https://www.nps.gov/bisc/planyourvisit/biscayne-bay-card-sound-lobster-sanctuary.htm. [Accessed 30 August 2018]

National Park Service 2017b. Explore a 19th Century Fort and Snorkel Crystal Clear Water with Incredible Marine Life. Available at: https://www.nps.gov/drto/index.htm [Accessed on 30th August 2018]

NMFS. 2009. Endangered Species Act – Section 7 Consultation on the continued authorization of fishing under the Fishery Management Plan (FMP) for Spiny Lobster in the South Atlantic and Gulf of Mexico. Biological Opinion, August 2009.

NMFS. 2012a. NOAA Fisheries Service Seeks Public Comment on Amendment 11 for Spiny Lobster in the Gulf of Mexico and South Atlantic Comment Period Ends June 26, 2012. Southeast Fishery Bulletin. 27 April 2012. FB12-030.

NMFS. 2017. TABLE 1. A SUMMARY (including footnotes) OF ATLANTIC MARINE MAMMAL STOCK ASSESSMENT REPORTS FOR STOCKS OF MARINE MAMMALS UNDER NMFS AUTHORITY THAT OCCUPY WATERS UNDER USA JURISDICTION. Available at: http://www.nmfs.noaa.gov/pr/sars/pdf/2016_atlantic_sars_summary_table.pdf

MFS, 2017. Summary of Stock Status for FSSI Stocks - 4th Quarter 2017 Update.

NMFS 2017b. North Atlantic Right Whale (Eubalaena glacialis) 5-Year Review: Summary and Evaluation. Gloucester, Massachusetts.

NMFS 2018a. Testing traps to target lionfish in the Gulf of Mexico and South Atlantic, including within the florida keys national marine sanctuary: final programmatic environmental assessment. St. Petersburg, FL. Available at: http://sero.nmfs.noaa.gov/sustainable_fisheries/gulf_fisheries/LOA_and_EFP/2018/Lionfish/PDF/lionfish_pea.pdf

NOAA. 2011a. ENVIRONMENTAL ASSESSMENT, REGULATORY IMPACT REVIEW, AND REGULATORY FLEXIBILITY ACT ANALYSIS TO REPEAL THE FISHERY MANAGEMENT PLAN FOR THE STONE CRAB FISHERY OF THE GULF OF MEXICO.

NOAA. 2012a. ATLANTIC LARGE WHALE TAKE REDUCTION PLAN MONITORING STRATEGY: Monitoring Effectiveness of and Regulatory Compliance with the Atlantic Large Whale Take Reduction Plan. NOAA Fisheries Service, Northeast Region. Available at: https://www.greateratlantic.fisheries.noaa.gov/protected/whaletrp/docs/5a_alwtrp_monitoring_strategy.pdf

NOAA. 2017a. Common Bottlenose Dolphin. Available at: https://www.fisheries.noaa.gov/species/common-bottlenose-dolphin. [Accessed on 21.11.17]

NOAA, 2017b. Bycatch Reduction Engineering Program (BREP) Abstracts. 2017. Available at: http://www.nmfs.noaa.gov/sfa/fisheries_eco/bycatch/docs/2017_brep_abstracts.pdf

NOAA. 2018a. List of Fisheries Summary Tables. Available at: https://www.fisheries.noaa.gov/national/marine-mammal-protection/list-fisheries-summary-tables [Accessed 5th June 2018]

Palazon-Fernandez, J. 2007. Reproduction of the white grunt, Haemulon plumieri (Lacépede, 1802) (Pisces: Haemulidae) from Margarita Island, Venezuela. SCIENTIA MARINA. 71 (3). pp. 429-440.

Pollock, D.E. 1995. Evolution of Life-history patterns in three genera of spiny lobsters. Bulletin of Marine Science. 57(2): 516-526.

Potts, J. C. 2000. Population assessment of two stocks of white grunt, Haemulon plumieri, from the southeastern coast of the United States. NOAA Tech. Mem. NMFS-SEFSC-442. US National Oceanic and Atmospheric Administration.

