Audubon Nature Institute

G.U.L.F.

Gulf United for Lasting Fisheries

G.U.L.F. Texas Blue Crab Action Plan

Marine Advancement Plan (MAP)

May 2015

Prepared for:
Texas Parks and Wildlife Department
Texas Blue Crab MAP Committee
Gulf States Marine Fisheries Commission

Prepared by:
Audubon Nature Institute
Gulf United for Lasting Fisheries (G.U.L.F.)
Laura Picariello
Ashford Rosenberg

TABLE OF CONTENTS

A publication of Audubon G.U.L.F. in concert with GlobalTRUST a SAI GLOBAL company

1. INTRODUCTION

1.1 About G.U.L.F.

Gulf United for Lasting Fisheries (G.U.L.F.) was founded in 2012 and is the sustainable seafood program of Audubon Nature Institute, a not-for-profit network of facilities dedicated to "Celebrating the Wonders of Nature." A home-grown, regional program, G.U.L.F. is dedicated to advancing the fisheries of the Gulf of Mexico towards greater sustainability. Through education and outreach, advancement plan development, and third-party assessment and certification of our fisheries, G.U.L.F. highlights what makes the region's seafood special and encourages our fisheries to go above and beyond to meet the highest standards for responsible fisheries management.

1.2 Marine Advancement Plans

This project has been conducted under the Gulf States Marine Fisheries Commission (GSMFC) Oil Disaster Recovery Program (ODRP), Grant Award No. NA10NMF4770481, at the request of GSMFC to create Marine Advancement Plans (MAPs) based on assessments of U.S. state fisheries in the Gulf of Mexico. Assessments are conducted by benchmarking the fishery against internationally recognized standards of sustainability. Comprehensive information on the fishery was gathered through interviews with management and industry representatives, public documents, and research publications, and compared to the United Nations Food and Agriculture Organization (FAO) Code of Conduct for Responsible Fisheries (CCRF) in a G.U.L.F. Sustainability Benchmarking Report (SBR). The CCRF is the foundational document for the FAO Ecolabelling Guidelines, as well as many sustainability certification standards currently used in the marketplace. "A Checklist for Fisheries Resource Management Issues Seen from the Perspective of the FAO Code of Conduct for Responsible Fisheries" in FAO Fisheries Circular No. 917 FIRM/C917 known as the "Caddy Checklist" (Appendix C), was used as the basis for the SBR based on its functionality as an operationalized version of the CCRF. The Caddy Checklist focuses on the sustainability of management measures by addressing five key areas of the fishery: fisheries management, fishing operations, integration of fisheries into coastal area management, post-harvest practices and trade, and fisheries research. By taking clauses of the CCRF and transforming statements into questions, it is possible to quantify and score the

system used to manage the fishery, measuring the robustness of management and sustainability. A snapshot of the ratings via a “stoplight” system (GREEN, full credit; AMBER, partial credit; RED, no credit) generated by the Sustainability Benchmarking Report is available in Appendix B.

Marine Advancement Plan Process

1.3 Texas Blue Crab Marine Advancement Plan (MAP)

The scope of the Texas Blue Crab MAP includes only the blue crab fishery management and operations in Texas state waters. Based on the most recent regional stock assessment conducted by GSMFC, the Texas blue crab fishery has been identified as part of a larger stock of Western Gulf of Mexico, which includes the blue crab fisheries of Louisiana, Alabama, and Mississippi. Regulatory authority, however, is maintained by each individual state, and each state is addressed in separate MAP reports.

After initial completion of the SBR, the G.U.L.F. team met with management and industry representatives and, utilizing the recommendations in the SBR, developed the actions detailed in Section 5 of this report.

Of the 174 questions in the SBR used to benchmark the fishery, the Texas blue crab fishery received the following rankings, indicating high compliance with CCRF principles:

Texas Blue Crab Results		
RATINGS	**description**	**# of questions**
GREEN	full credit	149
AMBER	partial credit	15
RED	no credit	6
N/A	not applicable	4

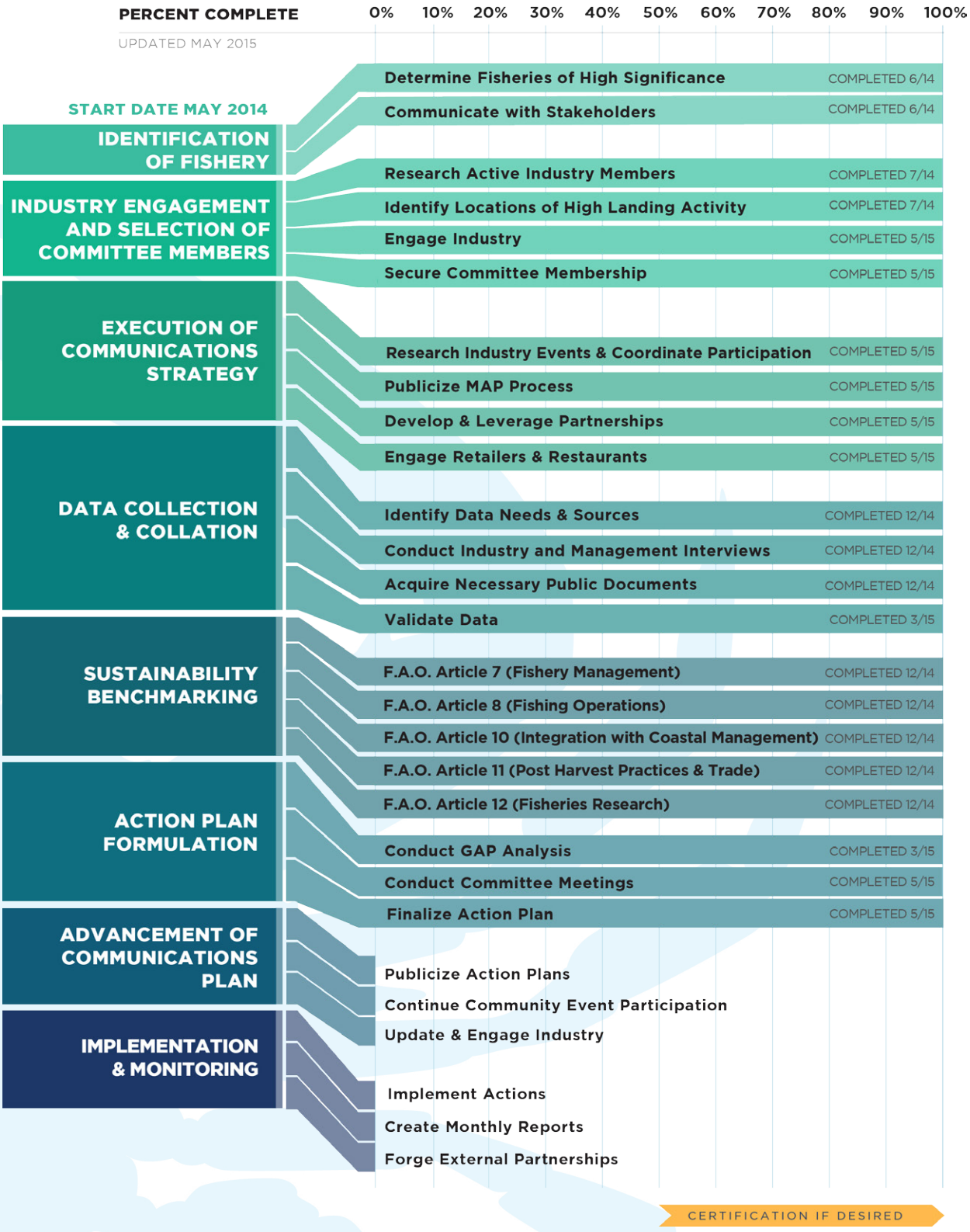
In numerical scoring (GREEN =1, AMBER = .5, and RED = 0) the Texas blue crab fishery scored a 92%. For details on numerical scoring, see the SBR.

See Appendix B for scoring results of each question.

The SBR has been reviewed by Texas Parks and Wildlife Department (TPWD) staff for completeness of information and audited by Global Trust Certification, LTD (GTC), a third party sustainability certification organization. GTC verified that the justifications provided for scoring met the approval of a certifying organization. The SBR contains a set of recommendations provided by G.U.L.F. and GTC for potential areas of improvement to increase the scoring of responses that did not meet a GREEN rating. A summary of commercial industry interviews and recommendations made by industry are also provided in the SBR.

The SBR and verification evidence can be provided upon request. Transparency of the MAP process is essential and is reflected through the G.U.L.F. website, www.AudubonGULF.org.

Progress for Texas Blue Crab MAP



2. BACKGROUND

2.1 Species Information:

Blue crab (*Callinectes sapidus*) has a wide range in the Northern hemisphere. They are found throughout the Gulf of Mexico, as far north as Nova Scotia and as far south as Argentina, including Bermuda and the Antilles (Sutton and Wagner 2007). Blue crab is considered an "r-selected species," displaying high fecundity, rapid growth, early age-at-maturation, short life spans, and high natural mortality rates. These characteristics make blue crab highly resilient and allow for sustained high exploitation rates, and rapid recovery in the event of overfishing (Guillory, Perry and VanderKooy 2001). The maximum life span for a blue crab is six years (West et al. 2011), but the average is 1-3 years (FWC). Blue crabs are sexually dimorphic; females have red claws and a broad abdominal apron, while males have blue claws and a narrow abdominal apron. Determining the exact age of crabs can be difficult; however, scientific evidence indicates that blue crabs in the Gulf of Mexico reach sexual maturity within ten to 12 months. Mating and spawning occurs March through November. Females mate once in their lives, but can store sperm for future spawning, and they may spawn several times in a season. The female carries as many as 3 million eggs per brood under the abdomen for about two weeks until they hatch.

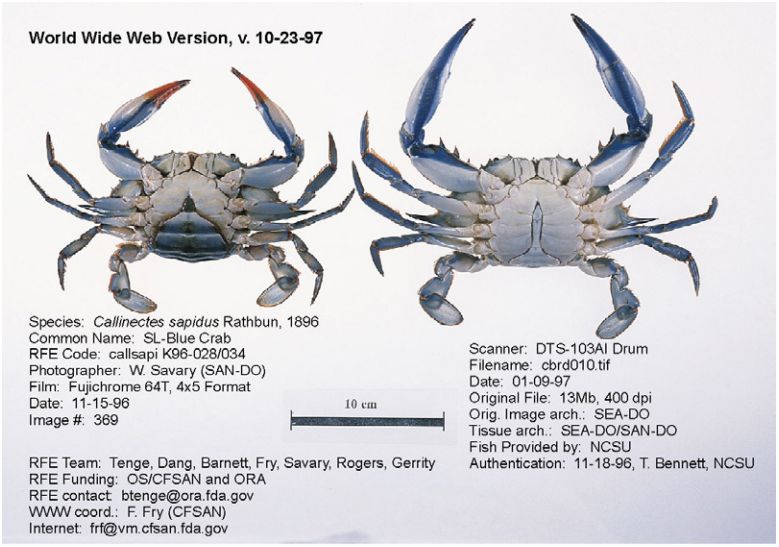


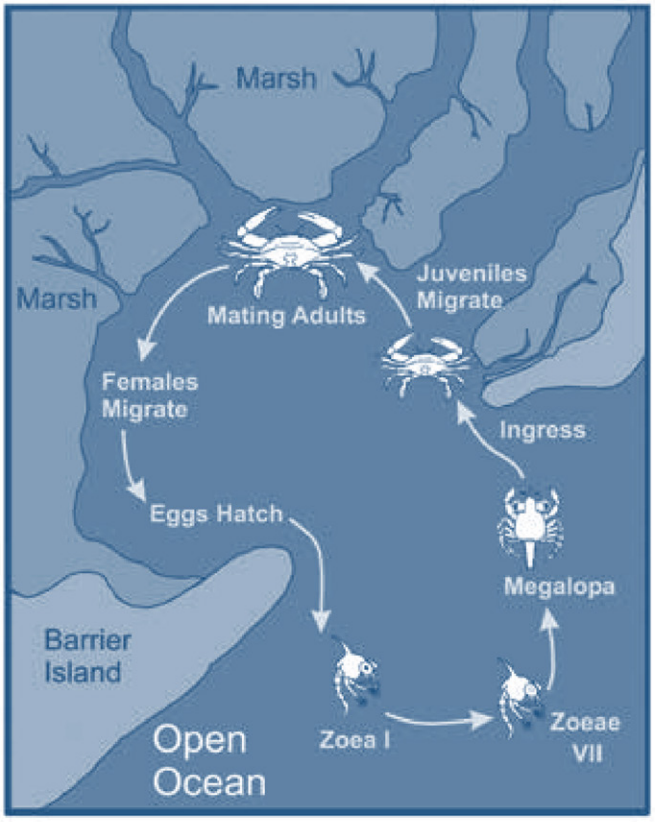
Image Credit: Food and Drug Administration (FDA) Regulatory Fish Encyclopedia (RFE), http://www.fda.gov/Food/FoodScienceResearch/RFE/ucm078750.htm

Blue crabs feed on a wide variety of organisms. While the exact diet of larval blue crabs is unknown, culture of blue crabs indicate that during free-swimming pelagic larvae stage, they are filter feeders that primarily consume zooplankton (Millikin and Williams 1984). Juvenile and adults are non-discriminating predators and scavengers, feeding on fish, blue crabs, other crab species, clams, oysters, shrimp, mussels, snails, worms, insects, aquatic plants, and detritus (Laughlin 1982). Blue crabs are also vital prey for many species of fish, reptiles, and mammals. Cannibalism is also common.

