be in lieu of a commercial fisherman's license required by this Section and shall also serve in lieu of any commercial gear licenses that may be required by any activities engaged in by the license holder. LA R.S. 56:303(F)
- The holder of a commercial fisherman's license may transport and sell his own catch to any licensed Louisiana wholesale/retail seafood dealer located within the state of Louisiana. The holder of a commercial fisherman's license may transport and sell his own catch to a consumer only within the state and only when in possession of a fresh products license as provided in LA R.S. 56:303.1.1. However, if he purchases fish for resale or transports his catch out of the state of Louisiana, or if he sells fish to a retail seafood dealer, restaurant, or retail grocer, he becomes a wholesale/retail seafood dealer and must obtain a wholesale/retail seafood dealer's license and is governed by the laws, rules, and regulations concerning wholesale/retail seafood dealers. LA R.S. 56:303.7(A)
- Whenever the holder of a commercial fisherman's license sells or transfers possession of his own catch to a wholesale/retail seafood dealer, he shall present the license to the dealer for license verification. The commercial fisherman shall provide the wholesale/retail seafood dealer with all information, as determined by the commission to be necessary to properly manage the fishery resources of the state, that is required to complete the commercial receipt form, which shall include but not be limited to the fisherman's first and last name, license number, signature, gear used, vessel used, primary location of where fish were caught, duration of trip, and permit numbers for species requiring a permit to harvest. The commercial fisherman shall sign each commercial receipt form attesting that the information provided therein is correct. LA R.S. 56:303.7(B)
- A commercial fisherman selling fish under the authority of a fresh product license specified in LA R.S. 56:303.1.1 shall record all information required on the commercial receipt forms, except that the fresh product license number shall be recorded in place of the wholesaler/retailer seafood dealer's license number. The fresh product licensee shall complete monthly returns to the department as specified in LA R.S. 56:306.6 for wholesale/retail seafood dealers. The commercial fisherman shall sign each commercial receipt form attesting that the information provided therein is correct. LA R.S. 56:303.7(C)
- The commercial taking or sale by a commercial fisherman of spotted sea trout is prohibited except by special permit issued by the Department of Wildlife and Fisheries at a cost of \$100 for residents of this state and \$400 for those who are nonresidents. No person shall purchase spotted sea trout from any commercial fisherman who does not possess a spotted sea trout permit. No person shall qualify for a charter boat fishing guide license and a spotted sea trout permit during the same licensure period. R.S. 56:325.3(C).
- No person shall be issued a license or permit for the commercial taking of spotted sea trout unless that person meets all of the following requirements:
  - a. The person shall provide proof that he purchased a valid Louisiana commercial saltwater gill net license in any two of the years 1995, 1994, and 1993.
  - b. The person shall provide copies of unamended, original income tax returns, including Schedule C from the federal form 1040, which show that the person derived more than 50% of his earned income from the capture and sale of seafood species in any two of the years 1995, 1994, and 1993.
  - c. The applicant shall not have been convicted of any fishery-related violations that constitute a class three or greater violation.
- The commission shall adopt rules and regulations for the entry of commercial fishermen into the commercial spotted sea trout fishery. Such rules shall include the provisions of Paragraph (1) of this Subsection as minimum requirements. LA R.S. 56:325.3(D) (1) and (2)

- The department shall not issue nor shall any person receive more than one permit or license to commercially take spotted sea trout. LA R.S. 56:325.3(D) and (E)
- Violation of any provision of this Section, except Subsection B, or of any Wildlife and Fisheries Commission regulation pertaining to spotted sea trout fishery, shall constitute a Class 6 violation. The offender shall also be penalized as follows:
  - a. For a first offense, the offender shall forfeit any spotted sea trout permit or commercial fisherman's license issued to him and shall be barred from obtaining a spotted sea trout permit or a commercial fisherman's license for the remainder of the period for which it was issued plus one year, during which the offender shall be barred from participating in any spotted sea trout fishery.
  - b. For a second offense, the offender shall forfeit any spotted sea trout permit or commercial fisherman's license issued to him and shall be barred from obtaining a spotted sea trout permit or a commercial fisherman's license for the remainder of the period for which it was issued plus two years, during which the offender shall be barred from participating in any spotted sea trout fishery.
  - c. For a third offense, the offender shall forfeit any spotted sea trout permit or commercial fisherman's license issued to him and shall be forever barred from obtaining a spotted sea trout permit or a commercial fisherman's license and from participating in the spotted sea trout fishery.
- Any person who participates in the spotted sea trout fishery while barred shall be penalized under the provisions of a Class 7-B violation. LA R.S. 56:325.3(F)(1) and (2)

### **Fresh Products License**

- A commercial fisherman selling his catch directly to a consumer shall possess a fresh products license. LA R.S. 56:303(A)(2) and LA R.S. 56:303.1.1(A)
- The cost of a fresh products license shall be \$20 for residents and \$120 for nonresidents. The fresh products license shall be valid for one year, beginning on Jan. 1 of each calendar year and expiring on Dec. 31 of the same calendar year. LA R.S. 56:303.1.1(B)
- Anyone holding a fresh products license shall, on or before the 10th day of each month, submit to the department, on forms provided or approved by the department for that purpose, information required by the department as provided in LA R.S. 56:303.7. LA R.S. 56:303.1.1(D)
- A commercial fisherman may purchase a secondary fresh products license for a spouse if he provides the spouse's name and social security number to the department. This secondary license will allow the commercial fisherman to continue to fish while the spouse sells the catch. The secretary of the Department of Wildlife and Fisheries shall promulgate rules and regulations implementing the provisions of this Subsection. The department is authorized to collect a fee for issuance of the license not to exceed \$5 which, after compliance with Article VII, Section 9(B) of the Constitution of Louisiana relative to the Bond Security and Redemption Fund, shall be credited to the Conservation Fund. LA R.S. 56:303.1.1(E)
- A commercial fisherman selling fish under the authority of a fresh product license specified in LA R.S. 56:303.1.1 shall record all information required on the commercial receipt forms, except that the fresh product license number shall be recorded in place of the wholesaler/retailer seafood dealer's license number. The fresh product licensee shall complete monthly returns to the department as specified in LA R.S. 56:306.6 for wholesale/retail seafood dealers. The commercial fisherman shall sign each commercial receipt form attesting that the information provided therein is correct. LA R.S. 56:303.7(C)

### **Vessel License**

- A vessel shall be licensed whenever engaged in commercial fishing in or whenever possessing fish for sale in the saltwater areas of the state defined in LA R.S. 56:322. A vessel may be licensed whenever engaged in commercial fishing in or whenever possessing fish for sale in the freshwater areas of the state defined in LA R.S. 56:322. LA R.S. 56:304(A)
- The cost of the vessel license is \$15 for residents and \$60 for nonresidents. LA R.S. 56:304(B)
- Vessel licenses are issued in the name of the owner of the vessel and shall list the owner's name and address, the vessel name and registration or documentation number, and any other information required by the department. LA R.S. 56:304(D)
- A vessel license is valid for one year, beginning on Jan. 1 of each calendar year and expiring on Dec. 31 of the same calendar year. LA R.S. 56:304.1(A)
- A vessel license may be purchased at any time of the year for the current license year and from Oct. 1 for the immediately following license year. LA R.S. 56:304.1(B)
- It is unlawful for the owner of a commercial fishing vessel licensed under this Subpart to permit any person not holding a valid, original commercial fisherman's license to operate such licensed vessel while the vessel is engaged in commercial fishing or while the vessel is possessing fish for sale in the waters of the state. LA R.S. 56:304.2(A)
- A vessel engaged in commercial fishing and operated by a person not possessing a valid, original commercial fisherman's license subjects the vessel owner to revocation of the vessel license and seizure of the vessel and all fish and equipment thereon. LA R.S. 56:304.2(B)
- Vessel licenses are not transferable except as provided by rule or regulation of the department. LA R.S. 56:304.5(A)
- The name of a vessel for which a vessel license has been issued cannot be changed without prior notification to the department. LA R.S. 56:304.5(B)
- The person in charge of the operation of each vessel engaged in commercial fishing must have, in his possession and in his name, a valid, original commercial fisherman's license. This person must also have in his possession a gear license indicating that the applicable gear fee has been paid and, if applicable, a vessel license. LA R.S. 56:303.2(A)