SAFMC 2016b. EVALUATION OF BLACK SEA BASS POT GEAR CLOSURE ALTERNATIVES IN SOUTH ATLANTIC SNAPPER-GROUPER REGULATORY AMENDMENT 16. SERO-LAPP-2014-09. St. Petersburg, Florida. Avalable at: http://cdn1.safmc.net/wp-content/uploads/2016/11/28101832/A4g_RevisedSEROReg16BSBAnalyses_web.pdf

SAFMC 2016a. Scientific and Statistical Committee Meeting Report Nov 21, 2016. Version final December 2, 2016. Available at: http://safmc.net/download/BriefingBook_12_2016/TAB%2018%20Late%20Materials/SSC_Nov16_Spiny_Lobster_

SAFMC 2018a. Spiny Lobster Regulations. Available at: https://safmc.net/regulations/regulations-by-species/spiny-lobster/. [Accessed 02 July 2018]

SEDAR. 2005. Stock assessment report of SEDAR 8 Southeastern US Spiny Lobster, SEDAR8 Assessment Report 3. Charleston, SC. 319 pages.

SEDAR. 2010. SEDAR 8 Update Spiny Lobster Stock Assessment 2010 (2010 Update Assessment). GMFMC/SAFMC/SEDAR Update Assessment Workshop, November 18-19, 2010. Key West, Florida. 129 pages.

SEDAR, 2018a. SEDAR 57 U.S. Caribbean Spiny Lobster Schedule of Events. May 2018. Available at: http://sedarweb.org/docs/supp/S57_Schedule_Take2_FINAL_v2.pdf.

Seudeal, N. 2013. "Panulirus argus", Animal Diversity Web. Available at: http://animaldiversity.org/accounts/Panulirus_argus/. [Accessed September 10, 2016].

Shester, G.G. and F. Micheli. 2011. Conservation challenges for small-scale fisheries: Bycatch and habitat impacts of traps and gillnets. Biological Conservation 144: 1673-1681.

State of Florida Department of Environmental Protection. 2018. John Pennekamp Coral Reef State Park Approved Management Plan 2004.

Truelove, N., Ley-Cooper, K., Segura-Garcíab, R. Briones-Fourzánd, P., Lozano-Álvarezd, E., Phillips B.F., Box, S.J., Preziosia, R.F., 2015b. No Genetic analysis reveals temporal population structure in Caribbean spiny lobster (Panulirus argus) within marine protected areas in Mexico. Fisheries Research, 172, pP.44–49. Available at: http://www.sciencedirect.com/science/article/pii/S0165783615001794.

Truelove, N.K., Griffiths, S., Ley-cooper, K., Azueta, J., Majil, I., Box, S.J., Behringer, D.C.,Butler, M.J., Preziosi, R.F., 2015a. Genetic evidence from the spiny lobster fishery supports international cooperation among Central American marine protected areas. Conservation Genetics, 16(2), pP.347–358. Available at: http://link.springer.com/article/10.1007/s10592-014-0662-4.

Truelove, N.K., Kough, A.S., Behringer, D.C., Paris, C.B., Box, S.J., Preziosi, R.F., Butler, M.J., 2017. Biophysical connectivity explains population genetic structure in a highly dispersive marine species. Coral Reefs 36, 233–244. https://doi.org/10.1007/s00338-016-1516-y

U.S. Department of the Interior Fish and Wildlife Service. 2008. Merritt Island National Wildlife Refuge Comprehensive Conservation Plan. Southeast Region. Atlanta, Georgia.

Uhrin, A. V., Fonseca, M. S.and G. P. DiDomenico. 2005. Effect of Caribbean spiny lobster traps on seagrass

beds of the Florida Keys National Ma-rine Sanctuary: damage assessment and evaluation of recovery. Pages 579–588 in P. W. Barnes and J. P. Thomas, editors. Benthic habitats and theeffect of ?shing. American Fisheries Society, Symposium 41, Bethesda,Maryland.

