Perception of Reef Habitat Change in the Gulf of Mexico

White Paper

January 2023

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1.1 Background

Coral reefs are often the emblem of a changing and warming world. Some corals are dying and are being replaced by algae while other types of coral continue to thrive. This leads to changes in the types of coral and fish found on coral reefs, which can also drive a change on how marine resources are utilized by humans (Woodhead et al. 2021).

Sustainable exploitation of fisheries resources requires consideration of the ecological, economic, and social components of the ecosystem (Fluharty 2000; Aanesen et al. 2014; GMFMC 2016; Serpetti et al. 2017). Broad stakeholder involvement at all stages of policy development, from inception to implementation, promotes good management outcomes. There are good reasons for involving stakeholders throughout the fisheries management process. The inclusion of local ecological knowledge can complement limited scientific information; thus, the participation of new stakeholders in the management process can improve the knowledge base (Aanesen et al. 2014). Stakeholder involvement in management is vital for many other reasons, including, but not limited to, supporting the development and understanding of the process and rationale for new management measures that lead to regulatory changes.

Knowing the complexity of changes on the reef, it is important to understand whether the most common coral reef stakeholders, the fishers, are also aware of the changes happening to the reefs. Fishers, like farmers, are directly affected by ecological change. Their perceptions of change are important both for understanding which changes are significant and how they are likely to respond.

The adaptive capacity of human communities according to what is perceived to be, or not to be, a risk can be shaped by perceptions of change (Adger et al. 2009). Incorporating perceptions into the analysis can help to integrate social and ecological dimensions of change, while disentangling different relationships between ecosystem services and well-being within groups. For example, perception-based data can help us to capture both the ecological dynamics of changing ecologies and the ways in which people feel and respond to these changes. Coral reef stakeholders, mostly fishers, use their ecological knowledge and everyday experiences to decide where to fish and where not to fish. If perceived changes in fish catches fall within a range that is considered normal, fishers may choose not to respond (Rassweiler et al. 2020), but if declines are considered severe enough, fishers may choose to fish elsewhere or leave the fishery (Daw et al. 2012). This, in turn, affects what is available for local consumption and how much pressure is put on the ecosystem being exploited (Cinner et al. 2011). Thus, perception-based research can complement scientific assessments of change to highlight which changes are meaningful within different social–ecological contexts (Rassweiler et al. 2020).

This study summarizes the perceptions of various stakeholders regarding the status and condition of coral reefs in the Gulf of Mexico based on a survey of stakeholders through a questionnaire. The results of the survey were compared with known information on the condition of coral reefs from studies. Differences between stakeholder perceptions and actual reef conditions will identify areas where the Council needs to focus on improving management activities to maintain sustainable fisheries in the ecosystem.

2.1 Methods

An online survey (Figure 1, Appendix A) was developed to ask stakeholders (e.g., divers, fisher, boat operators) about their perceptions of change in coral reef habitat in the Gulf. As stakeholders are the primary active users of the marine environment, they are the first to witness any changes happening in the marine environment and they are the best sources to identify any changes (Aanesen et al. 2014). A web-based survey method was selected for this study, considering that this method has had similar response rates to traditional methods based on the Council's experience with using survey methods to obtain feedback from stakeholders regarding the status of particular fisheries in recent years. The survey questionnaire was designed to ask the users about their perception of coral reef habitat change based on changes in reef habitat condition in relation to the effect of invasive species presence, non-climatic stress factors, and diseases. At the initial stage, the survey was designed for experienced divers and users who are knowledgeable about the coral reef ecosystem in the Gulf. Based on the feedback from Council staff, a second survey was designed to capture information from a broader audience such as fishers, boat operators, and other active users of the marine environment. Instead of circulating the surveys for multiple time periods, as described in the grant proposal, it was circulated in one cycle for a targeted response. The survey was sent to a broad audience with the help of our management partners and recorded responses from 1 July 2021 to 31 August 2021.

Responses from the survey were compiled into a database and assimilated with the results from previous activities in this grant, to provide a comprehensive scenario of how stakeholder perspectives could be matched with information on habitat condition observed in scientific assessments and in other products produced from earlier tasks in the project. This article and a companion learning module describe how the incorporation of local knowledge will potentially help formulate and guide better management decisions with information from the reef habitat change survey. The results of this exercise will help the Council determine the best approach to integrating local perception information with science-based knowledge in formulating management decisions for the future.