### Commercial Gear Licenses

- A commercial fisherman must possess a commercial gear license indicating that the applicable gear fee has been paid whenever using or possessing on the fishing grounds any gear listed in Subsection B. LA R.S. 56:305(A)
- Resident commercial gear fees are listed in LA R.S. 56:305(B)
- The commercial gear fee for nonresidents is four times the gear fee for residents. LA R.S. 56:305(C)(1)(a)
- No commercial gear license allowing the use of specific fishing gear shall be issued to any nonresident whose domiciliary state prohibits the use of similar commercial fishing gear. LA R.S. 56:305(C)(2)
- In the event more than one gear type is in possession on the fishing grounds the gear fee for each type of gear must be paid and so indicated on the gear license. LA R.S. 56:305(D)
- A gear fee must be paid for each piece of gear or each type of gear, whichever is applicable, being used to take fish or, if the gear is not in use but is in possession on the fishing grounds, the gear fee must be paid for each piece of gear or type of gear, whichever is applicable, intended for use or which was used to take fish. LA R.S. 56:305(E)
- Any commercial fisherman who purchases a trawl, skimmer, or butterfly gear license must also pay an annual fee of \$10 (residents) or \$40 (nonresidents) for deposit into the Shrimp Marketing and Promotion Account as provided for in LA R.S. 56:10(B)(1)(b)(i). LA R.S. 56:305(G)
- A commercial gear license is valid for one year, beginning on Jan. 1 of each calendar year and expiring on Dec. 31 of the same calendar year. LA R.S. 56:305.1(A)
- A commercial gear license may be purchased at any time of the year for the current license year and from Oct. 1 for the immediately following license year. LA R.S. 56:305.1(B)
- A commercial gear license can only be purchased by a person possessing a valid commercial fisherman's license. LA R.S. 56:305.2(A)
- A valid commercial gear license may be transferred for temporary use only to a person holding a valid commercial fisherman's license and having the same residency status as indicated on the license being transferred. Gear licenses that require qualification shall not be transferred and may only be used by the person to whom it was issued. LA R.S. 56:305.3(A)
- A commercial gear license used by a person not holding a valid, original commercial fisherman's license and using gear under privilege of the commercial fisherman's license is subject to revocation. LA R.S. 56:305.3(B)
- The person in charge of the operation of each vessel engaged in commercial fishing must have, in his possession and in his name, a valid, original commercial fisherman's license. This person must also have in his possession a gear license indicating that the applicable gear fee has been paid and, if applicable, a vessel license. LA R.S. 56:303.2(A)
- A commercial fisherman must possess a commercial gear license indicating that the applicable gear fee has been paid whenever using or possessing on the fishing grounds any gear listed in Subsection B. Rod and reel: two hundred fifty dollars to fish in the saltwater areas of the state as defined in R.S. 56:322(A) and (B). The department may issue a saltwater commercial rod and reel gear license to each applicant only if the following conditions have been met: (a) The applicant must provide positive proof that they held a valid commercial gear license for gill nets during any two years of the years 1995, 1994, and 1993. (b) The applicant must provide positive proof, in the form of unamended original state and federal income tax returns, including Schedule C of the federal 1040 form, submitted in accordance with procedures established by the commission, that the applicant has derived more than 50% of his earned income from the capture and sale of seafood species in at least two of the three years, 1995, 1994, or 1993. (c) Repealed by Acts 1997, No. 727, §2. (d) Each commercial rod and reel fisherman shall report his total monthly commercial take to the department in accordance with the provisions of LA R.S. 56:345.
- LA R.S. 56:305(A)(B)(14)(a)(b)(c)(d)

### Wholesale/Retail Seafood Dealer's License

- A commercial fisherman selling his catch to anyone other than a consumer or a licensed Louisiana wholesale/retail seafood dealer must possess a wholesale/retail seafood dealer's license as provided in LA R.S. 56:306 et seq. LA R.S. 56:303(A)2
- Any person buying, acquiring, or handling, from any person, by any means whatsoever, any species of fish, whether fresh, frozen, processed, or unprocessed, in Louisiana from within or outside the state, for sale or resale, including bait species, whether on a commission basis or otherwise, is a wholesale/retail seafood dealer and must purchase a wholesale/retail seafood dealer's license. A licensed wholesale/retail seafood dealer may act as a retail seafood dealer as specified in LA R.S. 56:306.1. LA R.S. 56:306(A)(1)
- A wholesale/retail seafood dealer shall include but not be limited to: (a) The owner or operator of any fish factory, platform, soft shell crab shedding facility, or other processing plant. (b) A person shipping fish out of or into the state. LA R.S. 56:306(A)(2)
- The license shall be in the name of the licensee and shall list the legal mailing address and the physical location of the place of business, and any other information required by the department. If the place of business is a vehicle, then the license shall state "vehicle" and shall list the legal mailing address and physical location of the licensee. LA R.S. 56:306(B)(1)
- If the licensee owns or operates more than one place of business, then an additional wholesale/retail seafood dealer's license must be purchased for each additional place of business or vehicle. The additional licenses shall be in the same name of the operator, list a different license number than the original license, list the legal mailing address and the location of the place of business, and any other information required by the department. LA R.S. 56:306(B)(3)
- The cost of the wholesale/retail seafood dealer's license is t\$250 for residents and \$1,105 for nonresidents. LA R.S. 56:306.2(A)(1)

- A wholesale/retail seafood dealer's license is valid for one year, beginning on Jan. 1 of each calendar year and expiring on Dec. 31 of the same calendar year. LA R.S. 56:306.3(A)
- A wholesale/retail seafood dealer's license may be purchased at any time of the year for the current license year and from Oct. 1 for the immediately following license year. LA R.S. 56:306.3(B)
- The department may also authorize the purchase of a wholesale/retail seafood dealer's license for a four-year period at four times the cost of the annual license fee. LA R.S. 56:306.3(C)
- Wholesale/retail seafood dealers shall buy directly from commercial fishermen validly licensed in Louisiana, and when purchasing fish for which a permit is required of the commercial fisherman, such dealers shall purchase only from those commercial fishermen possessing a valid permit. Wholesale/retail seafood dealers validly licensed in Louisiana, and in the case of wholesale/retail seafood dealers purchasing fish from out-of-state sellers and bringing the fish into Louisiana, shall purchase only from those persons from whom a wholesale/retail seafood dealer can legally purchase fish in the state of purchase, and from no one else. LA R.S. 56:306.4(A)(1)
- Each wholesale/retail seafood dealer who purchases fish from a licensed commercial fisherman shall record the sale on the three-part receipt form provided for in LA R.S. 56:303.7. The dealer shall copy the name and license number on the receipt form. The dealer, at the time of the sale, shall provide the commercial fisherman with a sales receipt which shall be one part of the three-part receipt form. All wholesale/retail seafood dealers shall comply with the records requirements contained in LA R.S. 56:306.5. LA R.S. 56:306.4(A)(2)
- Wholesale/retail seafood dealers can sell to anyone within or without the state. LA R.S. 56:306.4(B)