Uhrin, A.V., Matthews, T.R. and Lewis, C. 2014. Lobster Trap Debris in the Florida Keys National Marine Sanctuary: Distribution, Abundance, Density, and Patterns of Accumulation, Marine and Coastal Fisheries:Dynamics, Management, and Ecosystem Science, 6:1, 20-32.

University of Florida 2014. Florida's Spiny Lobster Recreational Regulations. Available at: http://sfyl.ifas.ufl.edu/archive/hot_topics/environment/spiny_lobster_regulations.shtml [Accessed 30th August 2018]

Waddington, K.I. and J.J.Meeuwig. 2009. Contribution of bait to lobster production in an oligotrophic marine ecosystem as determine d using a mass balance model. Fisheries Research 99: 1-6.

Waring GT, Josephson E, Maze-Foley K, Rosel, PE, editors. 2016. US Atlantic and Gulf of Mexico Marine Mammal Stock Assessments -- 2015. NOAA Tech Memo NMFS NE 238; 501 p. Available from: National Marine Fisheries Service, 166 Water Street, Woods Hole, MA 02543-1026. Available at: https://www.nefsc.noaa.gov/publications/tm/tm238/

Waring GT, Josephson E, Maze-Foley K, Rosel, PE, editors. 2014. U.S. Atlantic and Gulf of Mexico Marine Mammal Stock Assessments -- 2013. NOAA Tech Memo NMFS NE 228; 464 p. Available from: National Marine Fisheries Service, 166 Water Street, Woods Hole, MA 02543-1026. Available at: https://www.nefsc.noaa.gov/publications/tm/tm228/

Wilson, S. M., Raby, G. D., Burnett, N. J.,Hinch, S. G., and Cooke, S. J. 2014. Looking beyond the mortality of bycatch: sublethal effects of incidental capture on marine animals. Biological Conservation, 171: 61–72

Appendix A: Extra By Catch Species

FLORIDA STONE CRAB

Factor 2.1 - Abundance

FLORIDA / CARIBBEAN SEA, POTS, UNITED STATES OF AMERICA

Moderate Concern

There are no biological reference points to determine the overfished status of stone crabs. Since there is no recent stock assessment for the species, a PSA and data-limited indicators have been used to score the stock.

The stock assessment is between five and ten years old, adding uncertainty to the results of the stock assessment. Fishery-independent surveys show that relative abundance generally has remained stable over time (with fluctuations) or have been decreasing (FFWCC 2017a).

Since the PSA deems vulnerability as "low" and there is some conflicting information about stock status (either showing stable or declining trends), Seafood Watch deems abundance as a "moderate" concern**.**

Justification:

The most recent assessment of stone crab stocks (Muller et al. 2011) used two models to evaluate the stock status: the surplus production model and the DeLury model. The DeLury model demonstrated that recruitment varies without trend. The last stock assessment for the stone crab fishery concluded that the resource is fished at a maximum level (Muller et al. 2011). Since the most recent assessment, there has been little to no change in the fishery or its population (pers. comm., FFWCC 2017).

Fishery-independent surveys measured abundance using two indicators: young-of the-year (YOY) and post-YOY throughout two areas, the Atlantic and the Gulf (table 3) (FFWCC 2017a). The table below shows that relative abundance has generally remained stable or has been decreasing.

Table 3. Summary of data collected on young-of the-year (YOY) and post-YOY stone crab. Source: (FFWCC 2017a).

	ATLANTIC	GULF
YOY	Stone crabs were extremely rare and therefore it is difficult to deduce trends.	There were generally high, stable abundances between 2006 to 2015, but declined in 2016, to a 10-year low.
POST-YOY	Post-YOY has fluctuated over time, with a large peak in 2011 and high levels in 2014 and 2015; however, values have decreased in the 2016 season.	Since 2008, relative abundance has been generally decreasing.