2.2 Habitat

Blue crabs require a diverse range of habitats, as various life stages require different ecological niches. In general, males prefer lower salinity habitats, while females utilize hyposaline areas primarily to molt and mate. Females migrate offshore where the eggs hatch into free swimming pelagic larvae (zoeae). Larvae are distributed via currents and will molt several times before becoming a juvenile crab and settling in an estuary or bay (West et. al. 2011).

The estuarine phase of the blue crab life cycle is possibly the most important (VanderKooy 2013). Vegetated habitats are nursery areas for crabs, as the submerged vegetation provides cover for juvenile crabs to molt and grow with less risk of predation (VanderKooy 2013). Juvenile and adult blue crabs have a wide range within an estuary, utilizing submerged vegetation, mud bottoms, oyster reefs and sandy bottom areas. Males usually remain within estuaries while females move offshore to spawn and hatch their eggs (VanderKooy 2013).



Crabs found in different areas during different life stages.

Credit: *Sea Science: Blue crab* http://www.dnr.sc.gov/marine/pub/seascience/bluecrablife.html

2.3 Stock Status

Based on the most recent regional assessment conducted in 2013 by GSMFC, there are currently two recognized stocks of blue crab in the Gulf of Mexico. The Western Gulf of Mexico (Western GOM) stock occurs from central Texas to Apalachicola Bay in Florida. The Eastern Gulf of Mexico (Eastern GOM) stock in Florida is found from Apalachee to the Florida Keys (VanderKooy 2013).

The Western GOM stock, which includes the Texas blue crab fishery, is currently not overfished and

not experiencing overfishing. The Gulf Data, Assessment and Review stock assessment of blue crab (GDAR01) states that, while not at an overfished level, the Western GOM stock is in a "depressed state." The GSMFC 2015 regional blue crab fishery management plan (FMP) recommends close monitoring of the fishery in light of trends towards lower abundance, perhaps due to changes in hydrological cycles, but states that current abundance is adequate to maintain the fishery (Perry and Vanderkooy 2015).

2.4 Environmental Factors

2.4.1 Habitat Loss, Restoration, and Freshwater Inflow

Natural and anthropogenic alteration of habitat in the Gulf of Mexico impacts every stage of the crab life cycle. Activities that can contribute to habitat loss include but are not limited to pollution, eutrophication, and alterations in freshwater and sediment flow (Guillory, Perry and VanderKooy 2001). Blue crabs depend on the quality and quantity of estuarine marshes, mangrove areas, submerged vegetation, and nearshore soft sediment habitats to successfully reproduce and grow (Guillory, Perry and VanderKooy 2001).

Habitats may be altered by human activity through freshwater control. Wetlands are created by and maintained through nutrients and sediments transported to them by river systems; the damming, channelization, and leveeing of rivers can affect the timing and flow of freshwater to a wetland estuary and greatly affect the composition of the habitat (Guillory, Perry, and VanderKooy 2001).

Current research in the Gulf of Mexico has identified freshwater inflow to be a critical driver of blue crab population dynamics (VanderKooy 2013). Sanchez-Rubio et al. (2011) related abundance of juvenile blue crab to the influence of global climate factors on regional hydrology and how climate and hydrology structure habitat. Riedel et al. (2010) highlights the correlation between significant downward trends in abundance of juvenile blue crabs and a period characterized by drought and habitat changes from both natural and man-made alterations to coastal wetlands. High river flows have also been linked to increased commercial landings in Florida and Texas (More 1969, Wilbur 1994).

Fluctuations in freshwater inflow and resulting changes in salinity may also have secondary effects on blue crab abundance due to predation (Bourgeois, Marx, and Semon 2014). Predation is a significant

factor influencing blue crab abundance, and changes in salinity influence the presence or absence of predators. During periods of high freshwater inflow and low salinity, many predators remain offshore in higher salinity waters, while low rainfall will increase salinity, causing predators to move inshore and overlap with blue crab habitats.

2.4.2 Predation

Blue crabs are a common prey item for many species of finfish including red drum (*Sciaenops ocellatus*), spotted seatrout (*Cynoscion nebulosus*), black drum (*Pogonias cromis*), Atlantic croaker *(Micropogonias undulatus*), gafftopsail catfish (*Bagre marinus*), and hardhead catfish (*Ariopsis felis*) (Vander-Kooy 2013). Recent population increases of many of these species due to restrictions on fishing activities and reductions in finfish bycatch could have potential impacts on blue crab abundance.

Game fish predation

In the past, due to population concerns of some finfish species, red drum and spotted seatrout have been declared game fish species, and commercial fishing for these species is closed in Texas waters. Possession and retention of red drum in federal waters is also prohibited. Many Gulf States imposed similar rules that banned commercial harvest of red drum and spotted seatrout and created seasons and slot limits for the recreational fisheries. These regulatory changes have led to increased game fish populations throughout the Gulf of Mexico. Blue crabs are a large part of a red drum's diet; a study found that blue crab comprised 37% of total red drum diet by weight, and ranked over 13 times greater in relative importance than the next-ranked species (Guillory and Prejean 2001).

Other finfish predation

Atlantic croaker, gafftopsail catfish, and hardhead catfish are common bycatch species in the commercial shrimp trawl fishery; however, recent studies indicate that regulations requiring bycatch reduction devices (BRDs) in shrimp trawls combined with a reduction in shrimp trawl effort have led to population increases for these species (Raborn, Callaway, and Cole 2014).

2.5 History of Fishery

The blue crab fishery has been a part of the Gulf of Mexico seafood industry since at least the late

1800s, with early gear types including dip nets, drop nets, and trot lines. Louisiana and New Orleans were the center of development for the commercial blue crab fishery, with fishermen bringing crabs to New Orleans to supply the French Market and local restaurants (Perry et. al. 1984). The first processing plant for Louisiana crab meat was built in Morgan City in 1924, and an additional six plants were added by 1931. The first plant in Florida was built in Apalachicola in 1930 (Steele and Bert 1998). Commercial harvest of hard crabs increased gradually until the 1970s, at which point it accelerated sharply through the 80s, when the highest-ever commercial landings of crab were reported across the region, except in Mississippi, and Gulf-wide total landings peaked in 1988 at 79 million pounds. (Guillory, Perry and VanderKooy 2001).

Historically, blue crabs were harvested with dip nets. The 1950s saw an increase in trotlines, drop nets, otter trawls and pots, each of which were used with varying intensity from 1950 until the 1980s, when traps became the dominant gear (Guillory, Perry and VanderKooy 2001). Currently, blue crabs are harvested almost exclusively with wire traps.

In Texas, blue crab is the second-most commercially important species (Sutton and Wagner 2007). In 2013, approximately 1.9 million pounds were landed with a value of $2.3 million (NOAA OST). The commercial crab fishery of Texas consists primarily of the hard shell blue crab, with a small portion of the fishery comprising stone crab claws and soft shell crab. Stone crab claws encompass only about 1% of total crab landed in Texas in pounds, but can account for 3-5% of total value of crab landings (NOAA OST). The fishery is conducted primarily with wire-coated traps, which account for 99% of catch. Shrimp trawl bycatch of blue crab accounts for less than 1% of total commercial blue crab landings. Other gears, such as crab lines, are legal but essentially unused in the commercial fishery. Texas blue crab fishermen constitute 3-10% of total blue crabbers in the region. Landings of crab in Texas peaked in 1989 at approximately 11 million pounds, which was about 17% of total landings across the Gulf. In 1994, there were 345 blue crab license holders in Texas, but that number has steadily dropped. In 1998, Texas implemented the Crab License Management Program due to concerns of resource overutilization, resulting in a 28% reduction in licenses from 1998-2005 (Sutton and Wagner 2007). In 2011, landings were about 3 million pounds and 5% of total Gulf landings.

2.6 Ecosystem Considerations

2.6.1 Habitat Impacts

Crab traps, the dominant gear used by the commercial fishery, are a relatively selective gear and are considered to have low impact on the environment due to static placement and use on low-sensitivity mud bottoms and oyster reefs (Guillory et al. 2001). Texas conducts an Abandoned Trap Removal Program annually to reduce habitat impacts of lost or abandoned traps (Derelict Trap Task Force 2008).

2.6.2 Bycatch and Discards

Crab traps do not experience high bycatch mortality and allow for live catch with minimal waste. Stone crab, sheepshead, Gulf toadfish, black drum, southern flounder, hardhead catfish, red drum, and pinfish are some of the more common bycatch species found in traps (Derelict Trap Task Force 2008). Stone crab may be utilized for its claw and then returned to the water alive (see Appendix A for stone crab claw regulations). Blue crab fishermen in Texas are allowed to retain legal-sized incidental catch within recreational limits for each species, and finfish species are typically either utilized or still alive when released (Morris 2003). Studies in Louisiana and Mississippi found bycatch rates and mortality to be too low to present risk to the populations of bycatch species (Bourgeois, Marx, and Semon 2014, Graham et. al. 2012)

Traps are relatively size-selective and target a limited size range due to the diameter of trap funnels. Commercial fishermen cannot retain crabs smaller than five-inch carapace width (2014-2015 Commercial Fishing Guide). TPWD requires a minimum of two escape vents in each crab retaining chamber that are at least 2-3/8 inches in diameter. A degradable panel is also required in crab traps to reduce bycatch of sublegal crabs and non-target species in lost or abandoned gear (31 T.A.C. §57.973 Devices, Means, and Methods, 2014-2015 Commercial Fishing Guide).

2.6.3 Species of Concern

Diamondback terrapin

Diamondback terrapin (*Malaclemys terrapin*) share some habitat with blue crabs, and concerns have been raised by environmental groups over incidental catch and mortality of terrapins in blue crab

traps. In Texas, diamondback terrapin is listed as a Species of Greatest Conservation Need, and 31 TAC §65.82 makes it illegal to knowingly take or possess a diamondback terrapin (2015-2015 Outdoor Annual). Only two terrapins were documented as bycatch in the 2002 Abandoned Trap Removal Program (Morris 2003), and since then, research into potential solutions for terrapin bycatch has continued (Baxter 2013, Baxter 2014). Currently, Terrapin Excluder Devices are not required in traps, but industry in Texas has been encouraged to utilize them voluntarily as part of cooperative research project. A representative of TPWD sits on the committee for the Texas Diamondback Terrapin Working Group to discuss fishery interactions with terrapins. Additionally, the Crab Subcommittee of the GSMFC Technical Coordinating Committee has begun to work with the Gulf Coast Region Diamondback Terrapin Working Group to discuss concerns about terrapin bycatch on a regional scale.

Whooping crane

The Aransas National Wildlife Refuge located in Aransas, Texas, is a significant winter breeding area for the whooping crane (*Grus americana*), which has been federally listed as endangered since 1967. Because whooping cranes rely on blue crab as a primary food source, concerns have been raised by environmentalists regarding mortality of overwintering whooping cranes due to declining blue crab populations. Studies have been conducted on declining blue crab resources in Aransas Bay as a result of reduced freshwater inflow and the relationship of blue crab scarcity to whooping crane mortality (Pugesek, Baldwin, and Stehn 2008). Crabbing has been prohibited in the Refuge since 2009 to reduce pressure on blue crab populations in the Aransas area (2014-2015 Commercial Fishing Guide). Multiple projects now address freshwater inflow issues to examine both decreasing blue crab populations and the cranes reliant on them (The Aransas Project).

Marine mammals

NOAA's Office of Protected Resources considers the Gulf of Mexico blue crab fishery as a Category III (remote likelihood/no known) threat based on the level of interaction with marine mammals (NOAA Office of Protected Resources).

2.6.4 Derelict Traps

Crab trap loss is a factor that affects not only fishermen, but potentially the ecosystem in which traps are lost. In 2002, Texas developed an Abandoned Crab Trap Removal Program to address concerns

of bycatch and potential habitat damage of ghost traps from the blue crab fishery (Morris 2003). Each year, the trap cleanup program occurs during a ten-day closure period for the commercial and recreational fisheries, during which all traps must be removed from state waters (2014-2015 Commercial Fishing Guide). In its first year, the Abandoned Crab Trap Removal Program successfully removed over 8,000 lost or abandoned traps from Texas state waters (Morris 2003). In the first four years, 22,700 traps were removed, and the success of the program is reflected in the declining trap numbers that are removed each year, indicating that Texas bays are experience fewer impacts from derelict traps (Derelict Trap Task Force 2008). Crab traps are also required to have a degradable panel to help reduce the impact of lost or abandoned traps on populations of bycatch species (2014-2015 Commercial Fishing Guide).