Figure 1. Screenshot of coral habitat perception survey. The survey questionnaire is accessible from https://arcg.is/1DaSX8

3.1 Results

Understanding what corals need in order to survive is critical to their protection and conservation, especially in this era of change induced by climate, non-climate, invasive species, and anthropogenic stressors. Improved knowledge of coral habitat conditions, vulnerabilities and threats will help managers formulate better management plans to conserve reef habitats for sustainable fisheries.

The survey received a total of three responses from experts (e.g. members of the Coral Advisory Panel and the Scientific and Statistical Committee) and 24 responses from the public (e.g. divers, fishers, boat operators). Results based on survey respondents are presented here and categorized by type of question in the results section.

3.1.1 Coral reef habitats in the Gulf of Mexico

Coral reefs are diverse communities that provide habitat to many marine organisms. Although shallow-water coral reefs are not as abundant in the Gulf of Mexico (Gulf) as in other areas such as the Caribbean. Respondents of the survey reported reefs located throughout the Gulf with a majority in the eastern Gulf rather than the west (Figure 2).
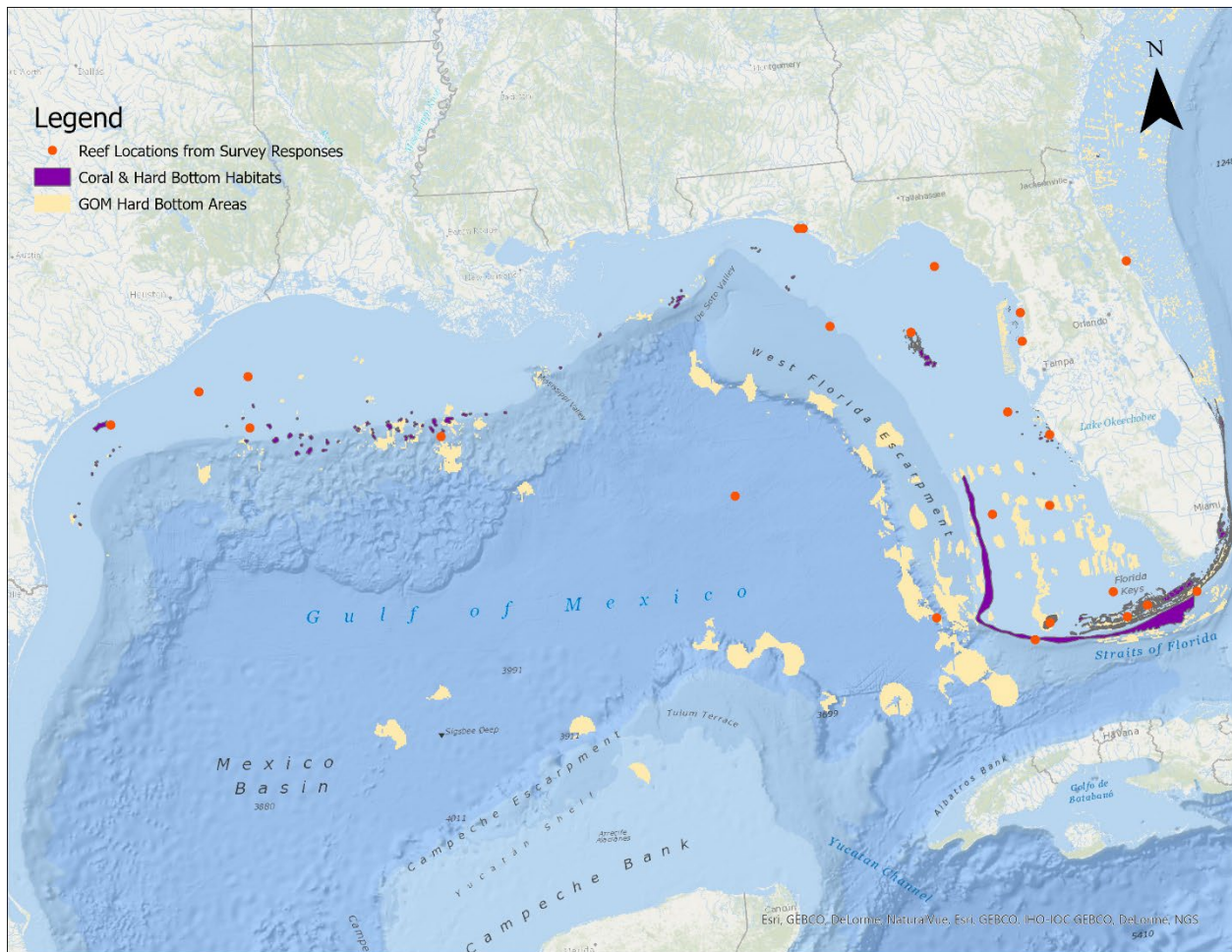
Figure 2. Reef locations reported by stakeholder (in orange) in relation to current coral reef habitats in the Gulf.