There is some concern relating to the low numbers of large, mature males (Muller et al. 2011). Gerhart and Bert (2008) suggested that few males are likely to have mated before entering the fishery. Since females mature at a smaller size than males, and their claws are proportionally smaller towards male crab claws, female crabs are expected to spawn once or more before reaching the minimal harvest claw size. Male stone crabs have a size-related mating hierarchy, hence few males have mated before they attain legal size (Gerhart and Bert 2008).

The PSA score is 2.23 or a "low" concern.

ATTRIBUTE	RESULT	SCORE
Productivity Attribute		
Average age at maturity	2 Years (Fluech 2012)	1
Average maximum age	7 to 9 years (Fluech 2012)	1
Fecundity	>1million/season (Fluech 2012)	1
Reproductive strategy	Brooder (Fluech 2012)	2
Trophic level	high TL predator ~3 (NOAA 2011a)	2
Density dependence	No density dependence suggested, unknown	2
Quality of Habitat	Habitat has been moderately altered by non-fishing impacts: extensive hydro-engineering in the Everglades have been reported to cause degradation of marine habitats used by the spiny lobster (Phillips). Coastal development has increased nutrient and sediment run-off, thus impacting seagrasses and coral reefs (Phillips). Seagrasses, which act as important nursery grounds for spiny lobsters, have declined due to a number of anthropogenic activities such as dredging and nutrient loading (Lirman et al. 2019).	2
Susceptibility Attribute		
Areal Overlap	Unknown; default	3
Vertical Overlap	Unknown; default	3
Selectivity of fishery	Species is targeted or is incidentally encountered AND is not likely to escape the gear, BUT conditions under "high risk" do not apply.	2
Post-capture mortality	Retained species (pers. comm., FFWCC 25 May 2018). Females are not processed/sold and only one claw can be removed (which decreases mortality rates from 46% (where both claws are removed) to 28%. (Davis et al. 1978). However, larger males are targeted (Gerhart and Bert 2008), which have higher rates of mortality than smaller males. Larger, clawed-male mortality rate is significantly higher than that for smaller males, since their claws are much larger in comparison to their body size (FFWCC 2016c). Additionally, they are at their prime mating size, thereby limiting reproductive potential.	3

P = 1.5

P2 = 2.25

S = (((3 * 3 * 2 * 3) -1)/ 40) + 1

S = ((54-1)/40)+1

S = (53/40)+1

S = 2.325

S2 = 5.405625

⬚⬚ = √(P2 + S2)

V = √2.25 + 5.405625

V = √7.655625

V = 2.76688001185451

Factor 2.2 - Fishing Mortality

FLORIDA / CARIBBEAN SEA, POTS, UNITED STATES OF AMERICA

Moderate Concern

The last stock assessment for stone crabs was published in 2011 and generally showed that the stock is undergoing overfishing (Muller et al. 2011) (FFWCC 2017a). The assessment concluded that stone crabs are the target of a highly over-capitalized trap fishery (where the number of traps is excessive and their stock status "is best indicated by the lack of an increase in landings when the number of traps more than doubled") (Muller et al. 2011). Though the stock assessment is between five and ten years old, low catch-per-trap rates have been recorded, indicating that there are too many traps in the fishery (FFWCC 2017a).

Spiny lobster traps account for less than 10% of stone crab landings (FFWCC 2017a). Stone crabs are not expected to exceed 5% of bycatch in the spiny lobster catch, and in recent ghost fishing studies, non-lobster invertebrates were observed in fewer than 10% of trap observations (Butler and Matthews 2015). However, stone crab claws are retained in the spiny lobster fishery (and the rest of the clawed crab is discarded back into the water). The mortality rates of the clawed crabs is highly dependent on the method in which they are harvested (see Justification for further explanation). When stone crabs are declawed, their mortality ranges between 25 to 71% (when one claw is removed) and 14 to 80% (when both claws are removed) (Duermit et al. 2015). Another study suggests that most stone crabs die when both claws are removed (Gandy et al. 2016). The frequency of clawed crabs re-entering the fishery is uncommon (Duermit et al. 2015) (Muller et al. 2011): Duermit et al. (2017) showed that only 3% of legal-sized crabs caught in the study had regenerated claws (Duermit et al. 2017).