### **Retail Seafood Dealer License**

- Any person buying, acquiring, or handling by any means whatsoever, from a Louisiana wholesale/retail seafood dealer, any species of fish whether fresh, frozen, processed, or unprocessed, that sells to the consumer for personal or household use and any person who ships fish out of or within the state of Louisiana to the consumer for personal or household use shall purchase a retail seafood dealer's license. LA R.S. 56:306.1(A)
- The license shall be in the legal name of the licensee and shall list the legal mailing address and physical location of the place of business and any other information required by the department. If the place of business is a vehicle, the license shall state "vehicle" and shall list the legal mailing address and physical location of the licensee. LA R.S. 56:306.1(B)(1)
- If the licensee owns or operates more than one place of business, then an additional retail seafood dealer's license must be purchased for each additional place of business or vehicle. The additional licenses shall be in the same name of the business, list a license number which shall be different than the original license, list the legal mailing address and the physical location of that place of business, and any other information required by the department. LA R.S. 56:306.1(B)(3)
- The cost of the retail seafood dealer's license is \$105 for residents and \$405 for nonresidents. LA R.S. 56:306.2(A)(2)
- A retail seafood dealer's license is valid for one year, beginning on Jan. 1 of each calendar year and expiring on Dec. 31 of the same calendar year. LA R.S. 56:306.3(A)
- A retail seafood dealer's license may be purchased at any time of the year for the current license year and from Oct. 1 for the immediately following license year. LA R.S. 56:306.3(B)
- The department may also authorize the purchase of a retail seafood dealer's license for a four-year period at four times the cost of the annual license fee. LA R.S. 56:306.3(C)
- Retail seafood dealers, restaurants, and retail grocers shall buy directly only from wholesale/retail seafood dealers licensed in Louisiana. When a retail seafood dealer, restaurant, or retail grocer purchases fish from an out-of-state seller and brings the fish into the state, he shall buy directly from those persons from whom he can legally purchase fish in the state of purchase. When a restaurant or retail grocer buys fish from an out-of-state seller and brings the fish into the state, the restaurant or retail grocer shall be licensed in accordance with the provisions of LA R.S. 56:306 or 306.1 and shall possess a valid transport license when bringing such fish into the state. LA R.S. 56:306.4(C)(1)
- Restaurants and retail grocers who only purchase fish, whether fresh, frozen, processed, or unprocessed, from a licensed wholesale/retail seafood dealer and only sell such fish fully prepared by cooking for immediate consumption by the consumer, need not be licensed in compliance with the provisions of this Subpart. LA R.S. 56:306.4(C)(2)

### **Transport License**

- Operators and drivers of any form of commercial transport, except common carriers, who are in the act of loading, unloading, or transporting fish shall have in their possession at least one of the following licenses:
  1. A commercial fisherman's license.
  2. A wholesale/retail dealer's license.
  3. A transport license. LA R.S. 56:307(A)
- Transport license requirements shall not apply to fish or fish products which are the result of processing as defined in LA R.S. 56:8. LA R.S. 56:307(C)
- The cost of a transport license is \$30 per vehicle and can only be purchased by a person holding a valid Louisiana commercial fisherman's license or valid Louisiana wholesale/retail dealer's license. LA R.S. 56:307.1(A)
- The transport license shall be in the name of and bear the license number of the purchaser and shall state "transport license". LA R.S. 56:307.1(B)

- The transport license may be applied for in the same manner and is valid for the same one-year period as that of the purchaser's license. LA R.S. 56:307.1(C)
- The department may also authorize the purchase of a four-year transport license at four times the cost of the annual license fee. LA R.S. 56:307.1(D)
- A person transporting fish under privilege of a transport license is prohibited from buying or selling, by any means whatsoever, any species of fish. The provisions of this Section shall not apply to a person transporting fish under the privilege of a Louisiana transport license purchased in connection with a Louisiana wholesale/retail dealer's license when that person buys fish for or on behalf of the wholesale/retail dealer to whom such transport license was issued and only transports such fish to that wholesale/retail dealer. LA R.S. 56:307.2(A) and (B)
- A validly licensed commercial fisherman or wholesale/retail dealer may purchase any number of transport licenses. LA R.S. 56:307.3
- Transport licenses are freely transferable between vehicles, but the licensee remains responsible for all activities taking place under authority of that license. LA R.S. 56:307.5
- When a restaurant or retail grocer buys fish from an out-of-state seller and brings the fish into the state, the restaurant or retail grocer shall be licensed in accordance with the provisions of LA R.S. 56:306 or 306.1 and shall possess a valid transport license when bringing such fish into the state. LA R.S. 56:306.4(C)(1)

### LEGAL GEAR AND GEAR REQUIREMENTS

- No person shall take or possess fish taken by means of spears, poisons, stupefying substances or devices, explosives, guns, tree-topping devices, lead nets, except as provided in LA R.S. 56:329(B), electricity, or any instrument or device capable of producing an electric current used in shocking said fish...It shall be unlawful to possess any of the prohibited instruments, weapons, substances, or devices set out hereinabove with the intent to take fish in violation of the provisions of this Section. LA R.S. 56:320(C)(1)
- No person shall use or deploy within the state territorial waters bandit gear or longline gear. A person may possess bandit gear or longline gear aboard a vessel within state territorial waters so long as such gear is not in use or deployed to take fish. No person shall possess fish taken within the state territorial waters using bandit gear or longline gear. LA R.S. 56:320(C)(2)
- It shall be unlawful for any person to use or employ any aircraft including fixed wing aircraft, dirigibles, balloons, helicopters, or any other form of aerial surveillance in the airspace of this state to assist in the taking of finfish except in the fisheries of menhaden and herring-like fish as defined in Title 76, Section 311 of the Louisiana Administrative Code. Any aircraft, boat, or vessel and equipment utilized in the taking of finfish and any fish taken or possessed, except in the fisheries of menhaden and other herring-like fish, contrary to the provisions of this Subsection shall be subject to confiscation. Violation of this Subsection constitutes a class 5-A violation. LA R.S. 56:320(G)
- No person shall use, possess, or have in his possession, or have aboard any vessel, a gill net, trammel net, strike net, or seine in the saltwater areas of the state as defined in LA R.S. 56:322(A) and (B), except as provided in LA R.S. 56:318 and 320.2. A violation of the provisions of this Section shall constitute a class six violation. LA R.S. 56:320.1(A) and (B)
- No person shall set, maintain, take, or attempt to take fish from any trotline of which any segment of the staging line measures in excess of 4 feet where any portion of any hook extends above the surface of the waters of any of the bodies of waters within the state of Louisiana. However, this Section shall not apply to White Lake in Vermilion Parish and Grand Lake and Lake Misere in Cameron Parish. Any violation of the provisions of this Section shall constitute a class two violation, LA R.S. 56:32. LA R.S. 56:321(A)
- No trawling shall be permitted in inside waters during the closed season. No vessel may pull more than the following trawl rigging in inside waters:
  - a. One trawl which shall not exceed 50 feet in length along the corkline and 66 feet along the lead line and in addition, one test trawl.
  - b. Two trawls which shall not exceed 25 feet along the corkline, 33 feet along the lead line, and have trawl doors no larger than 8 feet in length and 43 inches in height and, in addition, one test trawl.
  - c. Two trawls which shall not exceed 25 feet along the corkline, 33 feet along the lead line, and have no more than two outer trawl doors no larger than 8 feet in length and 43 inches in height and no more than two inner sled doors, and in addition, one test trawl. LA R.S. 56:495.1(A)(1)
- It shall be legal for a vessel in Breton and Chandeleur Sounds to pull no more than one or two trawls, either or both of which cannot exceed 65 feet along the corkline and 82 feet along the lead line in length, plus one test trawl. LA R.S. 56:495(A)(2)
- Fishing with a butterfly net or skimmer net shall be prohibited in inside waters during the closed season. LA R.S. 56:495(B)
- In outside waters, no vessel shall pull more than four trawls and one test trawl. LA R.S. 56:495(C)
- Only a rod and reel shall be used for the commercial harvest of spotted sea trout..The commercial taking or sale by a commercial fisherman of spotted sea trout is prohibited except by special permit issued by the Department of Wildlife and Fisheries at a cost of one hundred dollars for residents of this state and four hundred dollars for those who are nonresidents. LA R.S. 56:325.3(A) (1) and (C)