3.1.2 Observation notes

Some of the words most commonly included in the respondents' answer were: corals, reef fish, water, reefs, and habitats (Figure 3).

Figure 3. Word cloud based on response regarding the observation on status of coral reef habitats in the Gulf. Size of the word indicated the number of times they were mentioned in responses compared to others.

3.1.3 Reef habitat condition

Based on the responses, reef habitat condition was rated worst near the coast and best in offshore sites (Figure 4). Most of the best conditions of the reefs seem to be observed at sites located at the northeast offshore areas of the Gulf (Figure 4). On average the reef habitat condition indicated a perception of reef degradation across all habitat areas (with score 4.5 out of 10 on average, Figure 4).

Figure 4. Location and condition of coral reefs (on a scale of 1-10, where 1 is worst and 10 is best) based on survey response.

When asked how the habitat condition compares to the last visit of the stakeholders, only two responses indicated better conditions than in the past. The majority of the respondents indicated no change or worst habitat condition over the stakeholder's visited periods (Figure 5).
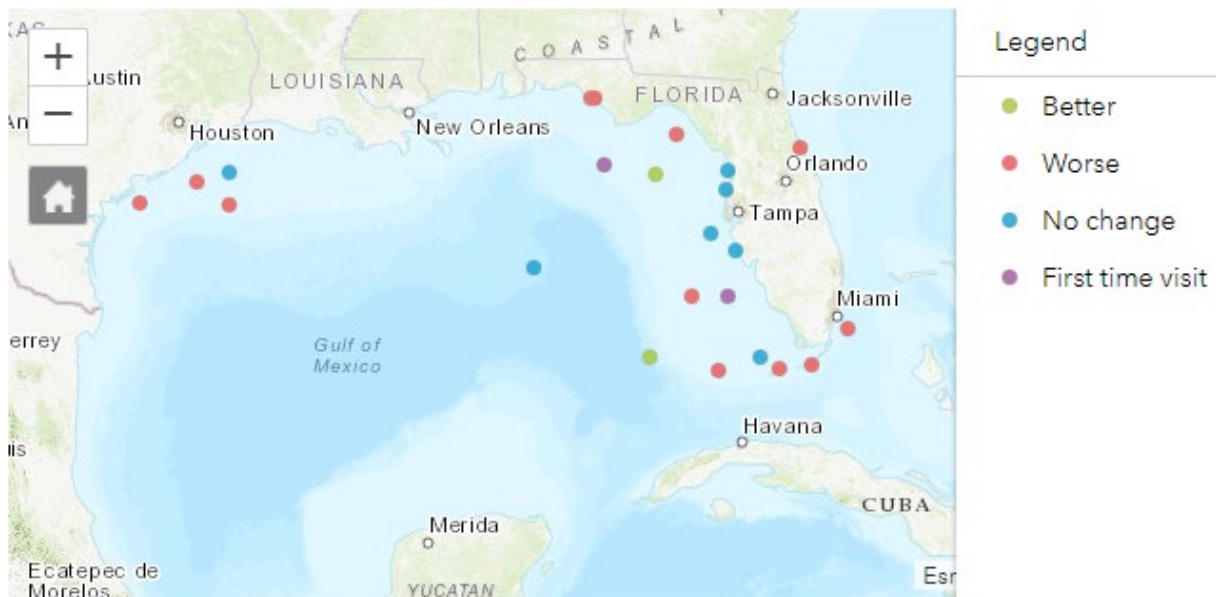
Figure 5. Location and condition of habitat compared to stakeholder's previous visit.