While the mortality rate of stone crabs can be high, catch rates of stone crabs and overall mortality caused by the lobster fishery is assumed to be relatively low compared to that from the direct stone crab fishery; therefore, Seafood Watch deems fishing mortality as a “moderate” concern.

Justification:

Two models were used to estimate fishing mortality: the surplus production model and DeLury model. In the surplus production model, over 50% of model runs suggests that overfishing may be occurring (F_{2009}/F_{MSY} = 1.11) (Muller et al. 2011). The DeLury model was used to estimate if recruitment has changed over time given the high levels of mortality. The model found that recruitment is variable but without trend. Recruitment in the fishery occurs from two sources: 1) where crabs with their original claws reach minimum size, and 2) where

crabs have new claws that meet the minimum size (i.e., the crab was declawed and grew a new one). Therefore, this method cannot fully be trusted to evaluate fishing mortality (Muller et al. 2011).

The catch-per-trip data series showed declines until the 2007–08 season but subsequently showed increases. The report suggested that the lack of an increase in landings—concurrent with a doubling in the number of traps—indicated catch potential has reached an upper limit. Between 1986 and 1987 through 2004–05, there have been no observed declines in recruitment (FFWCC 2017a).

The stock assessment mentions that there is a lack of data regarding fishing mortality in the recreational fishery, increasing uncertainty in total fishing mortality estimates (Muller et al. 2011). Additionally, the stock assessment is between five and ten years old (Muller et al. 2011). Another assessment is expected to be published in 2019.

Although discard mortality rates varies significantly with the number of claws removed, the size of the wound (produced by claw removal) is considered a more significant factor. The indirect effects of claw removal (including altered feeding abilities) are deemed substantial (Duermit et al. 2015). Depending upon the size of the crab and when in the intermolt cycle the crab is declawed, it can take one to two years for a crab to regenerate a claw to legal size (Muller et al. 2011). It is legal to remove both claws of legal crabs; however, fishery managers do not encourage this practice as it significantly reduces discard survival rates (FFWCC 2017d). Other factors that may increase mortality rates specifically include being dropped from large heights, but also sex, carapace width, degree of injury, which claw was removed (Kronstadt et al. 2018), and increasing handling times and temperature (Duermit et al. 2015).

Factor 2.3 - Discard Rate

FLORIDA / CARIBBEAN SEA, POTS, UNITED STATES OF AMERICA

< 100%

Discards

There is little information about the total discard rate in the Caribbean spiny lobster fishery. Total discard rates given in Shester and Micheli (2011) for spiny lobster trap fisheries are presented as 15%. Although this study refers to the California spiny lobster (*P. interruptus*) fishery, rather than the Caribbean spiny lobster in Florida, it is possible the rates are quite similar. Matthews et al. (2005) noted that the number of fish that died in traps during observations over one season was quite small (Matthews et al. 2005).

Studies determining discard impacts in the Floridian fishery have also determined that confinement of lobsters in traps also may result in a 10% mortality rate (Matthews 2001). This figure may increase due to sub-lethal effects caused by confinement (including slowed growth rates, weight loss, and molting where lobsters do not increase in size (Wilson et al. 2014) (Matthews 2001).

Bait

Studies from other global lobster fisheries have shown that the volume of bait used regularly exceeds the volume of the target species landed (Harnish and Willison 2009) (Waddington and Meeuwig 2009), but that is not the case in the Florida lobster fishery. The Florida fishery permits the use of undersized lobsters (or "shorts") or attractants in traps (GMFMC and SAFMC 2011). Attractant mortality represents an estimated 869,000 dead lobsters/year (FFWCC 2016b). The average weight for sub-legal sized lobsters is estimated at 0.3kg (Buesa 2018), this equates to around 260,700 kg dead attractants/year. Since 2,453,000 kg of Caribbean spiny lobster were landed into the US in 2016 (NMFS Commercial landings), dead attractants

represent around 11% of total lobster catch.