2.7 Fishery Interactions

There is high possibility of interaction between the Texas commercial blue crab fishery and other commercial and recreational fisheries. Recreational blue crabbing is allowed in Texas with a maximum of six recreational traps. However, other recreational fishing methods are used for blue crabs, including dip nets and lines baited with chicken necks. Interactions also occur across state and national boundaries. Each Gulf of Mexico state has a blue crab fishery, and crabs do not distinguish between state boundaries meaning other state's fishing practices may affect fisheries in Texas, and vice versa (MRAG Americas, Inc. 2008). Texas and Louisiana share Lake Sabine, a productive blue crab habitat. Southern Texas shares a border with Mexico, and there is a commercial crab fishery that operates in Mexican waters in the Gulf of Mexico; however, the Mexican fishery is currently thought to have minimal impact on the northern Gulf of Mexico stocks and has not been included by GSMFC or individual states in assessment activities. The crab fishery in Mexican waters centers around Veracruz (30% of landings) and Campeche (30% of landings) in the southern portion of the Gulf of Mexico (SAGARPA 2012); there is currently no specific cooperation between the United States and Mexico with respect to the blue crab fishery.

Interactions between crab gear and shrimp gear are common. Blue crab is a bycatch species in shrimp trawls (Fuls et al. 2002), and gear interactions can be a source of conflict between the fisheries. Crab traps, either actively fishing or ghost fishing, are sometimes caught in shrimp trawls, which

can cause damage to nets and loss of catch (Guillory et al. 2001). In 2000, TPWD closed several nursery areas for the shrimp trawl fishery, which also served to reduce interactions between blue crab and shrimp fishermen (31 T.A.C. §57.973 Devices, Means, and Methods). Additionally, TPWD instituted the Abandoned Crab Trap Removal Program, occurring annually, to reduce the number of abandoned traps in Texas waters and reduce gear interactions between the shrimp and crab fisheries (Morris 2003).

3. MANAGEMENT

3.1 Management Structure

The Texas blue crab fishery, which is fished exclusively within Texas state territorial waters, is managed by Texas state legislature and associated regulatory bodies, including the Texas Parks and Wildlife Commission (TPWC), and TPWD. TPWC sets regulations on methods, means of take, and catch limits. Legislature sets fees and license structure, as well as standards for management. TPWD is the administrative arm that carries out management tasks. Because blue crabs only occur within the nine-nautical mile limit of state waters, the United States federal government has no direct role in managing the fishery. Members of TPWD, as well as members from the management agencies of the other four Gulf States, collaborate regularly through the GSMFC. GSMFC acts as an advisory agency providing management recommendations to the Gulf States, but has no regulatory authority. The charge of GSMFC is, “to promote better utilization of the fisheries, marine, shell and anadromous, of the seaboard of the Gulf of Mexico, by the development of a joint program for the promotion and protection of such fisheries and the prevention of the physical waste of the fisheries from any cause.”

3.2 Brief History of Management Changes

- 1980 – 5-inch minimum size limit; illegal to retain sponge crabs
- 1991 – Trap tags required for each trap, issued by the state
- 1993 – Escape rings required

- 1995 – Texas Senate Bill 750, created legal authority for limited-entry licensing
- 1997 – Creation of Crab License Management Program
    - Effective in 1998
    - Through 1999, an applicant for a blue crab license must have held on in the 1995-1996 season
    - After 1999, applicant for blue crab license must have held a license in the previous year
    - Only allowed three licenses per person
    - Included a buyback program
- 1998 – Degradable component mandated
- 2002 – Creation of abandoned crab trap removal program

For full current regulations (as of May 2015), see Appendix A

4. MAP OUTREACH

4.1 Potential Stakeholders

In order to address the blue crab fishery as a whole, G.U.L.F. conducted extensive research and industry interviews to identify stakeholders and potential committee members. Stakeholder groups include:

- Commercial fishermen
- Recreational fishermen
- Processors/wholesalers
    - There are only two picking houses in the state of Texas
    - Most wholesalers and dealers distribute live crab product
- *Go Texan*© – the marketing initiative under the Department of Agriculture

    - Currently, only money from Texas shrimp licenses go toward the *Go Texan* marketing program, therefore it is only mandated to create initiatives for the Texas shrimp industry
- Management and research groups
    - TPWD
    - TPWC
    - Legislature
    - GSMFC
- Conservation and academic groups
    - Sea Grant
    - Coastal Bends and Bays Estuary Program (CBBEP)

4.2 G.U.L.F. Participating Stakeholders

- Texas Blue Crab MAP committee
    - Nikki Tran, Port Arthur, TX
    - Richard Howlett, Rockport, TX
- TPWD

4.3 Meetings

April 2, 2015:	Participating stakeholders. Dickinson, TX
February 25, 2015:	Blue crab dealer. Port Arthur, TX
February 20, 2015:	Jefferson and Chambers counties Texas Sea Grant Extension Agent. Port Arthur, TX
August 21, 2014:	Data collection with TPWD. Dickinson, TX

August 20, 2014:	Observed public hearing for TPWC. Houston, TX
June 30 & July 1, 2014:	Presented at blue crab enhancement meetings with TPWD to industry. Rockport and Seadrift, TX.
June 11, 2014:	Blue crab industry members. Seadrift, TX
June 10 & 11, 2014:	Initial meetings with TWPD. Dickinson and Rockport, TX
June 9, 2014:	Blue crab industry member. San Leon, TX

5. ACTIONS

5.1 Action Development

A list of recommendations based on the results of the SBR was presented to a committee of industry stakeholders on April 2, 2015, along with management representatives. The group discussed the initial recommendations from G.U.L.F. and associated actions that would achieve recommendations. Explanations for recommendations and corresponding actions are below. The current actions outlined in this report are the initial actions agreed upon by the MAP committee and may not address all of the original recommendations at this time.

5.2 Industry Actions

INDUSTRY RECOMMENDATION 1	Create an organized industry group for blue crab.
Reference	Industry interviews (also relates to 7.1.2 (a), 7.1.2 (b), 7.1.9, 8.1.7 in the SBR)

Summary:

In order for proposed rule changes to move forward, TPWD and TPWC weigh the level of industry support on various issues to determine whether or not a change should be implemented. There is an annual public hearing held by TPWC each August where members of the public can bring issues of concern to the attention of the Commission. By having an official blue crab industry organization whose members are elected by their peers, groups could discuss issues and ideas for change amongst the industry, make public comment at TPWC hearings, and more efficiently work with TWPD and TPWC towards modifying regulations.

Other fisheries in Texas have industry-led organizations that may serve as examples for the blue crab fishery regarding the structure and benefits of such groups. For example, The Port Arthur Area Shrimpers' Association is one pre-existing fishermen's organization that is active in professional education. Run by the Port Arthur International Seafarer's Center, the group organizes industry meetings to provide updates on regulations, safety trainings, and boat and gear inspections. Port Arthur is also an active area for the blue crab industry, and the Port Arthur Area Shrimpers' Association is open to the development of a division for crabbers within the Association. Another example of an industry-led fishermen's organization in Texas is the Texas Shrimp Association, which educates consumers, lawmakers and others about the importance of the Gulf shrimp industry.

In the past, TWPD and TPWC have convened species-specific committees of stakeholders to discuss certain issues, but they have been dissolved once the issue is addressed. One example is the Blue Crab Advisory Committee (BCAC). The BCAC was created to assist in the development and implementation of the Blue Crab Management Plan, but the committee is no longer active. TPWD does maintain a Coastal Resources Advisory Committee (CRAC) comprised of several stakeholder groups, including recreational and commercial fishermen. The CRAC meets a few times a year to advise TPWD on a variety of coastal issues, including proposed fishery regulations. Currently, of the approximately 25 members on the CRAC, few are commercial fishermen, and there is no representation from the blue crab fishery.

__NOTE__ Only the Chair of the Texas Parks and Wildlife Commission can designate official advisory committees. The proposed industry group would function as an independent working group.

Many of the recommendations resulting from the SBR and industry interviews for the blue crab fishery of Texas would be best addressed by a group of organized fishers and stakeholders. The issues addressed include:

1. Better notification of regulation changes across all recreational and commercial fisheries in Texas.
    - Changes in one fishery may impact a different fishery, and several industry members expressed concern over not knowing when regulations have changed. An industry group could serve the role of disseminating new information on fisheries that may impact the blue crab fishery.
2. Representation at TPWC and TPWD meetings to voice concerns for the industry and make recommendations for industry improvement.
    - Regulation changes, such as a change to stone crab regulation allowing the take of either the right or left crusher claw, need industry support during public comment at meetings.
3. A forum for the sale of blue crab licenses.
    - Blue crab in Texas is a limited entry fishery, and TWPD is not issuing any new licenses. If a fisherman is interested in selling his or her license, he or she can either sell it to an interested person, or sell it back to TPWD through the License Buyback Program.
    - Currently, word of mouth is the only way a fisherman indicates his or her intention to sell the license.
4. Increased marketing of blue crab.
    - Marketing initiatives through the organization (such as social media, branding, and networking) can serve to raise the profile of the fishery and increase market access.
    - Formal marketing for Texas products is done through the Texas Department of Agriculture. TPWD does not have authority to address seafood marketing. Currently, shrimp is the only seafood marketed by the Texas Department of Agriculture, and the money that funds this marketing is drawn directly from shrimp licenses.

5. Predation concerns due to increases in populations of finfish.

   - During interviews, several industry members raised concerns that increased populations of game fish may be impacting blue crab populations. Blue crab are a common prey item for many species of finfish, including red drum *(Sciaenops ocellatus),* spotted seatrout (*Cynoscion nebulosus*), black drum (*Pogonias cromis*), Atlantic croaker (*Micropogonias undulatus*), gafftopsail catfish (*Bagre marinus*), and hardhead catfish (*Ariopsis felis*). (See previous section 2.4.2 *Predation* for more detail.)
   - An industry group can act as a liaison for the blue crab fishery. Leaders within this group could coordinate a meeting with TPWD to address the need for further research on the effect of game fish and other finfish populations on blue crab abundance.

6. Addressing stone crab claw take.

   - Interviews with several industry members indicated that when blue crab harvest is low, stone crab claws provide a valuable resource for fishermen to maintain business until blue crab harvest increases. By changing current regulation, which only allow the harvest of the right claw, to permit harvest of only the crusher claw from either the right or left side, fishermen can always harvest the more valuable claw and have a steadier stream of income.
   - A proposal by the blue crab industry, with several members present to voice their support, is more likely to result in a regulation change.

ACTIONS	1	Create a sub-division of the Port Arthur Area Shrimpers' Association for the blue crab industry.
	2	Engage Sea Grant in the process of formalizing a blue crab industry group.
	3	Give more advanced notification of management and industry group meetings and better publicize their presence to generate more attendees.
	4	Explore other meeting areas outside of Port Arthur to make the group more geographically inclusive.
	5	Submit a proposal to TPWC to include a commercial blue crab fishermen on the existing CRAC.

INDUSTRY RECOMMENDATION 2	Increased training and education programs for industry.
Reference	Industry interviews Sustainability Benchmarking Report- 8.1.7, 8.1.8, 12.4

Summary:

Interviews with both management and industry raised concerns about professionalism, safety, and accurate reporting on trip tickets. Texas Sea Grant, through their work with fishermen along the Texas Coast, is an organization with the ability to coordinate training to better prepare people for the commercial fishing industry. While independent communities and organizations such as the Port Arthur Area Shrimper' Association and Port Arthur International Seafarer's Center host trainings and seminars, involving Sea Grant gives the opportunity for trainings to become coast-wide.

Commercial fishing is a hazardous occupation, and safety courses would serve fishermen well by giving them additional information to decrease the likelihood of accident or injury and properly deal with hazardous situations.

During interviews conducted by G.U.L.F. in every Gulf State, industry members have praised Sea Grant's ability to educate fishermen on improving product and updating them on innovative techniques within the fishery. In Florida, one fisherman said that a training session on shedding crabs by Florida Sea Grant completely changed and improved his business. Louisiana Sea Grant has extensively researched improving the quality of blue crabs through reduced handling and refrigeration and presented this information to fishermen trainings across the state. Similar programs and trainings could be instituted for Texas blue crab fishermen to improve the quality of the product.

Part of TPWD's data collection on fisheries is through trip tickets. Management and industry interviews raised concerns that trip tickets may not be filled out completely or accurately, thereby impacting the data TWPD is using to make decisions regarding the fishery. The consensus among interviewees is this inaccurate reporting by the industry is largely unintentional. TPWD does have a small team dedicated to collecting and verifying trip ticket information; however, staffing is limited and a large portion of time is spent correcting and verifying incomplete information on submitted forms. Increased information and trainings could reduce the likelihood of incomplete or inaccurate trip tickets. Support from an industry group or Sea Grant could assist TPWD in training and collecting more accurate trip ticket information.

ACTIONS	1	Sea Grant continues to collaborate with blue crab industry.
	2	Sea Grant/industry groups host safety education trainings.
	3	Conduct trainings on quality and handling of product.
	4	Assist with trip ticket training for fishermen and dealers.