## SEASONS

- The commission shall establish a maximum annual quota for the commercial harvest of spotted sea trout taken within Louisiana waters or landed in Louisiana which shall not exceed one million pounds nor shall it be less than five hundred thousand pounds. The commercial taking or harvesting of spotted sea trout shall be prohibited within Louisiana waters west of Mermentau River. The Louisiana Wildlife and Fisheries Commission shall establish an open season for the commercial harvest of spotted sea trout which shall run from the second day of January each year until the maximum annual quota is reached. The commercial harvest or taking of spotted sea trout is prohibited during the period from sunset on Friday through sunrise on Monday, and there shall be no possession of spotted sea trout in excess of the recreational limit during the period between 10:00 p.m. and 5:00 a.m. However, when not on a commercial fishing trip, a person holding a permit for the commercial taking or possessing of spotted sea trout may take or possess an amount not to exceed the legal recreational limit of spotted sea trout between the hours of 10:00 p.m. and 5:00 a.m. during the open season and at any time during the closed season if that person also possesses a basic recreational fishing license and a saltwater fishing license. LA R.S. 56:325.3(A)(1)
- The department shall monitor catch statistics for spotted sea trout and shall notify the commission when it is determined that the quota has been reached or is projected to be reached. When the quota has been reached or is projected to be reached, the commission shall by public notice close the spotted sea trout fishery to all commercial fishing in Louisiana waters. The closure shall not take effect for at least seventy-two hours after notice to the public. The closure and notice of closure shall provide that the purchase, barter, trade, or sale of spotted sea trout taken from Louisiana waters after the closure is prohibited. The closure and notice of closure shall also provide that the commercial taking or landing of spotted sea trout in Louisiana, whether caught within or without the territorial waters of Louisiana, after the closure is prohibited. The closure and notice of closure shall, in addition, provide that no vessel possessing or fishing any seine net, gill net, trammel net, or hoop net shall have a spotted sea trout aboard the vessel, whether caught within or without the waters of the state. Once the Spotted Seatrout commercial quota(s) has been met, the purchase, barter, trade or sale of Spotted Seatrout taken in Louisiana after the closure is prohibited. The commercial taking or landing of Spotted Seatrout in Louisiana, whether caught within or without the territorial waters of Louisiana after the closure is prohibited. Nothing in this rule shall be deemed to prohibit the possession of fish legally taken prior to the closure order. LA R.S. 56:325.3(A)(2)

## SIZE & POSSESSION LIMITS

- The following are the legal size limits on commercial fish. No person shall take or possess these fish under or over the prescribed sizes for commercial purposes. Fish of the prescribed legal size may be taken, had in possession, or sold in unlimited quantities, provided there is compliance with all other requirements of the law. Any commercial fish under the minimum prescribed size or over the maximum prescribed size shall be returned immediately to the waters from which taken without avoidable injury. No person shall sell, purchase, barter, trade, or exchange, or attempt to sell, purchase, barter, trade, or exchange, any commercial species under the minimum prescribed size or over a maximum prescribed size or creel limit. Any commercial species upon which there is no specific size limit may be taken in any size or quantity. Notwithstanding any other provisions stated above, commercial fish under the legal size may be taken from privately owned ponds, impoundments, or waters by the owner thereof or his authorized representative and may be sold to other persons for purposes of stocking private waters, ponds, or impoundments. LA R.S. 56:326(A)
- Spotted sea trout - 14 inches minimum total length with the mouth closed. LA R.S. 56:326(A)(3)
- All saltwater finfish except tuna, swordfish, and sharks possessed by a commercial fisherman shall have the head and caudal fin intact until set or put on shore or when sold All saltwater finfish shall be measured in accordance with applicable law. LA R.S. 56:326(E)(1)(a)

## BYCATCH

- No person shall waste any fish of this state. As used in this Section, "waste" means the harvesting of any fish for commercial purposes which results in the excessive killing of such fish. LA R.S. 56:409.1(A)
- Excessive killing shall be defined as "the killing resulting from taking or attempting to take any fish in excess of what the possessor thereof can process, utilize, or transport from the fishing grounds. Shrimp and shrimping operations are excluded." LAC 76:VII.313.B
- No person shall purchase, sell, exchange, or offer for sale or exchange, or possess or import with intent to sell or exchange any game fish as defined in LA R.S. 56:8. LA R.S. 56:327(A)(1)
- The commercial taking or landing of Red Drum in Louisiana is prohibited. LA R.S. 56:325.3(B)
- Only a rod and reel shall be used for the commercial harvest of spotted sea trout...The commercial taking or sale by a commercial fisherman of spotted sea trout is prohibited except by special permit issued by the Department of Wildlife and Fisheries at a cost of one hundred dollars for residents of this state and four hundred dollars for those who are nonresidents. LA R.S. 56:325.3(A)(1) and (C)
- The commercial taking of Spotted Seatrout is prohibited except by special nontransferable Spotted Seatrout permit issued by the Department of Wildlife and Fisheries at the cost of \$100 for residents of this state and \$400 for those who are nonresidents. This permit, along with other applicable licenses, authorizes the bearer to sell his Spotted Seatrout catch. LAC 76:VII.341.A.3.a

## AREA RESTRICTIONS

- Except as provided in Paragraph (2) of this Subsection, no obstructions including trawls, skimmer nets, butterfly nets, fyke nets, wings or leads, seines, gill nets, or trammel nets which interfere with the free passageway for fish as defined herein shall be set within 500 feet of the mouth of any inlet or pass, or within 500 feet of any water control structures, dams, or weirs. LA R.S. 56:329(B)(1)
- Trawling, skimming, or butterflying on White Lake in Cameron and Vermilion parishes and Grand Lake in Cameron Parish from official sunset to official sunrise is hereby prohibited. LA R.S. 56:410
- The commercial taking or harvesting of Spotted Seatrout shall be prohibited within Louisiana waters west of Mermentau River. LA R.S. 56:325.3(A)(1)
- The taking of fish, shrimp, and other seafood from the waters of the Lake Catherine and Lake Pontchartrain Sanctuary by use of trawls, skimmer nets, butterfly nets, seines, or traps or other netting, with the exception of cast nets, drop nets, or scoop nets, is hereby prohibited. LA R.S. 56:804(B)
- The areas within a 1/4-mile radius on the lake side only of the Lambert, Grand Bayou, Mangrove, and Peconi water control structures (otherwise identified as Structures No. 5, 1, 8 and 4 respectively), and the area within a 1/8-mile radius on the lake side only of the water control structure on No Name Bayou, all within the Calcasieu Lake system; the area within a 1/4-mile radius on the lake side only of the mouths of West Cove Bayou, West Cove Canal and the Sabine Refuge Headquarters Canal where they empty into Calcasieu Lake; and the area within a 1/4-mile radius on the lake side only of the mouths of Three Bayous and Willow Bayou where they empty into Sabine Lake, are fish sanctuaries and closed zones, and that all netting of fish by any means or method, including but not limited to trawls, butterfly nets, gill nets, seines, or trammel nets, is hereby prohibited, with the exception of hand cast nets, crab traps and crab drop nets. LAC 76:VII.333
- Commercial fishing is prohibited in the following areas:
  - Elmer’s Island Wildlife Refuge LAC 76:III.337
  - Salvador/Timken Wildlife Management Area LAC 76:XIX.111.A
  - Pointe aux Chenes Wildlife Management Area except in Cut Off Canal and Wonder Lake LAC 76:XIX.111.A
  - Marsh Island Wildlife Refuge LAC 76:III.310.4
  - State Wildlife and Paul J. Rainey Refuges LAC 76:III.323.A.4
  - White Lake Wetlands Conservation Area LAC 76:III.335
  - Rockefeller Wildlife Refuge LAC 76:III.309.5
  - Isle Dernieres Barrier Island Refuge LAC 76:III.331

## FEDERAL AREA RESTRICTIONS

Commercial fishing is prohibited in the following coastal National Wildlife Refuges:

- Big Branch Marsh National Wildlife Refuge
- Bayou Sauvage National Wildlife Refuge
- Breton National Wildlife Refuge
- Delta National Wildlife Refuge
- Mandalay National Wildlife Refuge
- Shell Keys National Wildlife Refuge
- Lacassine National Wildlife Refuge
- Cameron Prairie National Wildlife Refuge
- Sabine National Wildlife Refuge

Jean Lafitte National Historical Park and Preserve.

Commercial fishing allowed by permit only.