Alternatively, strips of salted cowhide and fish heads are used as bait (Buesa 2018). Studies have shown that traps baited with short lobsters catch more lobster than traps baited with any other method (Heatwole et al. 1988).

Discard and bait rates represent 15 and 11%, respectively and therefore, equate to less than 100% of lobsters landed. Therefore, a score of 1 is provided.

WHITE GRUNT

Factor 2.1 - Abundance

FLORIDA / CARIBBEAN SEA, POTS, UNITED STATES OF AMERICA

Moderate Concern

There is no recent or local stock assessment for white grunt and the International Union for Conservation of Nature (IUCN) classifies grunt as "Least Concern" (Lindeman et al. 2016).

Since white grunt are not deemed as an endangered, threatened or protected (ETP) species, and the PSA determines their vulnerability as "medium," Seafood Watch scores white grunt as a “moderate” concern.

Justification:

The PSA score for white grunt = 2.72. For this reason, the species is deemed as having a "medium” vulnerability.

ATTRIBUTE	RESULT	SCORE
Productivity Attribute		
Average age at maturity	1.5 years (Ault et al. 2005)	1
Average maximum age	18 years (Murie and Parkyn 2005)	2
Fecundity	19,873–535,039 (Palazon-Fernandez 2007)	1
Average maximum size (fish only)	30 cm (IGFA 2011)	2
Average size at maturity (fish only)	~17 cm (Potts 2000)	1
Reproductive strategy]	Broadcast spawner (Froese and Pauly 2016)	1
Trophic level	3.8 (Froese and Pauly 2016)	3
Susceptibility Attribute		
Areal Overlap	>30% of the species concentration is fished, considering all fisheries	3
Vertical overlap	High degree of overlap between fishing depths and depth range of species	3

Selectivity of fishery	Species is targeted, or is incidentally encountered AND is not likely to escape the gear, BUT conditions under "high risk" do not apply	2
Post-capture mortality	Retained species, or majority dead when released, or unknown	3

Factor 2.2 - Fishing Mortality

FLORIDA / CARIBBEAN SEA, POTS, UNITED STATES OF AMERICA

Moderate Concern

Since fishing mortality is unknown relative to reference points, fishing mortality is deemed a "moderate" concern.

Factor 2.3 - Discard Rate

FLORIDA / CARIBBEAN SEA, POTS, UNITED STATES OF AMERICA

< 100%

Discards

There is little information about the total discard rate in the Caribbean spiny lobster fishery. Total discard rates given in Shester and Micheli (2011) for spiny lobster trap fisheries are presented as 15%. Although this study refers to the California spiny lobster (*P. interruptus*) fishery, rather than the Caribbean spiny lobster in Florida, it is possible the rates are quite similar. Matthews et al. (2005) noted that the number of fish that died in traps during observations over one season was quite small (Matthews et al. 2005).

Studies determining discard impacts in the Floridian fishery have also determined that confinement of lobsters in traps also may result in a 10% mortality rate (Matthews 2001). This figure may increase due to sub-lethal effects caused by confinement (including slowed growth rates, weight loss, and molting where lobsters do not increase in size (Wilson et al. 2014) (Matthews 2001).

Bait

Studies from other global lobster fisheries have shown that the volume of bait used regularly exceeds the volume of the target species landed (Harnish and Willison 2009) (Waddington and Meeuwig 2009), but that is not the case in the Florida lobster fishery. The Florida fishery permits the use of undersized lobsters (or "shorts") or attractants in traps (GMFMC and SAFMC 2011). Attractant mortality represents an estimated 869,000 dead lobsters/year (FFWCC 2016b). The average weight for sub-legal sized lobsters is estimated at 0.3kg (Buesa 2018), this equates to around 260,700 kg dead attractants/year. Since 2,453,000 kg of Caribbean spiny lobster were landed into the US in 2016 (NMFS Commercial landings), dead attractants represent around 11% of total lobster catch.