3.1.4 Coral cover and coral species presence

Based on the responses, the perception of coral cover varies from location to location with sites near or in the Florida Keys National Marine Sanctuary (FKNMS) and offshore locations being perceived as having the most coverage, while the sites located near the coast at the northeast of the Gulf having the least coral cover (Figure 6).
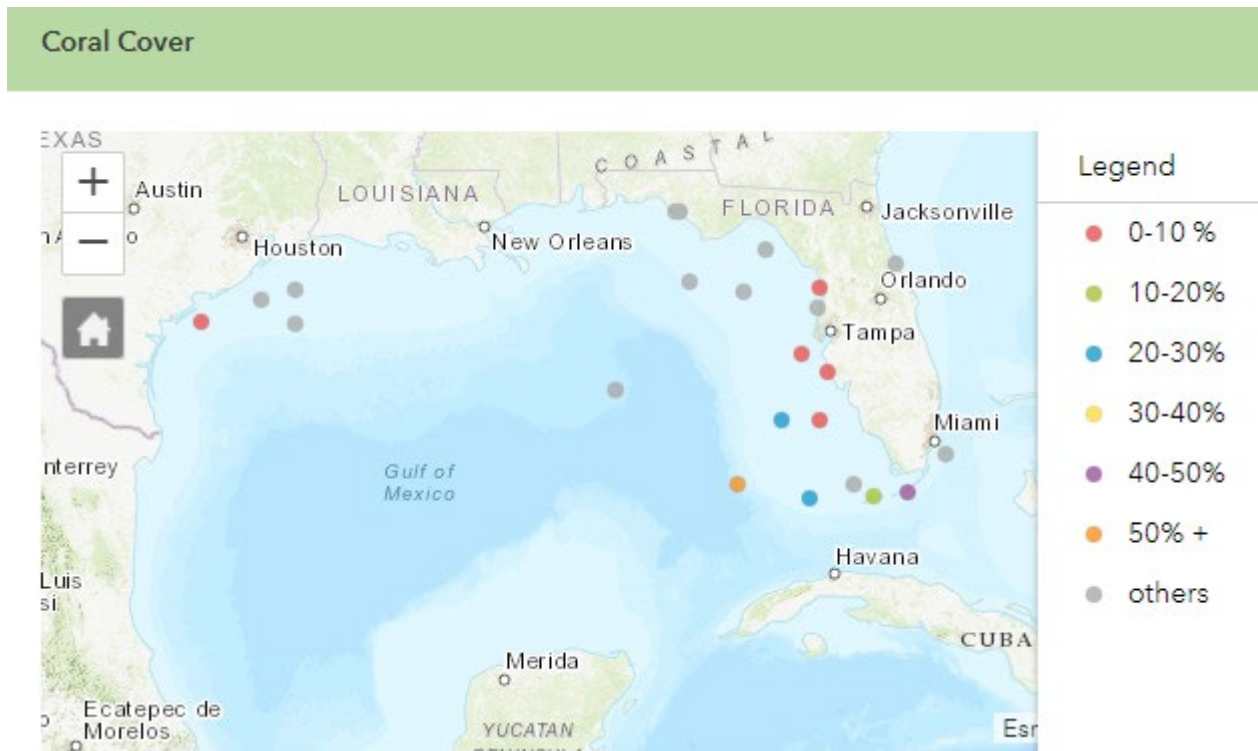
Figure 6. Location and estimated % coverage of corals in different habitats across the Gulf based on survey response.

The total number of coral species observed by the respondents also varied from site to site, with locations on the offshore southern areas having the highest coral species diversity compared to nearshore Gulf sites (Figure 7). Sites located at the FKNMS have the highest diversity among the observed sites.
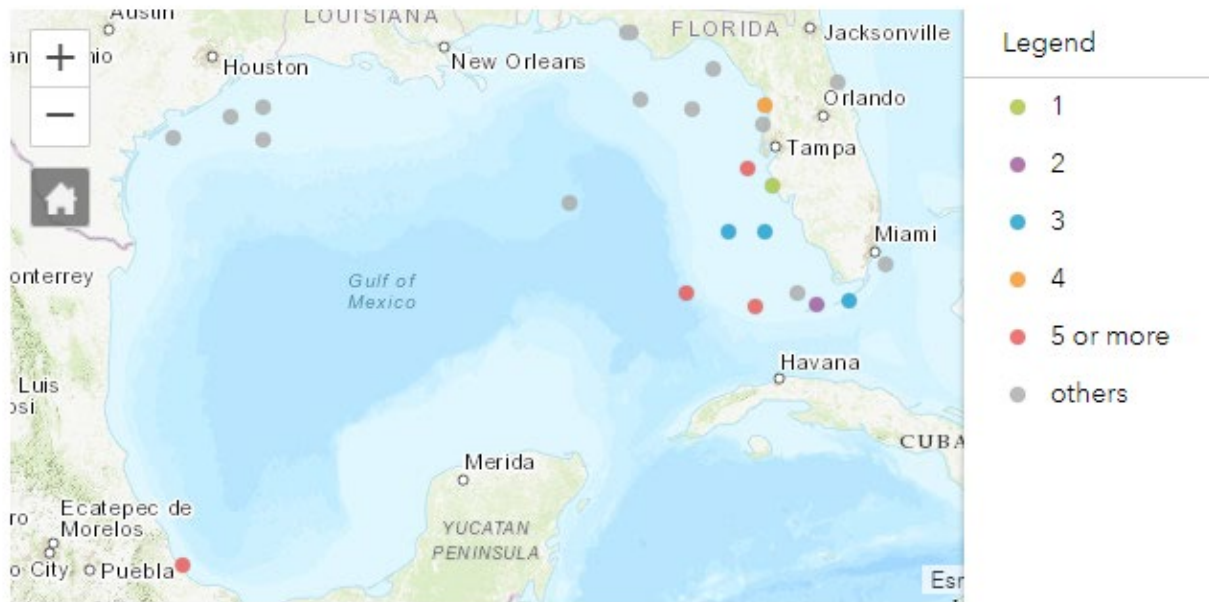
Figure 7. Location and the total number of coral species observed. Colored dots show responses which have included the species number observed on the sites while Grey dots show sites that did not have any specific number indicated in the survey response.