5.3 Management Actions

MANAGEMENT RECOMMENDATION 1	Population Analysis and Management Document Updates
Reference	Sustainability Benchmarking Report – 7.2.1 (c), 7.1.4 (b), 7.3.3, 7.1.9 and 12.4 (a)

Summary:

Texas:

TPWD annually monitors the blue crab stock based on trend reports of independent sampling data and landings from the Trip Ticket Program. There is no formal schedule for full stock assessments of blue crab in Texas waters, and assessment updates are conducted as-needed based on priority of available resources.

The first and most recent quantitative assessment for Texas blue crab was conducted in 2007. Reference points, in the form of E_{MSY}, were determined and used informally by management to support continuation of effort reduction programs (Blue Crab License Buyback Program). Blue crab license numbers have now reached a level below the E_{MSY} determined by the 2007 assessment. Since 2007, there have been advances in assessment techniques and modeling. Therefore, an updated stock assessment could now include additional factors, such as environmental influences and predation, which were not addressed in the 2007 assessment. It is recommended that TPWD update the assessment to account for changes in the fishery since 2007.

There is a Texas Blue Crab Fishery Management Plan (Cody et al. 1992) in place for the fishery; however, this plan has not been updated since it was adopted in 1992 and significant changes have occurred in the fishery since that time. An updated stock assessment report for the Texas blue crab fishery would also serve as a document updating management goals and objectives for the fishery, presenting management options based on information provided through the assessment update.

Regional:

GSMFC is a regional organization that coordinates fisheries management between state and federal management agencies across the Gulf of Mexico. GSMFC is not an authoritative entity, but can make recommendations to the Gulf States regarding the management of fisheries. TPWD currently collaborates and participates in regional research with GSMFC. GSMFC also coordinates a crab subcommittee under its Interjurisdicitonal Fisheries Program (IJF).

The GDAR01 regional assessment was completed through GSMFC in 2013 (data through 2011) with cooperation of TPWD staff, and found Texas blue crab to fall within a larger Western GOM stock that includes Louisiana, Mississippi, and Alabama. At this time, reviewers of the GDAR01 and the GSMFC TCC Crab subcommittee agree that stock definitions are based on limited data; more research and analysis are required before regional stock determinations are adopted. Given these findings, the stock-wide reference points developed in the GDAR are a valuable tool in continued inter-state collaboration, but do not provide state-specific references for management needs. Until such time as research fully supports regional management units, blue crab stocks should be managed locally, especially given the short lifespan and immediate effects of local pressure on populations. Therefore, we recommend that TPWD move forward with an updated state assessment until such time as a regional assessment and management plan is able to effectively meet management needs.

ACTIONS	1	Conduct an updated stock assessment for Texas blue crab, including factors such as predation and environmental influences
	2	Determine an assessment cycle for regular updates of TX blue crab population analysis
	3	Continue collaboration on research through the GSMFC IJF program to determine biological stock definitions
	4	Update management objectives/goals for the fishery (based on population update) into a revised or new management document.
	5	Publish updated management document in Management Data Series.

<table>
<tr><td colspan="2">MANAGEMENT RECOMMENDATION 2</td><td>Coastal Restoration</td></tr>
<tr><td colspan="2">Reference</td><td>Industry Interviews

Sustainability Benchmarking Report – 7.2.2, 7.2.3</td></tr>
<tr><td colspan="3"><u>Summary:</u>

Blue crabs depend on coastal habitats. The adult stages of blue crabs are usually found in marshes, tidal areas, and estuaries. Conservation and restoration activities would serve to increase viable habitat for blue crabs, as well as other vital marine and estuarine species.

Numerous coastal restoration initiatives are underway in Texas through both government agencies and non-profit organizations. As coastal populations increase and environmental changes occur, maintaining coastal habitats will be an ongoing challenge and continued support for coastal protection and restoration is recommended.</td></tr>
<tr><td>ACTIONS</td><td>1</td><td>TPWD continued support and participation in coastal restoration activities and research, including effects on blue crab population dynamics.</td></tr>
</table>

APPENDIX A: CURRENT COMMERCIAL AND REGREATIONAL REGULATIONS (AS OF MAY 2015)

Commercial Regulations

- Licenses (2014-2015 Texas Commercial Fishing Guide)
  - Texas residents 17 years of age or older while fishing, hunting or trapping MUST have on their person a driver's license or personal identification certificate issued by the Department of Public Safety. Non-residents must have similar documents issued by the agency of the state or country of which the person is a resident that is authorized to issue driver's licenses or personal identification certificates.
  - No person shall engage in commercial crab fishing without a commercial crab fisherman license.
  - A moratorium on the sale of licenses or a license management program (limited entry) has been in effect the crab fishery since 1998. To remain eligible, purchase of the previous year's license is required. A license buyback provision is in place for blue crab commercial licenses.
  - Commercial crab fishermen licenses will only be issued to persons concurrently howling the following license and tags during the period Sept 1, 1995 through Nov 13, 1996:
    - General commercial fisherman's license
    - Commercial fishing boat license
    - Commercial crab trap tags
  - Licenses may be suspended or revoked if the license holder is convicted of two or more flagrant offenses, which include:
    - Retaining undersized or left claws of a stone crab,
    - Possessing egg-bearing crabs or female crabs with its abdominal apron detached,
    - Removing crabs or crab traps 30 minutes before or after legal crabbing hours,
    - Fishing crab traps in restricted areas,
    - Fishing crab traps in excess of legal trap numbers,

    - Fishing for crabs without the appropriate license, or
    - Theft of crabs or crab traps.
- Methods, Bag, Possession, and Size Limits (from 2014-2015 Texas Commercial Fishing Guide)
    - Blue crab
        - Daily Bag: No limit
        - Possession: No limit
            - Except that not more than 5% by number, of undersized blue crabs may be possessed for bait purposes only and must be placed in a separate container.
            - May not possess egg-bearing (sponge) crabs.
            - May not possess a female crab that has its abdominal apron detached.
        - Minimum Length: five inches
            - Measured across the widest point of the body from tip of spine to tip of spine
    - Stone crab (right claw only)
        - Daily Bag: No limit
        - Possession: No limit
            - Only the right claw may be retained or possessed.
            - The body of the stone crab must be returned immediately to the water from which it was taken.
        - Minimum Length: 2-1/2 inches claw measurement
            - Measured from the tip of the immovable claw to the first joint behind the claw
    - Nongame fish and other aquatic products taken incidental to legal shrimp trawling operations may be retained provided each person that retains a lawful limit of fish has a current shrimp boat captain's license, or is the licensed owner of the shrimp boat, and:
        - the total weight of aquatic products retained, in any combination, do not exceed 50% by weight of shrimp on a shrimping vessel; or
        - from May 1 to Sept. 30 up to 1,500 live nongame fish not regulated by bag or size limit

and/or 300 dozen ribbonfish may be retained daily for bait purposes only on board a vessel licensed for commercial bait shrimp fishing. The taking of aquatic products of illegal size on board a licensed commercial shrimp boat engaged in the lawful taking of shrimp is not a violation if the aquatic products of UNLAWFUL size are returned to the waters from which taken in a manner to ensure their best chance of survival

- Devices and Restrictions (from 2014-2015 Texas Commercial Fishing Guide)
  - Crab Line: A baited line with no hook attached.
    - Must be marked with a white floating buoy not less than 6 inches in height, 6 inches in length and 6 inches in width.
    - Buoys must be marked with a commercial crab fisherman's license plate number in letters of a contrasting color at least 2 inches high attached to the trap.
    - Buoys or floats may not be made of plastic bottle(s) of any color or size.
  - Crab Traps
    - May only remove crab traps from the water or remove crabs from crab traps during the period from 30 minutes before sunrise to 30 minutes after sunset.
    - Maximum Number of Traps Allowed
      - Only 200 crab traps at a time may be used while fishing under the authority of a commercial crab fisherman's license.
      - Only 20 crab traps at a time may be used while fishing under the authority of a commercial finfish fisherman's license
    - Tag requirements: Must be used with a valid GEAR TAG attached within 6 inches of the buoy.
    - Construction and Design Restrictions:
      - Crab traps may not exceed 18 cubic feet.
      - Crab traps must be equipped with at least two escape vents in each crab-retaining chamber and located on the outside trap walls.
      - Escape vents must be at least 2-3/8 inch in diameter.

- Crab traps must be marked with an attached white floating buoy not less than 6 inches in height, 6 inches in length and 6 inches width.
- Crab traps fished under the authority of a commercial crab fisherman's license must have buoys marked with a commercial crab fisherman's license plate number in letters of a contrasting color at least 2 inches high.
- Crab traps fished under the authority of a commercial finfish fisherman's license must have buoys marked with a commercial finfish fisherman's license plate number preceded with the letter "F" in letters of a contrasting color at least 2 inches high attached to the trap.
- Buoys or floats may not be made of plastic bottle(s) of any color or size.
- Crab traps must be equipped with a degradable panel. A trap is considered to have a degradable panel if one of the following methods is used in construction of the trap:
    - The trap lid tie-down strap is secured to the trap at one end by a simple loop of untreated jute twine (comparable to Lehigh brand #530), sisal twine (comparable to Lehigh brand #390) or untreated steel wire with a diameter of 20 gauge or smaller. The trap lid must be secured so that when the twine or wire degrades, the lid will no longer be securely closed; or the trap contains at least one sidewall, not including the bottom panel, with a rectangular opening no smaller in either dimension than 3 inches by 6 inches. Any obstruction placed in this opening may not be secured in any manner EXCEPT it may be laced, sewn, or otherwise obstructed by a single length of untreated jute twine (comparable to Lehigh brand #530), sisal twine (comparable to Lehigh brand #390) or untreated steel wire with a diameter of 20 gauge or smaller knotted only at each end and not tied or looped more than once around a single mesh bar. When the twine or wire degrades, the opening in the sidewall of the trap will no longer be obstructed; or
    - The obstruction may be loosely hinged at the bottom of the opening by

no more than two untreated steel hog rings and secured at the top of the obstruction in no more than one place by a single length of untreated jute twine (comparable to Lehigh brand #530), sisal twine (comparable to Lehigh brand #390) or untreated steel wire with a diameter of 20 gauge or smaller. When the twine or wire degrades, the obstruction will hinge downward and the opening in the sidewall of the trap will no longer be obstructed.

- Placement and Location Restrictions:
  - May not place a crab trap or portion thereof closer than 100 feet from any other crab trap, EXCEPT when traps are secured to a pier or dock.
  - May not fish a crab trap in public fresh waters.
  - May not fish a crab trap within 200 feet of a marked navigable channel in Aransas County; and in the water area of Aransas Bay within one-half mile of a line from Hail Point on the Lamar Peninsula, then direct to the eastern end of Goose Island, then along the southern shore of Goose Island, then along the eastern shoreline of the Live Oak Peninsula past the town of Fulton, past Nine Mile Point, past the town of Rockport to a point at the east end of Talley Island including that part of Copano Bay within 1,000 feet of the causeway between Lamar Peninsula and Live Oak Peninsula.
  - May not possess, use or place more than three crab traps in waters north and west of Highway 146 where it crosses the Houston Ship Channel in Harris County.
  - May not use or place more than three crab traps in public waters of the San Bernard River north of a line marked by the boat access channel at Bernard Acres.
- Baiting Crab Traps: It is unlawful to use any part of a game fish for bait, except for processed catfish heads used as crab-trap bait by a licensed crab fisherman, provided the catfish is obtained from an aquaculture facility permitted to operate in the United States. A person who uses catfish as bait under this subparagraph shall, upon the request of a department employee acting within the scope of official duties, furnish appropriate au-

thenticating documentation, such as a bill of sale or receipt, to prove that the catfish was obtained from a legal source.

- Other Devices:
    - Devices legally used for taking of fresh or saltwater fish or shrimp may be used to take crab if operated in places and at times authorized by a proclamation of the Texas Parks and Wildlife Commission or the Texas Parks and Wildlife Department Code.
        - See applicable pages in this guide to determine authorized uses, places and times for other legal devices.
- Aransas National Wildlife Refuge — Special regulations beginning March 1, 2009 the Aransas National Wildlife Refuge began enforcing a no commercial crabbing regulation within refuge marshes. For more information contact the Aransas National Wildlife Refuge at (361) 286-3559.

Recreational Regulations (from 2014-2015 Outdoor Annual)

- Crabs may be taken for personal use (bait or food.) Crabs taken with recreational license for personal use may not be sold.
- There are no public salt waters, seasons or times closed to the taking and retaining of crabs and ghost shrimp, except as provided in this guide.
- It is lawful to take, attempt to take or possess crabs and ghost shrimp by means, in numbers and of sizes only.
- A person taking or attempting to take crabs or ghost shrimp from salt water for non-commercial purposes is required to have a valid fishing license and a saltwater fishing stamp endorsement.
- Legal Devices
    - Crab line - A baited line with no hook attached: No restrictions
    - Umbrella net (crab net) – A non-metallic mesh net that is suspended horizontally in the water by multiple lines attached to a rigid frame.
        - May be used to take crabs and *nongame* fish only.
        - May not have within the frame an area that exceeds 16 square feet

- Folding panel traps
    - Only crabs may be taken.
    - Overall surface area (including panels) may not exceed 16 square feet.