Alternatively, strips of salted cowhide and fish heads are used as bait (Buesa 2018). Studies have shown that traps baited with short lobsters catch more lobster than traps baited with any other method (Heatwole et al. 1988).

Discard and bait rates represent 15 and 11%, respectively and therefore, equate to less than 100% of lobsters

landed. Therefore, a score of 1 is provided.

RED LIONFISH

Factor 2.1 - Abundance

FLORIDA / CARIBBEAN SEA, POTS, UNITED STATES OF AMERICA

Very Low Concern

Since lionfish are a non-native species (Akins et al. 2012), Seafood Watch deems them as a "very low" conservation concern.

Factor 2.2 - Fishing Mortality

FLORIDA / CARIBBEAN SEA, POTS, UNITED STATES OF AMERICA

Low Concern

Since lionfish are a non-native species (Akins et al. 2012), Seafood Watch deems them a "low" conservation concern.

Factor 2.3 - Discard Rate

FLORIDA / CARIBBEAN SEA, POTS, UNITED STATES OF AMERICA

< 100%

Discards

There is little information about the total discard rate in the Caribbean spiny lobster fishery. Total discard rates given in Shester and Micheli (2011) for spiny lobster trap fisheries are presented as 15%. Although this study refers to the California spiny lobster (*P. interruptus*) fishery, rather than the Caribbean spiny lobster in Florida, it is possible the rates are quite similar. Matthews et al. (2005) noted that the number of fish that died in traps during observations over one season was quite small (Matthews et al. 2005).

Studies determining discard impacts in the Floridian fishery have also determined that confinement of lobsters in traps also may result in a 10% mortality rate (Matthews 2001). This figure may increase due to sub-lethal effects caused by confinement (including slowed growth rates, weight loss, and molting where lobsters do not increase in size (Wilson et al. 2014) (Matthews 2001).

Bait

Studies from other global lobster fisheries have shown that the volume of bait used regularly exceeds the volume of the target species landed (Harnish and Willison 2009) (Waddington and Meeuwig 2009), but that is not the case in the Florida lobster fishery. The Florida fishery permits the use of undersized lobsters (or "shorts") or attractants in traps (GMFMC and SAFMC 2011). Attractant mortality represents an estimated 869,000 dead lobsters/year (FFWCC 2016b). The average weight for sub-legal sized lobsters is estimated at 0.3kg (Buesa 2018), this equates to around 260,700 kg dead attractants/year. Since 2,453,000 kg of Caribbean spiny lobster were landed into the US in 2016 (NMFS Commercial landings), dead attractants represent around 11% of total lobster catch.

Alternatively, strips of salted cowhide and fish heads are used as bait (Buesa 2018). Studies have shown that

traps baited with short lobsters catch more lobster than traps baited with any other method (Heatwole et al. 1988).

Discard and bait rates represent 15 and 11%, respectively and therefore, equate to less than 100% of lobsters landed. Therefore, a score of 1 is provided.

Appendix B: A

The Caribbean-wide assessment is expected to be published in March 2019 through SEDAR 57 (SEDAR 2018). The stone crab stock assessment is expected in late 2018, to be published in 2019. Stone crab abundance studies are on-going and the data will be used in the upcoming assessment. (pers. comm., Florida Fish and Wildlife Conservation Commission on 28.09).

Appendix C: B

(Matthews et al. 2001) estimates 0.646 million lobster could be recruited to the fishery if they were not used as bait. This multiplied by 0.52kg (average legal-sized lobster weight) = ~ 335,920 kg lobster. Based on 2015 landings (2690 MT), this represents about 12% of lobster landings.