## OPERATIONAL RESTRICTIONS

- All saltwater finfish except tuna, swordfish, and sharks possessed by a commercial fisherman shall have the head and caudal fin intact until set or put on shore or when sold. All saltwater finfish shall be measured in accordance with applicable law. LA R.S. 56:326(E)(1)(a)

## FISHING GEAR INTERACTIONS

- It shall be unlawful for any person to knowingly and intentionally use or employ any net to encircle a vessel or to otherwise knowingly and intentionally use or employ any vessel or fishing gear to interfere with the lawful fishing of another. LA R.S. 56:320(I)(1)
- It shall be unlawful for any person to knowingly and intentionally use or employ any vessel or recreational gear to interfere with the lawful commercial fishing of another. LA R.S. 56:320(I)(2)

## PACKAGING

- The secretary of the Department of Wildlife and Fisheries is authorized to adopt rules and regulations in accordance with the Administrative Procedure Act establishing standards for the packaging of seafood in Louisiana for wholesale or retail sale. Those

standards may govern the quality, contents, and weight of all seafood packaged in this state. The Louisiana Seafood Promotion and Marketing Board may make recommendations to the secretary for standards for the packaging of seafood. For purposes of this Section, retail sale shall not include food service establishments which only serve food prepared for on premises or off premises consumption as defined by LA R.S. 40:5.5(E). LA R.S. 56:578.10

- Shipments containing fish shall be plainly marked, the tags or certificates to show the date and names of the consignor and the consignee, with an itemized statement of the number of pounds of fish and the names of each kind contained therein. Bills of lading issued by a common carrier for such shipments shall state the number of packages which contain fish, and the date and names of the consignor and consignee, with an itemized statement of the number of pounds of fish and the names of each kind contained therein. Shipments of fish of any species and fish products shall be subject to inspection by enforcement agents of the department while in transit and upon leaving the state. LA R.S. 56:307.7(A)

## RECORDKEEPING AND REPORTING REQUIREMENTS

- Wholesale/retail seafood dealers, retail seafood dealers, restaurants, and retail grocers shall keep, in the English language the following (LA R.S. 56:306.5(A)):
  - Records of the quantity and species of fish acquired, the date the fish was acquired, and the name and license number of the wholesale/retail seafood dealer or the out-of-state seller from whom the fish was acquired. When creel limits apply to commercial species, records shall also indicate the number by head count of such species of fish. LA R.S. 56:306.5(A)(1)
  - Records of the quantity and species of fish sold, the date the fish was sold, and the name and license number of the person to whom the fish was sold. When sold to the consumer, the records shall indicate the quantity, species, and date and shall state that the fish was sold to the consumer. LA R.S. 56:306.5(A)(2)
- Wholesale/retail seafood dealers purchasing or acquiring fish from commercial fisherman shall complete a commercial receipt form. The commercial receipt form shall be a three-part form signed by both the commercial fisherman and the wholesale/retail seafood dealer or his designee, attesting to that the information required to be provided by each is correct. One part of the receipt form shall be retained by the wholesale/retail seafood dealer, one part shall be given to the commercial fisherman at the time of the transaction, and one part shall be transmitted to LDWF. LA R.S. 56:306.5(B)(1)
- Wholesale/retail seafood dealers are responsible for recording on the commercial receipt form that information provided by the commercial fisherman and are responsible for the following information at the time of purchase or transfer of possession of the catch from a commercial fisherman to a wholesale/retail seafood dealer: wholesale/retail seafood dealer's name and license number, commercial fisherman's name, license number and signature, transaction date, species identification, quantity and units of each species, size and condition of each species, unit price of each species, and permit number for species requiring a permit to harvest. LA R.S. 56:306.5(B)(2)
- Required records must be maintained for three years and shall be open to inspection by LDWF. LA R.S. 56:306.5(C)
- Each wholesale/retail seafood dealer shall, on or before the 10th of each month, make a return to the department of all commercial receipt forms representing actual transactions from every commercial fisherman during the preceding month. All commercial receipt forms submitted by a dealer shall be accompanied by a monthly submission sheet signed by the wholesale/retail seafood dealer certifying that the transactions submitted represent all of the transactions by that dealer from commercial fishermen for that particular month. LA R.S. 56:306.6(A)
- A commercial fisherman selling fish under a fresh products license shall record all information required on trip tickets, except that the fresh products license number shall be recorded in place of the wholesaler/retailer seafood dealer's license number. The fresh products licensee shall complete monthly returns to LDWF as specified for wholesale/retail seafood dealers. The commercial fisherman shall sign each commercial receipt form attesting that the information provided therein is correct. LA R.S. 56:303.7(C)

## LOUISIANA FINFISH TASK FORCE

- There is hereby established the Louisiana Finfish Task Force to study and monitor the finfish industry and to make recommendations to the Wildlife and Fisheries Commission, the Department of Wildlife and Fisheries, and other state agencies for the maximization of benefit from that industry for the state of Louisiana and its citizens. LA R.S. 56:301.10(A)
- The task force shall be composed as follows:
  - The governor or his designee.
  - Three members appointed by the secretary of the Department of Wildlife and Fisheries as follows:
    - One member who is a fisheries biologist.
    - One member who is an enforcement agent.
    - One member who is an economist.
  - The commissioner of the Department of Agriculture and Forestry or his designee.
  - The secretary of the Louisiana Department of Health or his designee.
  - Three members and three alternate members appointed by the governor each of whom shall possess a commercial fisherman's license with a "certified" endorsement pursuant to LA R.S. 56:303(E), with three to be selected from a list of six nominees submitted by the Louisiana Shrimp Association and three to be selected from a list of six nominees submitted by the Delta Commercial Fisheries Association.
  - One member appointed by the governor who is an active Louisiana dock buyer of finfish.

- Three members and three alternate members appointed by the governor each of whom shall possess recreational freshwater and saltwater fishing licenses, with four to be selected from a list of eight nominees submitted by the Coastal Conservation Association Louisiana and two to be selected from a list of four nominees submitted by the Louisiana Chapter of the Bass Anglers Sportsman Society (B.A.S.S.).
- One member of the Senate appointed by the president of the Senate.
- One member of the House of Representatives appointed by the speaker of the House of Representatives. LA R.S. 56:301.10(B)
- The members appointed pursuant to the provisions of Paragraphs (B)(I) through (4) of this Section shall be nonvoting members. In addition, they shall not be considered members of the task force for determination of the number of members necessary for a quorum and for establishing the presence of a quorum. LA R.S. 56:301.10(C)
- The task force shall adopt bylaws under which it shall operate, and five voting members of the task force shall constitute a quorum sufficient to conduct meetings and business of the task force. The governor shall appoint the chairman of the task force for a period of one year, and thereafter the task force shall elect a chairman from its membership and may seek and receive assistance from universities within the state in the development of methods to increase production and marketability of finfish. The members of the task force shall serve without compensation; however, the task force may receive the same reimbursement of travel expenses for attending the meetings as is allowed for other state employees' travel, except all legislative members of the commission shall receive the same per diem and travel allowance for attending meetings of the task force or any meeting thereof as is normally provided for members of the legislature. LA R.S. 56:301.10(D)
- The task force is hereby charged with responsibility to do the following:
  - Coordinate efforts to increase finfish production and marketability.
  - Provide for the study of the decline in finfish marketability and market price, provide for the study of the impacts of imported finfish on the domestic market, assist in the development of a state finfish inspection program, assist in the development of a Louisiana finfish certification and branding program, and make recommendations to the Wildlife and Fisheries Commission, the Department of Wildlife and Fisheries, the Department of Natural Resources, the Department of Agriculture and Forestry, and the Louisiana Department of Health for implementation of policies to help enhance the domestic finfish industry.
  - Make recommendations with respect to issues pertaining to the finfish industry and finfish production to the various state agencies charged with responsibility for differing elements of the finfish industry in this state, including the Department of Wildlife and Fisheries, the Department of Natural Resources, the Coastal Protection and Restoration Authority, the Louisiana Department of Health, the Department of Agriculture and Forestry, and the legislature.
  - Develop markets and marketing strategies for the development and expansion of markets for finfish harvested from Louisiana waters.
  - Represent the interests of the Louisiana finfish industry before federal and state administrative and legislative bodies on issues of importance to the Louisiana finfish industry.
  - Contract for legal services to represent the interests of the Louisiana finfish industry in judicial, administrative, and legislative proceedings.
  - Perform any acts deemed necessary and proper to carry out its duties and responsibilities. LA R.S. 56:301.10(E)