- Crab traps
    - Only 6 crab traps at a time may be fished for non-commercial purposes.
    - May only remove crab traps from the water or remove crabs from crab traps during the period from 30 minutes before sunrise to 30 minutes after sunset.
    - Tag Requirements: Must be used with a gear tag valid for 10 days and attached within 6 inches of the buoy or pier to which the trap is tied.
    - Construction and design restrictions
        - May not exceed 18 cubic feet.
        - Must be equipped with at least 2 escape vents in each crab-retaining chamber and located on the outside trap walls.
        - Escape vents must be at least 2-3/8 inches in diameter.
        - Must be marked with a white floating buoy not less than 6 inches in height, 6 inches in length and 6 inches in width, bearing a 2-inch wide center stripe of contrasting color, attached to the crab trap.
        - Buoys or floats may not be made of plastic bottle(s) of any color or size.
        - Must be equipped with a degradable panel. A trap is considered to have a degradable panel if one of the following methods is used in construction of the trap:
            - the trap lid tie-down strap is secured to the trap at one end by a simple loop of untreated jute twine (comparable to Lehigh brand #530), sisal twine (comparable to Lehigh brand #390) or untreated steel wire with a diameter of 20 gauge or smaller. The trap lid must be secured so that when the twine or wire degrades, the lid will no longer be securely closed; or
            - the trap contains at least one sidewall, not including the bottom panel, with a rectangular opening no smaller in either dimension than 3 inches by 6

inches. Any obstruction placed in this opening may not be secured in any manner except it may be laced, sewn or otherwise obstructed by a single length of untreated jute twine (comparable to Lehigh brand #530), sisal twine (comparable to Lehigh brand #390) or untreated steel wire with a diameter of 20 gauge or smaller knotted only at each end and not tied or looped more than once around a single mesh bar. When the twine or wire degrades, the opening in the sidewall of the trap will no longer be obstructed; or

- the obstruction may be loosely hinged at the bottom of the opening by no more than two untreated steel hog rings and secured at the top of the obstruction in no more than one place by a single length of untreated jute twine (comparable to Lehigh brand #530), sisal twine (comparable to Lehigh brand #390) or untreated steel wire with a diameter of 20 gauge or smaller. When the twine or wire degrades, the obstruction will hinge downward and the opening in the sidewall of the trap will no longer be obstructed.

- Placement and Location Restrictions
    - May not place a crab trap or portion thereof closer than 100 feet from any other crab trap, except when traps are secured to a pier or dock.
    - May not fish a crab trap in public fresh waters.
    - May not fish a crab trap within 200 feet of a marked navigable channel in Aransas County; and in the water area of Aransas Bay within one-half mile of a line from Hail Point on the Lamar Peninsula, then direct to the eastern end of Goose Island, then along the southern shore of Goose Island, then along the eastern shoreline of the Live Oak Peninsula past the town of Fulton, past Nine Mile Point, past the town of Rockport to a point at the east end of Talley Island including that part of Copano Bay within 1,000 feet of the causeway between Lamar Peninsula and Live Oak Peninsula.
    - May not possess, use or place more than 3 crab traps in waters north and west

of Highway 146 where it crosses the Houston Ship Channel in Harris County.

- May not use or place more than 3 crab traps in public waters of the San Bernard River north of a line marked by the boat access channel at Bernard Acres.
- It is unlawful to place any type of trap within the area in Cedar Bayou between a department sign erected where Mesquite Bay flows into Cedar Bayou and the department sign erected near the point where the pass empties into the Gulf of Mexico.

- Other Devices
  - Devices legally used for taking of fresh or saltwater fish or shrimp may be used to take crab if operated in places and at times authorized by a proclamation of the Parks and Wildlife Commission or the Parks and Wildlife Code.

APPENDIX B: TEXAS BLUE CRAB SUSTAINABILITY BENCHMARK RATINGS

GREEN=1 (full credit) AMBER=.5 (partial credit) RED= 0 (no credit)

7 – Fisheries Management	Rating
7.1.1 (a)	
7.1.1. (b)	
7.1.1. (c)	
7.1.2 (a)	
7.1.2 (b)	
7.1.3 (a)	
7.1.3 (b)	
7.1.4	
7.1.4 (a)	
7.1.4 (b)	
7.1.4 (d)	
7.1.4 (e)	
7.1.6 (a)	
7.1.6 (b)	
7.1.7 (a)	
7.1.7 (b)	
7.1.8 (a)	
7.1.8 (b)	
7.1.9 – Assessment	
7.1.9 – Management	
7.1.9 – Decision making	
7.1.10	
7.2.1 (a)	
7.2.1 (b)	
7.2.1 (c) formal reference points	
7.2.2 – Defined	
7.2.2 – Avoided	
7.2.2 – Economic conditions	
7.2.2 – Small-scale interests	
7.2.2 – Biodiversity	

7.2.2 – Depleted stocks	
7.2.2 – Environmental impacts	
7.2.2 – Pollution	
7.2.2 – Ghost fishing	
7.2.2 – Fishing methods	
7.2.3	
7.3.1 (a)	
7.3.1 (b)	
7.3.1 (c)	
7.3.1 (d)	
7.3.1 (f)	
7.3.2	
7.3.3 – Plan exists	
7.3.3 – Plan subscribed to	
7.3.4 – Information gathering	
7.3.4 – Research	
7.3.4 – Management	
7.3.4 – Development	
7.4.2 – Resource	
7.4.2 – Climate & environment	
7.4.2 – Socio-economics	
7.4.3 – Cost-benefit	
7.4.3 – Alternative management	
7.4.4	
7.4.5	
7.4.6 – Agreed format	
7.4.6 – Timely manner	
7.4.7	
7.5.1 (a)	
7.5.1 (b)	
7.5.2 – Target reference points	

7.5.2 – Limit reference points	
7.5.2 – Research procedures	
7.5.2 – Management actions	
7.5.5 (a)	
7.5.5 (b) – Natural phenomena	
7.5.5 (b) – Fishing impact	
7.6.1	
7.6.2	
7.6.3 (a)	
7.6.3 (b)	
7.6.5	
7.6.6	
7.6.7	
7.6.8 – Review procedures	
7.6.8 – Flexible mechanism	
7.6.9 (a) – Waste and discards	
7.6.9 (a) – Non-target catch	
7.6.9 (a) – Non-target impacts	
7.6.9 (b) – Fish size	
7.6.9 (b) – Gear	
7.6.9 (b) – Discards	
7.6.9 (b) – Seasons	
7.6.9 (b) – Closed areas	
7.6.9 (b) – Artisanal areas	N/A
7.6.9 (b) – Juveniles	
7.6.9 (c)	
7.6.10	
7.7.1	
7.7.2 (a)	
7.7.2 (b)	
7.7.2 (c)	
7.7.3 – MCS	
7.7.3 – Observers	
7.7.3 – Inspection	
7.7.3 – VMS	N/A
7.7.5 (a)	
7.7.5 (b)	

8 – Fishing Operations	**Rating**
8.1.1	
8.1.2	
8.1.3	
8.1.4	
8.1.7	
8.1.8	
8.1.9	N/A
8.1.10	
8.2.1 (a)	
8.2.1 (b)	
8.2.4	
8.2.7 (a)	
8.2.7 (b)	
8.4.2	
8.4.3 (a) – Fishing operations	
8.4.3 (a) – Non-fish catches	
8.4.3 (a) – Fish catches	
8.4.3 (b)	
8.4.4	
8.4.5	
8.4.6	
8.4.7	
8.4.8 – Environmental impacts	
8.4.8 – Social impacts	
8.4.8 – Biodiversity impacts	
8.4.8 – Coastal fisheries	
8.5.1 (a)	
8.5.1 (a) Supplemental	
8.5.1 (b)	
8.5.2	
8.5.3	
8.5.4	

10 – Institutional Framework	Rating
10.1.1	
10.1.2	
10.1.3	
10.1.4 (a) – Between bottom users	
10.1.4 (a) – Between bottom users & others	
10.1.4 (b)	
10.2.1	
10.2.2 – Economic	
10.2.2 – Social & cultural	
10.2.3	
10.2.4	
10.2.5 – Environment & biology	
10.2.5 – Economy & social	
10.2.5 – Legal & institutional	
10.3.1 – Use of resources	
10.3.1 – Conservation of environment	

11 – Post-harvest Practices & Trade	Rating
11.1.11	
11.2.3	

12 – Fisheries Research	Rating
12.1 (a)	
12.1 (b)	
12.1 (c)	
12.2	
12.3 (a)	
12.3 (b)	
12.3 (c)	
12.4 (a)	
12.4 (b)	
12.5 (a)	
12.5 (b)	
12.6	
12.7 (a)	
12.7 (b)	
12.8 (a)	
12.8 (b)	
12.10 (a)	
12.10 (b)	
12.10 (c)	
12.11 (a)	
12.11 (b)	
12.12	
12.13 (a)	
12.13 (b)	
12.14	N/A
12.17	

APPENDIX C: CADDY CHECKLIST

Article 7 - Fisheries Management

7.1 General

7.1.1 (a) Are conservation and management measures based on the best scientific evidence available? *Yes...*[1] *Some...*[½] *No...*[0]

(b) Are conservation and management measures designed to ensure the long-term sustainability of fishery resources at levels which promote the objective of optimum utilization and maintain their availability for present and future generations? *Yes...*[1]*Some...*[½] *No...*[0]

(c) Are management measures currently in effect in the fishery designed for the long-term conservation and sustainable use of fishery resources, as opposed to reasons of short-term expediency? ***Yes...***[1] ***Some...***[½] ***No...***[0]

7.1.2 (a) Have attempts been made to identify domestic parties having a (legitimate) interest in the use and management of fisheries resources? ***Yes...***[1] ***No...***[0]

(b) Have arrangements been made to consult these parties and gain their collaboration? ***Yes...*** [1] ***No...***[0]

7.1.3** (a) Where transboundary, straddling or highly migratory fish stocks and high seas fish stocks are exploited by two or more States, do the States concerned cooperate to ensure effective conservation and management of the resources? ***Yes...[1] ***No...***[0]

(b) Is there a formal fishery commission or arrangement to which all parties fishing belong? ***Yes...*** [1] ***No...***[0]

7.1.4** Do States which have a real interest in the fisheries or the resource outside their national jurisdiction cooperate in the work of the relevant regional fisheries management organization or arrangement by becoming a member of such organization and arrangement and by actively participating in its work? ***Yes...[1] ***No...***[0]

(a) Do all parties attend meetings and collect data in the specified format? ***Yes...***[1] ***No...***[0]

(b) Is the population analysis updated regularly and in cooperation by a scientific group? ***Yes...*** [1] ***No...***[0]

(d) Are scientific recommendations of groups reflected in the regulations? ***Yes...***[1] ***No...***[0]

(e) Are the regulations respected by the parties concerned? ***Yes...***[1] ***No...***[0]

7.1.6** (a) Should representatives from relevant organizations, both governmental and non-governmental, concerned with fisheries be afforded the opportunity to take part in meetings of subregional and regional fisheries management organizations and arrangements as observers or otherwise, in accordance with the procedures of the organization or arrangement concerned? ***Yes...[1] ***No...***[0]

(b) Subject to the procedural rules on access, are such representatives given timely access to the records and reports of such meetings? ***Yes...***[1] ***No...***[0]

7.1.7 (a) Have mechanisms been established for fisheries monitoring, surveillance, control and enforcement to ensure compliance with their conservation and management measures for the fishery in question? ***Yes...***[1] ***No...***[0]

(b) Have these measures proved effective? ***Yes...***[1] ***In part...***[½] ***No...***[0]

7.1.8 (a) Have mechanisms been established to (identify, quantify) prevent or eliminate excess fishing capacity? ***Yes...***[1] ***No...***[0]

(b) Have these measures proved effective? ***Yes...***[1] ***In part...***[½] ***No...***[0]

7.1.9 Are the arrangements followed for assessment, management of the fishery and the decision-making process in general transparent?

- Assessment ***Yes...***[1] ***No...***[0]

    - Management ***Yes...***[1] ***No...***[0]

- Decision-making ***Yes...***[1] ***No...***[0]

7.1.10 Are the conservation and management measures adopted for management of the fishery and the related decision-making process given due publicity in order to ensure that laws, regulations and other legal rules governing their implementation are effectively disseminated? ***Yes...***[1] ***In part...*** [½] ***No...***[0]

Comments:

7.2 Management objectives

7.2.1 (a) Are fisheries measures based on the best scientific evidence? ***Yes...***[1] ***No...***[0]

(b) Are they qualified by relevant environmental and economic factors? ***Yes...***[1] ***No...***[0]

(c) Have formal reference point(s) based on stock size been established? ***Yes...***[1] ***No...***[0]

7.2.2 Have management measures taken into account the need to avoid excess capacity and promote conditions under which the interests of fishermen, especially the small-scale, artisanal and subsistence fishery sectors, are protected, the biochemistry conserved, depleted stocks restored and adverse environmental impacts assessed and corrected?