### LOUISIANA SEAFOOD PROMOTION AND MARKETING BOARD

- Recognizing that the commercial fishing industry in Louisiana has reached an ebb economically, creating an environment which has or could place, not only commercial fishermen, but also wholesale and retail dealers in dire economic straits, which situation could have an extreme economic impact on the state economy as a whole if nothing is done to alleviate the situation, and recognizing that there exist barriers and impediments to the economic well-being of the commercial fishery industry in Louisiana and recognizing that among these barriers and impediments, the virtual void in this state of any cohesive, coordinated and comprehensive seafood promotion and marketing effort and stratagem has a significant negative impact on the seafood industry, the Legislature of Louisiana does hereby establish the Louisiana Seafood Promotion and Marketing Board in an effort to aid the industry in two vital aspects--product promotion and marketing development. LA R.S. 56:578.1(A)
- The purpose of this Subpart, then, is to enhance the public image of commercial fishery products, thereby promoting the consumption of these products and, further, to assist the seafood industry, including commercial fishermen and wholesale and retail dealers, in market development so as to better utilize existing markets and to aid in the establishment of new marketing channels. Attention to the promotion and marketing of non-traditional and underutilized species of seafood would be inherent in the purpose of the council established herein. LA R.S. 56:578.1(B)

### LOUISIANA WILD SEAFOOD CERTIFICATION PROGRAM

- A certification program for Louisiana wild fish, as defined in LA R.S. 56:8, and for Louisiana wild seafood products which are taken, harvested, or landed in Louisiana. LAC 76:I.701
- Must possess one of the following resident or nonresident Louisiana licenses: commercial fisherman's license; senior commercial fisherman's license; fresh products dealer license; seafood wholesale/retail dealer; or seafood retail dealer. LAC 76:I.701.C.1.a
- Wholesale/retail dealers must have their facility located within Louisiana. Retailers are not required to have their facility located within Louisiana. LAC 76:I.701.C.1.b
- Eligible participants not requiring an LDWF license include in-state restaurants or grocers who only sell seafood that is fully prepared by cooking for immediate consumption by the consumer, and all out-of state retailers. LAC 76:I.701.C.1.c

- Must possess and be in compliance with all other state and federal permits, licenses, and laws regarding the buying, acquiring, or handling, from any person, by any means whatsoever, any species of fish or seafood products, whether fresh, frozen, processed, or unprocessed, for sale or resale, whether on a commission basis or otherwise. LAC 76:l.701.C.1.d
- Product considered eligible to possess the LWSCP logo must meet the following criteria:
  - Eligible wild seafood includes crab, oysters, freshwater finfish, saltwater finfish, crawfish, and shrimp. Seafood must be wild-caught, taken from Louisiana waters or from the U.S. Gulf of Mexico (Gulf) and any other adjacent state waters, and landed in Louisiana. Farmed and/or aquaculture products are excluded from program participation. LAC 76:l.701.C.2.a
  - Seafood must be taken by a Louisiana licensed commercial fisherman. Seafood must be landed in Louisiana and either be sold under an LWSCP-participating fish products dealer license, or be purchased and/or physically acquired by a wholesale/retail seafood dealer participating in the LWSCP. Transfer of product throughout the supply chain must be between LWSCP participants until the product has been placed in sealed and LWSCP-labeled retail packaging. LAC 76:l.701.C.2.b
  - Seafood commingled with any other seafood that does not meet the above requirements, domestic or foreign, shall be prohibited from possessing the LWSCP label. LAC 76:l.701.C.2.c

## RECREATIONAL SPOTTED SEATROUT REGULATIONS

### LICENSING

- A recreational fisherman must purchase a basic recreational fishing license to use the following gear or to possess fish on the fishing grounds which have been caught for recreational purposes:
  - Hook and line
  - Bow and arrow
  - A barbless spear, or a multi-pronged barbed gig
  - Castnets with a radius not to exceed 8 feet 6 inches
  - Frog gigs or catchers
  - Scuba gear. LA R.S. 56:302(A)
- In addition to a basic recreational fishing license, a recreational fisherman over the age of sixteen years using any gear listed in LA R.S. 56:302.3 must purchase a recreational gear license as provided therein. Anyone under the age of sixteen years shall not be required to purchase or possess a gear license. However, any person using crawfish nets, dip nets, landing nets, minnow traps, crab nets, or crab lines for the purpose of taking fish for recreational purposes shall not be required to purchase or possess a basic recreational fishing license or be required to purchase a gear license. LA R.S. 56:302(B)
- The cost of the annual basic recreational fishing license is \$9.50 for residents and \$60 for nonresidents, except that residents using a rod or fishing pole, hook and line, without a reel and without using artificial bait shall pay \$2.50 per year; however, any person required by this Part to possess a basic \$2.50 license shall be subject to a maximum fine of \$5 for not possessing the license as herein required, and there shall be no court costs associated with the fine. LA R.S. 56:302.1(A)
- In addition to the annual basic recreational fishing license, any person fishing in the saltwater areas of the state defined in LA R.S. 56:322 must purchase a saltwater license. The fee for the annual saltwater license is \$5.50 for residents and \$30 for nonresidents. As a condition of the application for and the granting of the saltwater license, all saltwater finfish caught or transported by the license holder while the license is in effect are presumed to have been taken in the waters of Louisiana. LA R.S. 56:302.1(C)(1)(a)
- Between June 1, 2014, and May 31, 2022, in addition to the fee required by Subparagraph (a) of this Paragraph for purchase of a saltwater fishing license, there shall be an additional fee of \$7.50 to be paid for each license purchased by a resident that shall be credited to the Saltwater Fish Research and Conservation Fund, LA R.S. 56:10(B)(1)(g). The commission is authorized to increase the additional fee to an amount not to exceed \$9.50. The increase in the additional fee shall be used for the administration and conducting of the saltwater fish stock estimate. LA R.S. 56:302.1(C)(1)(c)
- The saltwater license is not required for residents possessing a \$2.50 basic recreational fishing license and using only a rod or fishing pole, hook and line, without a reel and without using artificial bait. LA R.S. 56:302.1(C)(3)
- A recreational fisherman must possess, in addition to a basic recreational fishing license, a recreational gear license indicating that the applicable gear fee has been paid, whenever using or possessing on the fishing grounds any gear listed in Subsection B. LA R.S. 56:302.3(A)
- Recreational gear fees are found in LA R.S. 56:302.3(B).
- The gear fee for nonresidents is four times the gear fee for residents. LA R.S. 56:302.3(C)
- A valid recreational gear license may be transferred for temporary use only to a person holding a basic fishing license and having the same residency status as indicated on the license being transferred. LA R.S. 56:302.3(E)
- Basic recreational licenses, freshwater trout licenses, saltwater licenses, and recreational gear licenses are valid beginning June 1 of each calendar year and expiring on June 30 of the following calendar year. However, through promulgation and adoption of rules and regulations therefor, the department may issue recreational licenses and recreational gear licenses for a period of one year from the date of issuance. Any such rule promulgated and adopted under the provisions of this Section shall supersede the licensure period delineated in this Section prior to the adoption of the rule. LA R.S. 56:302.4(A)