- Is the level of excess capacity defined? ***Yes...***[1] ***No...***[0]

- Is excess capacity avoided? ***Yes...***[1] ***In part...***[½] ***No...***[0]

- Do the economic conditions under which the fishery operates promote responsible fisheries? ***Yes...***[1] ***No...***[0]

- Are interests of small-scale, etc., fishermen accounted for? ***Yes...***[1] ***In part...***[½] ***No...*** [0]

- Has the biodiversity of aquatic ecosystems been conserved (as a result of operation of the fishery in question)? ***Yes...***[1] ***No...***[0]

- Have depleted stocks been allowed to recover or, where appropriate, restored? ***Yes...*** [1] ***In part...***[½] ***No...***[0]

- Have adverse environmental impacts on the stocks from human activities been assessed and,

where appropriate, rectified? ***Yes...***[1] ***In part...***[½] ***No...***[0]

- Have pollution and waste been minimized? ***Yes...***[1] ***In part...***[½] ***No...***[0]

- Has catch by lost and abandoned gear of commercial species and other organisms been minimized? ***Yes...***[1] ***In part...***[½] ***No...***[0]

- Have selective and environmentally-safe and cost-effective fishing methods been developed? ***Yes...***[1] ***No...***[0]

7.2.3 Have the impacts of environmental factors on target species and those species associated with, dependent on, or belonging dependent on the target stocks, been assessed? ***Yes...***[1] ***In part...*** [½] ***No...***[0]

Comments:

7.3 Management framework and procedures

7.3.1 (a) Have the management measures developed taken into account the whole stock unit over its entire area of stock distribution? ***Yes...***[1] ***No...***[0]

(b) Have previously-agreed management measures established and applied in the same region been considered? ***Yes...***[1] ***No...***[0]

(c) Have all removals and the biological unity and other biological characteristics of the stock been considered? ***Yes...***[1] ***No...***[0]

(d) Has the best scientific evidence available been used to determine, *inter alia*, the area of distribution of the resource? ***Yes...***[1] ***No...***[0]

(e) Have all removals and the biological unity and other biological characteristics of the stock been considered? ***Yes...***[1] ***No...***[0]

(f) Has the area through which the species migrates during its life cycle been considered? ***Yes...*** [1] ***No...***[0]

*__7.3.2__ In the case of a transboundary, straddling and highly migratory fish stock or high seas fish

stock throughout its range, are the conservation and management measures established for such stock within the jurisdiction of the relevant States, or the appropriate subregional, regional fisheries management organizations and arrangements, compatible? ***Yes...***[1] ***In part...***[½] ***No...***[0]

7.3.3 Have long-term management objectives been translated into a plan or other management document (subscribed to by all interested parties)?

- Is there a plan? ***Yes...***[1] ***No...***[0]

- Is it subscribed to? ***Yes...***[1] ***No...***[0]

*__7.3.4__ Have attempts been made to foster cooperation in all matters related to:

- information gathering and exchange? ***Yes...***[1] ***No...***[0]

- fisheries research? ***Yes...***[1] ***No...***[0]

- fisheries management? ***Yes...***[1] ***No...***[0]

- fisheries development? ***Yes...***[1] ***No...***[0)

Comments:

7.4 Data gathering and management advice

7.4.2 Has relevant research been carried out on:

- the resource? ***Yes...***[1] ***No...***[0]

- climatic and environmental factors? ***Yes...***[1] ***No...***[0]

- the socio-economic context? ***Yes...***[1] ***No...***[0]

7.4.3 Has research been carried out on:

- cost-benefits of fishing? ***Yes...***[1] ***No...***[0]

- alternative management strategies? ***Yes...***[1] ***No...***[0]

7.4.4 Are timely and reliable statistics available on catch and fishing effort maintained in accordance with applicable international standards and practices and in sufficient detail to allow sound statistical analysis? ***Yes...***[1] ***No...***[0]

7.4.5 Has sufficient knowledge of social, economic and institutional factors relevant to the fishery in question been developed through data gathering, analysis and research? ***Yes...***[1] ***In part...***[½] ***No...*** [0]

7.4.6 Are fishery-related and other supporting scientific data relating to fish stocks covered by subregional or regional fisheries management organizations or arrangements compiled in an internationally agreed format and provided in a timely manner to the organization or arrangement?

- in an internationally agreed format? ***Yes...***[1] ***No...***[0]

- in a timely manner? ***Yes...***[1] ***No...***[0]

7.4.7 With respect to the data collected for management purposes, are applicable confidentiality requirements complied with? ***Yes...***[1] ***No...***[0]

Comments:

7.5 Precautionary approach

7.5.1 (a) Has the precautionary approach been applied widely to conservation, management and exploitation of living aquatic resources in order to protect them and preserve the aquatic environment? ***Yes...***[1] ***In part...***[½] ***No...***[0]

(b) Has the absence of adequate scientific information been used as a reason for postponing or failing to take conservation and management measures? ***No...***[1]***Occasionally...*** [½] ***Often...***[0]

7.5.2 Has there been an attempt to determine for the stock both safe targets for management +**3** (Target Reference Points) and limits for exploitation (Limit Reference Points), and, at the same time, the action to be taken if they are exceeded?

- Have target reference point(s) been established? ***Yes...***[1] ***No...***[0]

- Have limit reference points been established? ***Yes...***[1] ***No...***[0]

- Have data and assessment procedures been installed measuring the position of the fishery in relation to the reference points established? ***Yes...***[1] ***No...***[0]

- Have management actions been agreed to in the eventuality that data sources and analyses indicate that these reference points have been exceeded? ***Yes...***[1] ***No...***[0]

7.5.4 (a) For new and exploratory fisheries, are procedures in place for promptly applying precautionary management measures, including catch or effort limits? ***Yes...***[1] ***No...***[0]

(b) Have provisions been made for the gradual development of new or exploratory fisheries while information is being collected on the impact of these fisheries, allowing an assessment of the impact of such fisheries on the long-term sustainability of the stocks? ***Yes...***[1] ***No...***[0]

- Have precautionary management provisions been established early on? ***Yes...***[1] ***No...***[0]

- Has information collection been initiated early to allow impact assessment? ***Yes...***[1] ***No...***[0]

7.5.5 (a) Have contingency plans been agreed to in advance on the appropriate temporary management response to serious threats to the resource as a result of overfishing or adverse environmental changes or other phenomena adversely affecting the resource? ***Yes...***[1] ***No...***[0]

(b) Have these emergency (temporary) responses been agreed to due to:

- natural phenomena adversely impacting the stock? ***Yes...***[1] ***No...***[0]

- fishing adversely impacting the stock? ***Yes...***[1] ***No...***[0]

Comments:

7.6.1 Is the level of fishing permitted commensurate with the current state of the fishery resources? ***Yes...***[1] ***No...***[0]

7.6.2 Are fishing vessels allowed to operate on the resource in question without specific authorization? ***Yes***...[1] ***No***...[0]

7.6.3 (a) Have attempts been made to measure fleet capacity operating in the fishery? ***Yes***...[1] ***No***... [0]

(b) Have mechanisms been established where excess capacity exists to reduce capacity to levels commensurate with sustainable use of the resource? ***Yes...***[1] ***No...***[0]

7.6.5 Has the fishery been regulated in such a manner that conflict among fishers using different vessels, gear and fishing methods are minimized? ***Yes...***[1] ***No...***[0]

7.6.6 In the course of deciding on use, conservation and management of the resource, were relevant national laws and regulations relating to the traditional practices needs and interests of indigenous people and local fishing communities highly dependent on these resources for their livelihood taken into account? ***Yes...***[1] ***In part...***[½] ***No...***[0]

7.6.7 Have the cost-effectiveness and social impact been considered in the evaluation of alternative conservation and management measures? ***Yes...***[1] ***No...***[0]

7.6.8 Are procedures in place to keep the efficacy of current conservation and management measures and their possible interactions under continuous review to revise or abolish them in the light of new information?

- Have review procedures been established? ***Yes...***[1] ***No...***[0]

- Does a flexible mechanism for revision of management measures exist? ***Yes...***[1] ***No...***[0]

7.6.9 (a) Are appropriate measures being applied to minimize:

- waste and discards? ***Yes...***[1] ***No...***[0]

- catch of non-target species (both fish and non-fish species)? ***Yes...***[1]***No...***[0]

- impacts on associated, dependent or endangered species? ***Yes...***[1] ***No...***[0]

(b) Are technical measures being taken in relation to:

- fish size? ***Yes...***[1] ***No...***[0]

- mesh size or gear? ***Yes...***[1] ***No...***[0]

- discards? ***Yes...***[1] ***No...***[0]

- closed seasons? ***Yes...***[1] ***No...***[0]

- closed areas? ***Yes...***[1] ***No...***[0]

- areas reserved for particular (e.g. artisanal) fisheries? ***Yes...***[1] ***No...***[0]

- protection of juveniles or spawners? ***Yes...***[1] ***No...***[0]

(c) Are suitable arrangements in place to promote, to the extent practicable, the development and use of selective, environmentally safe and cost-effective gear and techniques? ***Yes...***[1] ***No...***[0]

7.6.10 Have measures been introduced to identify and protect depleted resources and those resources threatened with depletion, and to facilitate the sustained recovery of such stocks? ***Yes...***[1] ***No...***[0]

Comments:

7.7 Implementation

7.7.1 Has an effective legal and administrative framework been established at the local and national level, as appropriate, for fishery resource conservation and management? ***Yes...***[1] ***No...***[0]

7.7.2 (a) Are national laws in place that provide for sanctions? ***Yes...***[1] ***No...***[0]

(b) Are these adequate in severity to be effective? ***Yes...***[1] ***No...***[0]

(c) Do sanctions affect (refusal/withdrawal/suspension) authorization to fish in the event of non-compliance with conservation and management measures in force? ***Yes...***[1] ***No...***[0]

7.7.3 Are there in place:

- monitoring control and surveillance schemes? ***Yes...***[1] ***No...***[0]

- observer programmes? ***Yes...***[1] ***No...***[0]

- inspection schemes? ***Yes...***[1] ***No...***[0]

- vessel monitoring schemes? ***Yes...***[1] ***No...***[0]

*__7.7.4__ (a) Have States and subregional or regional fisheries management organizations and arrangements, as appropriate, agreed on the means by which the activities of such organizations and arrangements will be financed, bearing in mind, *inter alia*, the relative benefits derived from the fishery and the differing capacities of countries to provide financial and other contributions?

- Is the capacity of member countries to finance taken into account? ***Yes...***[1] ***No...***[0]

- Is there an agreement on financing? ***Yes...***[1] ***No...***[0]

- Is there an agreement on relative benefits? ***Yes...***[1] ***No...***[0]

(b) Is it possible for such organizations and arrangements to agree on an attempt to recover the costs of fisheries conservation, management and research measures (and their enforcement) that are in place? ***Yes...***[1] ***No...***[0] Does an Agreement on cost recovery exist? ***Yes...***[1] ***No...***[0]

7.7.5 (a) Have States which are members of or participants in subregional or regional fisheries management organizations or arrangements taken steps to implement (into national legislation and practice) internationally agreed measures adopted in the framework of such organizations or arrangements which are consistent with international law? ***Yes...***[1] ***No...***[0]

(b) In particular, have national measures been adopted to deter the activities of vessels flying the flag of non-members or non-participants which engage in activities which undermine the effectiveness of conservation and management measures established by such organizations or arrangements? ***Yes...*** [1] ***Some...***[½] ***No...***[0]

Comments:

Score Article 7 (Maximum = 108)

(Maximum = 87 for fisheries in national waters, i.e. omitting clauses marked with *)

Article 8 - Fishing Operations

8.1 Duties of all States

8.1.1 Are States involved in the fishery ensuring that only fishing operations allowed by them are conducted within waters under their jurisdiction and that these operations are carried out in a responsible manner? ***Yes...***[1] ***Some...***[½] ***No...***[0]

*__8.1.2__ Are States involved in the fishery maintaining a record, updated at regular intervals, on all authorizations to fish issued by them? ***Yes...***[1] ***Some...***[½] ***No...***[0]

*__8.1.3__ Are States involved in the fishery maintaining, in accordance with recognized international standards and practices, statistical data, updated at regular intervals, on all fishing operations allowed by them? ***Yes...***[1] ***Some...***[½] ***No...***[0]

8.1.4 Are States involved in the fishery, in accordance with international law, within the framework of subregional or regional fisheries management organizations or arrangements, cooperating to establish systems for monitoring, control, surveillance and enforcement of applicable measures with respect to fishing operations and related activities in waters outside their national jurisdiction? ***Yes...*** [1] ***Some...***[½] ***No...***[0]

8.1.7 Are education and training programmes enhancing the education and skills of fishers and, where appropriate, their professional qualifications, taking into account agreed international standards and guidelines? ***Yes...***[1] ***No...***[0]