## LEGAL GEAR AND GEAR REQUIREMENTS

- Freshwater and saltwater recreational fish may be taken by means of rod, fishing pole, hook and line, trolling line, handline, bait casting, fly casting apparatus, crawfish nets, by use of devices known as yo-yos or trigger devices, bow and arrow, recreational hoop nets, recreational wire nets, recreational slat traps, standard spearing equipment used by a skin diver sport fishing in saltwater or freshwater when submerged in the water, recreational pipes, recreational buckets, recreational drums, recreational tires, and recreational cans, and by no other means except a barbless spear or a multi-pronged barbed gig that may be used in saltwater for taking flounder. Recreational wire nets and recreational hoop nets authorized for use under the provisions of this Section shall be used only in the geographical areas of the state designated as freshwater under the provisions of LA R.S. 56:322. LA R.S. 56:320(A)(1)
- No person shall take or possess fish taken by means of spears, poisons, stupefying substances or devices, explosives, guns, tree-topping devices, lead nets, except as provided in LA R.S. 56:329(B), electricity, or any instrument or device capable of producing an electric current used in shocking said fish; except a barbless spear or a multi-pronged barbed gig that may be used in salt water for taking flounder. LA R.S. 56:320(C)(1)
- No person shall use or deploy within the state territorial waters bandit gear or longline gear. A person may possess bandit gear or longline gear aboard a vessel within state territorial waters so long as such gear is not in use or deployed to take fish. No person shall possess fish taken within the state territorial waters using bandit gear or longline gear. LA R.S. 56:320(C)(2)

## SIZE AND POSSESSION LIMITS

- The Wildlife and Fisheries Commission may set by rule, in accordance with the Administrative Procedure Act, daily take, and possession, and size limits for saltwater finfish caught recreationally in Louisiana territorial waters, based on biological and technical data. Aquaculturally raised fish, as defined in R.S. 56:356, shall be exempt from the provisions of this Section. LA R.S. 56:325.1(A)(1)
  - The daily take and possession limit of Spotted Seatrout shall be 25 fish daily. LA R.S. 56:325.1(A)(2)
- A recreational saltwater fisherman in possession of a valid basic and saltwater license may possess twice the daily bag limit of spotted sea trout; however, no person shall be in possession of over the daily bag limit while fishing or while on the water, unless such recreational saltwater fisherman is aboard a trawler engaged in commercial fishing for a consecutive period of longer than twenty-five hours. LA R.S. 56:325.1(A)(3)(a)
- Notwithstanding the provisions of Subparagraph (a) of this Paragraph and LA R.S. 56:325.2(A) and (B), a fisherman who holds and is in possession of a valid recreational fishing license and can demonstrate to the department's satisfaction use of a boat launch located south of U.S. Highway 90 and that the fisherman has been actively on the water or at a remote camp that can be accessed only by water for two days or more may possess up to the possession limit of filleted Red Drum, spotted sea trout, and Southern Flounder. The filleted fish shall have sufficient skin remaining on the fillet to allow for identification of the species and shall be segregated by species into plastic bags or plastic containers that are marked by species to allow easy identification, the date caught, and the name and license number of the person who took the fish. The spotted sea trout fillets shall be no less than 10 inches in length and the Red Drum shall be no less than 14 inches in length. The fish shall be in the possession only of the person who took the fish. However, no fisherman shall be actively fishing or engaged in fishing while in possession of more than the daily take limit. LA R.S. 56:325.1(A)(3)(b)
- The possession limit for Red Drum and spotted sea trout taken south of U.S. Highway 90 shall be three times the daily take limit when the fisherman holds and is in possession of a valid recreational fishing license and can show a landing receipt from a public boat launch located south of U.S. Highway 90 that demonstrates to the satisfaction of the department that the fisherman has been actively on the water or at a remote camp that can be accessed only by water for two days or more. The fish shall be kept whole or whole gutted in separate bags for each species of fish. The bags shall be marked with the date the fish were taken, the species, the number of fish contained in the bag, and the name and license number of the person taking the fish. The fish shall only be in the possession of the person who took the fish. However, no fisherman shall be actively fishing or engaged in fishing while in possession of more than the daily take limit. LA R.S. 56:325.1(A)(4)
- The minimum size for Spotted Seatrout is 12 inches total length when measured with the mouth closed. LA R.S. 56:325.1(B)
- Within those areas of the state, including coastal territorial waters, south of Interstate 10 from its junction at the Texas-Louisiana boundary eastward to its junction with Louisiana Highway 171, south to Highway 14, and then south to Holmwood, and then south on Highway 27 through Gibbstown south to Louisiana Highway 82 at Creole and south on Highway 82 to Oak Grove, and then due south to the western shore of the Mermentau River, following this shoreline south to the junction with the Gulf of Mexico, and then due south to the limit of the state territorial sea, under the authority of the provisions of LA R.S. 56:325.1(A), the daily take and possession limit shall be 15 fish, regardless of where taken, with no more than 2 Spotted Seatrout exceeding 25 inches total length. Those Spotted Seatrout exceeding 25 inches in length shall be considered as part of the daily recreational take and possession limit. LAC 76:VII.341.C

## OPERATIONAL RESTRICTIONS

- No person shall sell or barter any fish that has been taken recreationally or under the authority of any type of recreational fishing license or with any recreational gear. LA R.S. 56:302.10(A)
- All saltwater recreational finfish shall have the head and caudal fin intact until set or put on shore. All saltwater recreational finfish shall be measured in accordance with applicable law. LA R.S. 56:325.2(A)

- No person shall possess any finfish parts, such as filleted fish, while aboard a vessel on the water. For the purpose of consumption at sea aboard the harvesting vessel, a person shall have no more than two pounds of finfish parts per person on board the vessel, provided that the vessel is equipped to cook such finfish and such finfish does not exceed applicable bag limits. LA R.S. 56:325.2(B)

#### **FISHING GEAR INTERACTIONS**

- It shall be unlawful for any person to knowingly and intentionally use or employ any vessel or recreational gear to interfere with the lawful commercial fishing of another. LA R.S. 56:320(1)(2)

## APPENDIX XI. Chronology of Major Changes to Louisiana's Spotted Seatrout Fisheries Regulations

### PRIOR TO 1977

The commercial Spotted Seatrout fishery was regulated by a minimum size limit of 10 inches TL and bar mesh minimum sizes of 1.5 inches for saltwater gillnets, 1 inch for the inside wall of saltwater trammel nets, and 0.875 inches for saltwater fish seines. All nets used in the fishery were restricted to maximum lengths of 2,000 feet. Recreational fishermen were required to possess a basic fishing license to harvest Spotted Seatrout. Changes in gear, size, daily and possession limits, and licensing requirements following 1976 are listed chronologically below. Prior to 1976, the fishery was virtually unregulated.

### 1977

**Commercial:** Banned monofilament webbing in all saltwater nets except those on properly permitted vessels engaged in the Pompano and Black Drum underutilized species program. Reduced maximum net lengths to 1,200 feet. Enacted new minimum bar mesh sizes of 2 inches for saltwater gillnets, 1 inch for the inside wall of trammel nets, and 1 inch for saltwater fish seines. Established a commercial angler's license at a cost of \$250 for the take of Spotted Seatrout using rod and reel gear.

**Recreational:** Restricted daily limit to a combined total of 50 Red Drum and Spotted Seatrout with an allowable two-day catch in possession.

### 1980

**Commercial:** Established a minimum mesh size of 3-inch bar in the outer wall of saltwater trammel nets.

### 1983

**Commercial:** Required all saltwater trammel nets to consist of three walls. Established a saltwater seller's license at a cost of \$105 for the sale of commercial finfish.

### 1984

**Commercial:** Increased the minimum size limit to 12 inches TL. Required minimum bar mesh sizes of 1.75 inches for saltwater gillnets and 1.625 inches for the inside wall of saltwater trammel nets and a maximum bar mesh size of 12 inches for the outer wall of trammel nets. Mandated a bar mesh size of 1 inch for saltwater fish seines, discontinued the commercial angler's license, and increased gear license fees.

**Recreational:** Reduced possession limit of a combined total of 50 Red Drum and Spotted Seatrout with a one-day catch in possession. Required saltwater fishing license for all anglers fishing for saltwater species south of the officially established saltwater line.

### 1986

**Commercial:** Discontinued the saltwater seller's license.

### 1987

**Commercial:** Increased minimum size limit to 14 inches TL. Established minimum bar mesh sizes of 1.75 inches for saltwater gillnets, saltwater fish seines and the inside wall of saltwater trammel nets. Set an annual harvest quota of one million pounds.