8.1.8 Are records of fishers being maintained which should, whenever possible, contain information on their service and qualifications, including certificates of competency, in accordance with their national laws? ***Yes...***[1] ***No...***[0]

8.1.9 Do measures applicable in respect of masters and other officers charged with an offence relating to the operation of fishing vessels include provisions which may permit, *inter alia*, refusal, withdrawal or suspension of authorizations to serve as masters or officers of a fishing vessel? ***Yes...*** [1] ***No...***[0]

8.1.10 Is an attempt being made to ensure that, through education and training, all those engaged in

fishing operations are given information on the most important provisions of this Code, as well as provisions of relevant international conventions and applicable environmental and other standards that are essential to ensure responsible fishing operations? ***Yes...***[1] ***No...***[0]

Comments:

8.2 Flag State duties

8.2.1** (a) Are flag States maintaining records of fishing vessels entitled to fly their flag and authorized to fish, which indicate details of the vessels, their ownership and authorization to fish? ***Yes... [1] ***Some...***[½] ***No...***[0]

(b) Have such vessels have been issued with, and carry on board, a Certificate of Registry and authorization to fish? ***Yes...***[1] ***No...***[0]

8.2.2** Are Flag States taking steps to ensure that no fishing vessels entitled to fly their flag fish on the high seas or in waters under the jurisdiction of other States unless such vessels have been issued with a Certificate of Registry and have been authorized to fish by the competent authorities? ***Yes... [1] ***Some...***[½] ***No...***[0]

8.2.3** Are national fishing vessels authorized to fish on the high seas or in waters under the jurisdiction of a State other than the Flag State marked in accordance with uniform and internationally recognizable vessel marking systems such as the FAO Standard Specifications and Guidelines for Marking and Identification of Fishing Vessels? ***Yes...[1] ***No...***[0]

8.2.4 Is there national legislation requiring fishing gear to be marked, taking into account uniform and internationally recognizable gear marking systems, in order that the owner of the gear can be identified? ***Yes...***[1] ***No...***[0]

8.2.6** Are States involved in a fishery on the high seas party to the Agreement to Promote Compliance with International Conservation and Management Measures by Vessels Fishing in the High Seas? ***Yes...[1] ***Some...***[½] ***No...***[0]

***8.2.7** (a) Are Flag States taking enforcement measures in respect of fishing vessels entitled to fly their flag which have been found by them to have contravened applicable conservation and manage-

ment measures, including, where appropriate, making the contravention of such measures an offence under national legislation? ***Yes...***[1] ***No...***[0]

(b) Are sanctions applicable in respect of violations and illegal activities adequate in severity to be effective in securing compliance and discouraging violations wherever they occur? ***Yes...***[1] ***No...***[0]

Comments:

8.4 Fishing operations

8.4.2 Have States prohibited within national legislation dynamiting, poisoning and other comparable destructive fishing practices? ***Yes...***[1] ***Some...***[½] ***No...***[0]

*__8.4.3__ (a) Is documentation required with regard to fishing operations, retained catch of fish and non-fish species and, as regards discards, the information required for stock assessment as decided by relevant management bodies, collected and forwarded systematically to those bodies?

- documentation on fishing operations ***Yes...***[1] ***No...***[0]

- documentation on non-fish catches ***Yes...***[1] ***No...***[0]

- documentation on fish catches ***Yes...***[1] ***No...***[0]

(b) Is such as observer and inspection scheme being established in order to promote compliance with applicable (fishery management) measures? ***Yes...***[1] ***No...***[0]

8.4.4 Is the adoption of appropriate technology being promoted taking into account economic conditions for the best use and care of the retained catch? ***Yes...***[1] ***No...***[0]

8.4.5 Are States and relevant groups from the fishing industry encouraging the development and implementation of technologies and operational methods that reduce discards? ***Yes...***[1] ***Some...*** [½] ***No...***[0]

8.4.6 Are technologies, materials and operational methods being applied that minimize the loss of fishing gear and the ghost fishing effects of lost or abandoned fishing gear? ***Yes...***[1] ***No...***[0]

8.4.7 Are assessments being carried out of the implications of habitat disturbance prior to the intro-

duction on a commercial scale of new fishing gear, methods and operations? ***Yes...***[1] ***No...***[0]

8.4.8 Is research being promoted on the environmental and social impacts of fishing gear and, in particular, on the impact of such gear on biodiversity and coastal fishing communities, being promoted?

- on the environmental impacts? ***Yes...***[1] ***No...***[0]

- on the social impacts? ***Yes...***[1] ***No...***[0]

- on the impact on biodiversity? ***Yes...***[1] ***No...***[0]

- on the impact on coastal fisheries? ***Yes...***[1] ***No...***[0]

Comments:

8.5 Fishing gear selectivity

8.5.1 (a) Where practicable, is there a requirement that fishing gear, methods and practices are sufficiently selective as to minimize waste, discards, catch of non-target species - both fish and non-fish species - and impacts on associated or dependent species and that the intent of related regulations is not circumvented by technical devices and that information on new developments and requirements is made available to all fishers? ***Yes...***[1] ***No...***[0] Are regulatory measures being circumvented by technical devices? ***Yes...***[0] ***Sometimes...***[½] ***No...***[1]

(b) Are fishers cooperating in the development of selective fishing gear and methods? ***Yes...*** [1] ***Sometimes...***[½] ***No...***[0]

8.5.2 Do regulations governing the selectivity of fishing gear take into account the range of fishing gear, methods and strategies available to the industry? ***Yes...***[1] ***No...***[0]

8.5.3 Are States and relevant institutions involved in the fishery collaborating in developing standard methodologies for research into fishing gear selectivity, fishing methods and strategies? ***Yes...*** [1] ***Some...***[½] ***No...***[0]

8.5.4 Is international cooperation being encouraged with respect to research programmes for fishing gear selectivity and fishing methods and strategies, dissemination of the results of such research pro-

grammes and the transfer of technology? ***Yes...***[1] ***No...***[0]

Comments:

8.11 Artificial reefs and fish aggregation devices

8.11.1 Have policies been developed for increasing stock populations and enhancing fishing opportunities through the use of artificial structures, placed with due regard to the safety of navigation? ***Yes...*** [1] ***No...***[0)

8.11.2 When selecting the materials to be used in the creation of artificial reefs, as well as when selecting the geographical location of such artificial reefs, have the provisions of relevant international conventions concerning the environment and safety of navigation been observed? ***Yes...***[1] ***No...***[0]

8.11.3 (a) Are management systems for artificial reefs and fish aggregation devices established within the framework of coastal area management plans? ***Yes...***[1] ***No...***[0]

(b) Does the construction and deployment of such reefs and devices take into account the interests of fishers, including artisanal and subsistence fishers? ***Yes...***[1] ***No...***[0]

Comments:

Score Article 8 (Maximum = 39)

(Maximum = 26 for fisheries in national waters, i.e. omitting clauses marked with *)

Article 10 - Integration of Fisheries into Coastal Area Management

10.1 Institutional framework

10.1.1 Has an appropriate policy, legal and institutional framework been adopted in order to achieve sustainable and integrated use of living marine resources, taking into account the fragility of coastal ecosystems and the finite nature of their natural resources and the needs of coastal communities? ***Yes...***[1] ***No...***[0]

10.1.2 In view of the multiple uses of the coastal area, are representatives of the fisheries sector and fishing communities consulted in the decision-making processes involved in other activities related to coastal area management planning and development? ***Yes...***[1] ***No...***[0]

10.1.3 Do institutional and legal frameworks regulating the possible uses of coastal resources and their access take into account the rights of coastal fishing communities and their customary practices to the extent compatible with sustainable development? ***Yes...***[1] ***Partly...***[½] **No...**[0]

10.1.4 (a) Has the adoption of fisheries practices been promoted that avoids conflict among +.5 - bottom resource users? ***Yes...***[1] ***No...***[0]

- bottom resource users and other users of the coastal area? ***Yes...***[1]***No...***[0]

(b) Have procedures and mechanisms been adopted which help settle these conflicts? ***Yes...***[1] ***No...*** [0]

(c) Have procedures and mechanisms been established at the appropriate administrative level to settle conflicts which arise within the fisheries sector and between fisheries resource users and other users of the coastal area? ***Yes...***[1] ***No...***[0]

Comments:

10.2 Policy measures

10.2.1 Is public awareness being created on the need for the protection and management of coastal resources

and the participation in the management process by those affected? ***Yes...***[1] ***No...***[0]

10.2.2 Has an attempt been made to assess the economic, social and cultural value of coastal resources in order to assist decision-making on their allocation and use?

- economic ***Yes...***[1] ***No...***[0]

- social and cultural ***Yes...***[1] ***No...***[0]

10.2.3 Have risks and uncertainties involved in the management of coastal areas been taken into

account in setting policies for the management of coastal areas? ***Yes...***[1]***No...***[0]

10.2.4 In accordance with capacities, have measures been taken to establish or promote the establishment of systems to monitor the coastal environment as part of the coastal management process using physical, chemical, biological, economic and social parameters? ***Yes...***[1] ***In part...***[½] ***No...***[0])

10.2.5 Has multi-disciplinary research in support of coastal area management been promoted on

- environmental and biological aspects? ***Yes...***[1] ***No...***[0]

- economic and social aspects? ***Yes...***[1] ***No...***[0]

- legal and institutional aspects? ***Yes...***[1] ***No...***[0]

Comments:

10.3 Regional cooperation

10.3.1 Do States with neighbouring coastal areas cooperate with one another in:

- the sustainable use of resources? ***Yes...***[1] ***Some...***[½] ***No...***[0]

- the conservation of the environment? ***Yes...***[1] ***Some...***[½] ***No...***[0]

Comments:

Score Article 10 (Maximum = 17)

Article 11 - Post-Harvest Practices and Trade

11.1 Responsible fish utilization

11.1.11 Is international domestic trade in fish and fishery products in accord with sound conservation and management practices through the identification of the origin of fish and fish products traded? ***Yes...***[1] ***No...***[0]

Comments:

11.2 Responsible international trade

11.2.3 Are measures affecting international trade in fish and fishery products transparent, based, when applicable, on scientific evidence, and in accordance with internationally agreed rules? ***Yes...*** [1] ***No...***[0]

Comments:

Score Article 11 (2)

Article 12 - Fisheries Research

12.1 Responsible fishing requires the availability of a sound scientific basis to assist fisheries managers and other interested parties in making decisions, taking into account the special needs of developing countries.

(a) Is appropriate research conducted into all aspects of fisheries, including biology, ecology, technology, environmental science, economics, social science, aquaculture and nutritional science? ***Yes...*** [1] ***In part...***[½] ***No...***[0]

(b) Are research vessel surveys of the resource and the marine environment carried out? ***Annually...*** [1] ***Occasionally...***[½] ***No...***[0]

(c) Are appropriate research and training facilities available and provisions made for staffing and institution building to conduct the necessary research, taking into account the special needs of developing countries? ***Yes...***[1] ***In part...***[½] ***No...***[0]

Comments:

12.2 Has an appropriate institutional framework been established to determine the applied research which is required and its proper use? ***Yes...***[1] ***No...***[0]

12.3 (a) Are data generated by research being analysed and the results of such analyses published in a way that confidentiality is respected where appropriate? ***Yes...***[1] ***No...***[0]

(b) Are results of analyses being distributed in a timely and readily understandable fashion in order that the best scientific evidence be made available as a contribution to fisheries conservation, management and development? ***Yes...***[1] ***No...***[0]

(c) In the absence of adequate scientific information, is appropriate research being initiated in a timely fashion? ***Yes...***[1] ***No...***[0]

12.4 (a) Are reliable and accurate data required to assess the status of fisheries and ecosystems - including data on bycatch, discards and waste - being collected? ***Yes...***[1] ***No...***[0]

(b) Are these data being provided, at an appropriate time and level of aggregation, to relevant States and subregional, regional and global fisheries organizations? ***Yes...***[1] ***No...***[0]

Comments:

12.5 (a) Are States monitoring and assessing the state of the stocks under their jurisdiction, including the impacts of ecosystem changes resulting from fishing pressure, pollution or habitat alteration? ***Yes...***[1] ***No...***[0]

(b) Have they established the research capacity necessary to assess the effects of climate or environment change on fish stocks and aquatic ecosystems? ***Yes...***[1] ***No...***[0]

12.6 Are States taking steps to support and strengthen national research capabilities to meet acknowledged scientific standards? ***Yes...***[1] ***Some...***[½] ***No...***[0]

Comments:

12.7 (a) Are States cooperating with relevant international organizations to encourage research in order to ensure optimum utilization of fishery resources? ***Yes...***[1] ***Some...***[½] ***No...***[0]

(b) Are they stimulating the research required to support national policies related to fish as food? ***Yes...***[1] ***No...***[0]

12.8 (a) Is research being conducted into the study and monitoring of human food supplies from aquatic sources and the environments from which they are taken to ensure that there is no adverse health impact on consumers? ***Yes...***[1] ***No...***[0]

(b) Are results of such research being made publicly available? ***Yes...***[1] ***No...***[0]

Comments:

12.10 (a) Are studies on the selectivity of fishing gear, the environmental impact of fishing gear on target species and on the behaviour of target and non-target species in relation to such fishing gear being conducted as an aid for management decisions? ***Yes...***[1] ***No...***[0]

(b) Is an attempt being made through research to minimize non-utilized catches? ***Yes...***[1] ***No...***[0]

(c) Is the biodiversity of ecosystems and the aquatic habitat being safeguarded? ***Yes...***[1] ***No...***[0]

12.11 (a) Before the commercial introduction of a new type of gear, is a scientific evaluation of its impact on the fisheries and ecosystems where it will be used being undertaken? ***Yes...***[1] ***No...***[0]

(b) Is the effect of such gear introduction monitored? ***Yes...***[1] ***No...***[0]

Comments:

12.12 Are traditional fisheries knowledge and technologies being investigated and documented, in particular those applied to small-scale fisheries, in order to assess their application to sustainable fisheries conservation, management and development? ***Yes...***[1] ***No...***[0]

12.13 (a) Is the use of research results as a basis for the setting of management objectives, reference points and performance criteria being promoted? ***Yes...***[1] ***No...***[0]

(b) Is research being used to help ensure adequate linkages between applied research and fisheries management? ***Yes...***[1] ***No...***[0]

Comments:

12.14 Are States conducting scientific research activities in waters under the jurisdiction of another State, ensuring that their vessels comply with the laws and regulations of that State and international law? ***Yes...***[1] ***No...***[0]

12.17 Are States, either directly or with the support of relevant international organizations, developing collaborative technical and research programmes to improve understanding of the biology, environ-

ment and status of transboundary aquatic stocks? ***Yes...***[1] ***Some...***[½] ***No...***[0]

12.18 Are States and relevant international organizations promoting and enhancing the research capacities of developing countries, *inter alia*, in the areas of data collection and analysis, information, science and technology, human resource development and provision of research facilities, in order for them to participate effectively in the conservation, management and sustainable use of living aquatic resources? ***Yes...***[1] ***Some...***[½] ***No...***[0]

APPENDIX D: TEXAS BLUE CRAB MAP TIMELINE

June 2014 – start of Texas Blue Crab MAP	
1st	Start researching active industry members
9th	Industry Meeting: crab dealer, San Leon, TX Topics Covered - Issues with drought and crabbing - Issues with supply from Texas - Discussed proposed changes to regulations – supports larger minimum size limit - Potential problems with predation (redfish)
10th	Management Meeting: Dickinson, TX - Introduced program - Discussed culture of blue crab fishery -- Largely isolated – one person on a boat -- Culturally isolated – most crabbers are Vietnamese and don't engage much - Big disconnect between harvester and processor in this industry - TPWD has no legislative power to do any blue crab marketing - Freshwater issues main concern - Feel have in good place with effort - Potentially some issues with data accuracy on trip tickets
11th	Management Meeting: Rockport, TX - Discussed proposed changes to blue crab management – must still go through public scoping -- Increase carapace width -- Increase escape ring size -- Seasonal closures -- Area closures -- Prohibit take of females -- Introduce TEDs - Industry's biggest needs are marketing strategies

11th	Industry Meeting: blue crabbers, Seadrift TX - Where is product going? Mostly West Coast markets, Chicago, Las Vegas - Having issues getting good price in local market because still competing with Louisiana crabs - A few picking houses are left - Female crabs are sent to picking houses or are sent to Asian markets on the West Coast - Drought and predation main issues for population - Support increased minimum size limit and larger escape rings - Concerned about ban on taking females because large part of business
30th	Industry Meeting: Presented at blue crab industry meeting in Rockport, TX - Meeting led by Art Morris - Strong opposition to banning female take - Supported larger peeler rings and proposed making it a felony to wire them shut - Price is good, but catch is down - Concerns over salinity in estuaries and how to deal with it - Strong opposition to requiring TEDs - Public proposals -- Get rid of peeler industry -- Ban take around mouth of rivers -- Move trap clean up to spongy season -- Get more data about herbicides and pesticides in the rivers
July 2014 – Continued industry outreach and engagement	
1st	Industry Meeting: Presented at blue crab industry meeting in Seadrift, TX - Meeting led by Art Morris - 90% of attendees Vietnamese - Concerns and proposals mirrored those in Rockport

2nd	Industry Meeting: crab dealer, Anahuac, TX - Concern with drought - Concern of interactions with shrimpers who throw chemicals overboard - Opposition to TEDs; detrimental to fishermen - Supports larger minimum size - Concerns over predation - Supports some kind of marketing or eco-label - Keep everything the same
18th	Industry Meeting: Conference Call with processor in Port Arthur, TX - Prefers LA and TX crabs: better product than Chesapeake - Supply is his biggest concern for industry. There has been a dwindle in stock - Product stays local - Habitat quality and predation also concerns for crab population - Supports size increase and escape rings, but doesn't think will be effective - Would like to see better notification to industry of regulation changes in other fisheries as well
August 2014 – Data Collection and Report Writing	
21st	Management Meeting: Dickinson, TX - Detailed discussion about Texas blue crab and Caddy Checklist
December 2014 – Submitted report for review by third-party	
February 2015	
25th	Industry meeting: crab dealer, Port Arthur, TX - Biggest concern is safety training for fishermen - Concerns over new requirements in LA since many fishermen in the area fish in Sabine Lake
March 2015 – Finalization of SBR and Recommendations for blue crab fishery	
April 2015	
2nd	Participating Stakeholder Meeting: Dickinson, TX - Convened MAP Committee - Discussed recommendations that resulted from SBR - Determined which recommendations to address and corresponding actions

WORKS CITED

1. Baxter, Aaron S. 2013. Diamondback Terrapin Paired Crab Trap Study in the Nueces Estuary, Texas. Publication CBBEP-87, Project Number-1329. Coastal Bend Bays and Estuaries Program. http://cbbep.org/publications/CBBEP1329.pdf
2. Baxter, Aaron S. 2014. Diamondback Terrapin Paired Crab Trap Study in the Mission-Aransas Estuary, Texas. Publication CBBEP-92, Project Number-1335. Coastal Bend Bays and Estuaries Program. http://www.cbbep.org/manager/wp-content/uploads/Final-Report-Diamond-back-Terrapin-Paired-Crab-Trap-Study-in-Mission-Aransas-Estuary-TX-CBBEP-1335.pdf
3. Bourgeois, M., Marx, J., Semon, K. Louisiana Blue Crab Fisheries Management Plan. Louisiana Department of Wildlife and Fisheries, 2014. http://www.wlf.louisiana.gov/sites/default/files/pdf/page/37762-fishery-management-plans-marine/finalbluecrabfmp11-7-14.pdf
4. Derelict Trap Task Force. 2008. Guidelines for Developing Derelict Trap Removal Programs in the Gulf of Mexico. Gulf States Marine Fisheries Commission. Ocean Springs, MS. http://www.gsmfc.org/publications/GSMFC%20Number%20154.pdf
5. Florida Fish and Wildlife Commission. Blue Crab FAQ. http://myfwc.com/research/saltwater/crustaceans/blue-crabs/faq/
6. Graham, D., Perry, H., Floyd, T. 2012. Composition of Bycatch in Commercial Crab Traps in Mississippi Blue Crab Fishery.
7. Guillory, V. Perry, H. VanderKooy, S. 2001. The Blue Crab Fishery of the Gulf of Mexico, United States: A Regional Management Plan. Gulf States Marine Fisheries Commission. Ocean Springs, MS. http://www.gsmfc.org/publications/GSMFC%20Number%20096.pdf
8. Guillory, V. McMillen-Jackson, A. Hartman, L. Perry, H. Floyd, T. Wagner, T. Graham, G. 2001. Blue Crab Derelict Traps and Trap Removal Programs. Gulf States Marine Fisheries Commission. Ocean Springs, MS. http://www.gsmfc.org/publications/GSMFC%20Number%20088.pdf
9. Guillory, V. and P. Prejean. 2001. Red drum predation on blue crabs (Callinectes sapidus). Pages 93-104 in V. Guillory, H. Perry and S. VanderKooy (editors), Proceedings of the Blue

Crab Mortality Symposium. Gulf States Marine Fisheries Commission, Publication 90.

10. Laughlin, R.A. 1982. Feeding habits of the blue crab, Callinectes sapidus Rathbun, in the Apalachicola estuary, Florida. Bulletin of Marine Science 32:807-822.

11. Millikin, M.R. and A.B. Williams. 1984. Synopsis of biological data on the blue crab, Callinectes sapidus Rathbun. U.S. Department of Commerce, NOAA Technical Report NMFS 1, 39 pp.

12. More, W.R., 1969. A contribution to the biology of the blue crab. (Callinectes sapidus Rathburn) in Texas, with a description of the fishery. Texas Parks and Wildlife Department. Technical Series 1, 31 pp.

13. Morris, A., 2003. Report on the 2002 Texas Abandoned Trap Removal Program. TPWD DMS No. 217. http://www.tpwd.texas.gov/publications/pwdpubs/media/mds_coastal/Series%202_MDS217.pdf

14. MRAG Americas, Inc. 2008. Pre-assessment of the Louisiana Blue Crab Fishery.

15. NOAA Office of Protected Resources- List of Fisheries. http://www.nmfs.noaa.gov/pr/interactions/lof/final2014.htm

16. NOAA Office of Science and Technology- Commercial Fisheries Statistics. http://www.st.nmfs.noaa.gov/commercial-fisheries/

17. Perkins and P. Steele. 1984. A profile of the blue crab fishery of the Gulf of Mexico. Gulf States Marine Fisheries Commission, Publication Number 9, 80 pp.

18. Perry, H. and S. VanderKooy, 2015. The Blue Crab Fishery of the Gulf of Mexico, United States: A Regional Management Plan. Gulf States Marine Fisheries Commission. Ocean Springs, MS. In publication.

19. Perry, H.M., G. Adkins, R. Condrey, P.C. Hammerschmidt, S. Heath, J.R. Herring, C. Moss, G. Perkins, and P. Steele. 1984. A profile of the blue crab fishery of the Gulf of Mexico. Gulf States Marine Fisheries Commission, Publication Number 9, 80 pp.

20. Pugesek, B. H., M. J. Baldwin, and T. V. Stehn. 2008. A low intensity sampling method for assessing blue crab abundance at Aransas National Wildlife Refuge and preliminary results on

the relationship of blue crab abundance to whooping crane winter mortality. Proceedings North American Crane Workshop 10:13-24. http://digitalcommons.unl.edu/cgi/viewcontent.cgi?article=1199&context=nacwgproc

21. Raborn, S., Benny Gallaway, B., Cole, J. 2014. Descriptive assessment of the most prevalent finfish species in the US Gulf of Mexico Penaeid shrimp fishery bycatch. Ecological Research Associates, Inc. https://drive.google.com/file/d/0B-yvNu3ojn4ZRmF1NEVWNnBMZzQ/view

22. Riedel, R. H. Perry, L. Hartman, and S. Heath, 2010. Population trends of demersal species from inshore waters of Mississippi and Alabama. Final Report to the Mississippi-Alabama Sea Grant Consortium. 89 pp.

23. Sanchez-Rubio, G., H.M. Perry, P.M. Biesiot, D.R. Johnson and R.N. Lipcius. 2011. Climate-related hydrological regimes and their effects on abundance of juvenile blue crabs (Callinectes sapidus) in the north central Gulf of Mexico. Fishery Bulletin 109:139-146.

24. Steele, P. and T. Bert. 1998. The Florida blue crab fishery. Journal of Shellfish Research 17(2):441-450. http://research.myfwc.com/engine/download_redirection_process.asp?file=98steele_5925.pdf&objid=37516&dltype=publication

25. Sutton, G. and T. Wagner. 2007. Stock assessment of blue crab (Callinectes sapidus) in Texas coastal waters. TPWD Management Data Series Number 249, 53p. http://tpwd.texas.gov/publications/pwdpubs/media/pwd_rp_v3400_1440.pdf

26. The Aransas Project. http://thearansasproject.org/

27. TPWD. 2014-2015 Texas Commercial Fishing Guide. https://tpwd.texas.gov/publications/pwdpubs/media/pwd_bk_v3400_0074.pdf

28. VanderKooy, S. (ed). 2013. GDAR01 Gulf of Mexico Blue Crab Stock Assessment Report. Gulf States Marine Fisheries Commission. Ocean Springs, MS. GSMFC Number 215. http://www.gsmfc.org/publications/GSMFC%20Number%20215.pdf

29. West, J., Blanchet, H., Bourgeois, M., Powers, J. 2011. Assessment of Blue Crab Callinectes sapidus in Louisiana Waters 2011

30. Wilbur, D.H., 1994. The influence of the Apalachicola River flows on blue crab, Callinectes sapidus, in north Florida. Fishery Bulletin 92:180-188.

A Program of

Audubon Nature Institute

Celebrating the Wonders of Nature

Sponsored and coordinated by Gulf States Marine Fisheries Commission. Authorized by the five Gulf state marine resource management agencies. NOAA Award #NA10NMF4770481.