**Recreational:** Established minimum size limit of 12 inches TL.

### 1988

**Commercial:** Prohibited the use of unattended nets. Established a seasonal framework (from Sept. 1 until quota reached). Increased the harvest quota to 1.25 million pounds.

**Recreational:** Reduced daily limit to 25 with an allowable one-day catch in possession.

### 1992

**Commercial:** Reduced the seasonal harvest quota to one million pounds. Adjusted the seasonal framework to Sept. 15 to April 30 or until quota reached. Harvest prohibited between sunset Friday through sunrise Monday.

### 1995

**Commercial:** Set season from third Monday in November through April 30 of the following year. Prohibited harvest after sunset and before sunrise as well as between sunset Friday through sunrise Monday. Prohibited commercial take except by special non-transferable Spotted Seatrout permit with qualifying criteria. Established commercial rod and reel gear license with qualifying criteria. Restricted harvest with the use of Mullet strike nets and all other legal gears to a seasonal framework. Adjusted the quota to not more than one million pounds and no less than 500,000 pounds.

**Recreational:** Required possession of Marine Resources Conservation Stamp by all saltwater anglers.

### 1997

**Commercial:** All commercial gear prohibited for Spotted Seatrout except rod and reel gear.

## 1998

**Recreational:** Increased possession limit to twice the daily limit; however, only the daily limit may be in possession while on the water.

## 2004

**Commercial:** Set commercial season from Jan. 2 until July 31 of each year or until quota reached. Prohibited persons from holding both a charter boat fishing guide license and a Spotted Seatrout permit during the same license period.

**Recreational:** Changed daily bag and possession limit in described parts of Cameron and Calcasieu Parish to include no more than two fish more than 25 inches TL in possession.

## 2006

**Recreational:** Changed daily bag and possession limit in described parts of Cameron and Calcasieu Parish to 15 fish per day, with only two fish more than 25 inches TL in possession.

## 2011

**Commercial:** Set commercial season from Jan. 2 of each year until quota reached. Prohibited commercial take of Spotted Seatrout within Louisiana waters west of the Mermentau River.

## 2018

**Recreational:** Set the possession limit for Spotted Seatrout taken south of U.S. Hwy 90 at three times the daily take limit when the fisherman holds and is in possession of a valid recreational fishing license and can show a landing receipt from a public boat launch located south of U.S. Hwy 90 that demonstrates to the satisfaction of the LDWF that the fisherman has been actively on the water or at a remote camp that can be accessed only by water for two days or more. The fish shall be kept whole or whole gutted in separate bags for each species of fish. The bags shall be marked with the date the fish were taken, the species, the number of fish contained in the bag, and the name and license number of the person taking the fish. The fish shall only be in the possession of the person who took the fish. However, no fisherman shall be actively fishing or engaged in fishing while in possession of more than the daily take limit.

Fillets may not be possessed on the water, except for the purpose of consumption at sea aboard the harvesting vessel. An individual must not have more than 2 pounds of finfish parts per person in state waters, or more than 1.5 pounds of finfish parts per person in federal waters, on board the vessel, provided that the vessel is equipped to cook finfish and that the finfish does not exceed applicable bag limits. These provisions do not apply to bait species. Saltwater finfish caught or transported by a recreational fisherman are presumed to have been caught in Louisiana waters, for license requirements. All regulations regarding these species apply whether caught in freshwater or saltwater areas. FILLETS EXCEPTION: A fisherman who holds and is in possession of a valid recreational fishing license and can demonstrate to the department's satisfaction use of a boat launch located south of U.S. Hwy 90 and that the fisherman has been actively on the water or at a remote camp that can be accessed only by water for two days or more may possess up to the possession limit of filleted Red Drum, Spotted Seatrout, and Southern Flounder. The filleted fish shall have sufficient skin remaining on the fillet to allow for identification of the species and shall be segregated by species into plastic bags or plastic containers that are marked by species to allow for easy identification, the date caught, and the name and license number of the person who took the fish. The spotted sea trout fillets shall be no less than 10 inches in length and the Red Drum fillets shall be no less than 14 inches in length. The fish shall be in possession only of the person who took the fish. However, no fisherman shall be actively fishing or engaged in fishing while in possession of more than the daily take limit.

## APPENDIX XII. Penalties for Regulatory Violations

Classes of violations vary by legislative statute or Commission rule. Penalties for each class of violation are below (LA R.S. 56:31-37.1):

**Class One:** First offense - fine of \$50, imprisonment for no more than 15 days, or both; second offense - fine of \$75-250, imprisonment of 30-60 days, or both; third and subsequent offenses - fine of \$250-550 and imprisonment of 30-90 days

**Class Two:** First offense - fine of \$100-350, imprisonment of no more than 60 days, or both; second offense - fine of \$300-550 and imprisonment of 30-60 days; third and subsequent offenses - fine of \$500-750, imprisonment of 60-90 days, and forfeiture of anything seized in connection with the violation

**Class Three:** First offense - fine of \$250-500, imprisonment of no more than 90 days, or both; second offense - fine of \$500-800, imprisonment of 60-90 days, and forfeiture of anything seized in connection with the violation; third and subsequent offense - fine of \$750-1,000, imprisonment of 90-120 days, and forfeiture of anything seized in connection with the violation. In addition to any other penalty, for a second or subsequent violation of the same provision of law the penalty imposed may include revocation of the permit or license under which the violation occurred for the period for which it was issued and bar the issuance of another permit or license for that same period.

**Class Four:** First offense - fine of \$400-950, imprisonment of no more than 120 days, or both; second offense - fine of \$750-999 and imprisonment of 90-180 days; third and subsequent offenses - fine of \$1,000-5,000 and imprisonment of 180 days to two years. All Class Four penalties include forfeiture of anything seized in connection with the violation.

**Class Five-A:** First offense - fine of \$500-750 and imprisonment of 15-30 days; second offense - fine of \$750-1,000 and imprisonment of 60-90 days; third and subsequent offenses - fine of \$750-1,000 and imprisonment of 90-120 days. All Class Five penalties include forfeiture of anything seized in connection with the violation. In addition, the license under which the violation occurred shall be revoked and not reinstated at any time during the period for which it was issued and for one year thereafter.

**Class Five-B:** First offense - fine of \$350-500 and imprisonment of 30 days; second offense - fine of \$500-1,000 and imprisonment of 60 days; third and subsequent offenses - fine of \$1,000-2,000 and imprisonment of 90 days. All Class Five penalties include forfeiture of anything seized in connection with the violation. In addition, the license under which the violation occurred shall be revoked and not reinstated at any time during the period for which it was issued and for one year thereafter.

**Class Six:** For each offense, a fine of \$900-950, imprisonment of no more than 120 days, or both, as well as forfeiture of anything seized in connection with the violation.

**Class Seven-A:** For each offense, a fine of \$5,000-7,500, imprisonment for one year, or both, as well as forfeiture of anything seized in connection with the violation.

**Class Seven-B:** For each offense, a fine of \$5,000-7,500 and imprisonment for one year, as well as forfeiture of anything seized in connection with the violation.

**Class Eight:** For each offense, a fine of \$5,000-7,000 and imprisonment for 60 days to six months.

In addition to all other penalties, anyone convicted of Class 1-4, 6, and 7 violations may have their license under which the violation occurred revoked for the period for which it was issued. LA R.S. 56:38(A)

In addition to all other penalties, violators shall forfeit any Spotted Seatrout seized in connection with their violation upon conviction. LA R.S. 56:39

Anyone who kills, catches, takes, possesses, or injures any wildlife or aquatic life in violation of Title 56, regulations adopted pursuant to Title 56, or a federal statute or regulation governing fish and wildlife, or, through the violation of any other state or federal law or regulation, kills or injures any wildlife and aquatic life, is liable to the state for the value of each wildlife and aquatic life, unlawfully killed, caught, taken, possessed, or injured. LA R.S. 56:40.1