Among the species observed on coral habitats by the respondents, boulder brain coral was reported most, followed by elkhorn and staghorn corals as the second and third most reported across the Gulf sites (Figure 8).
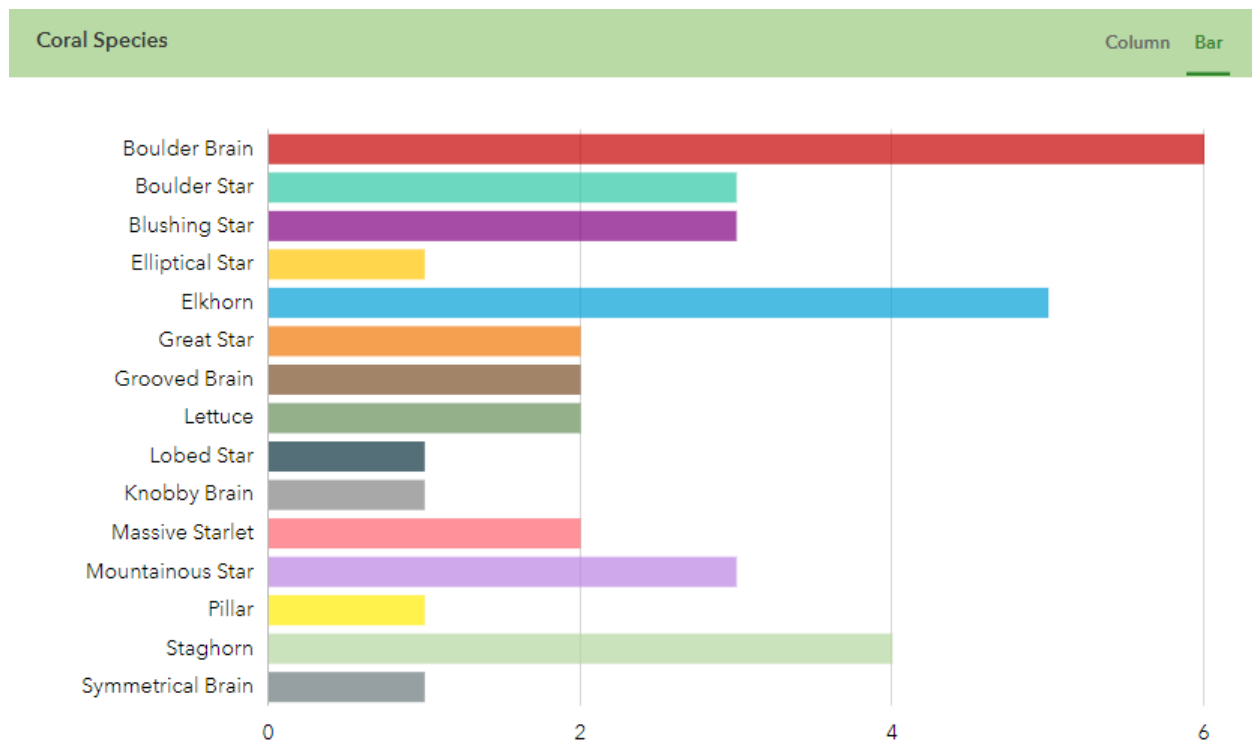
Figure 8. Name and frequency of coral species observed in the Gulf reefs based on survey response.

3.1.5 Reef associated other species

Gray snapper, lane snapper, hogfish, and yellowtail snapper are the most common species of fish observed by the respondents in coral reefs across the Gulf (Figure 9).
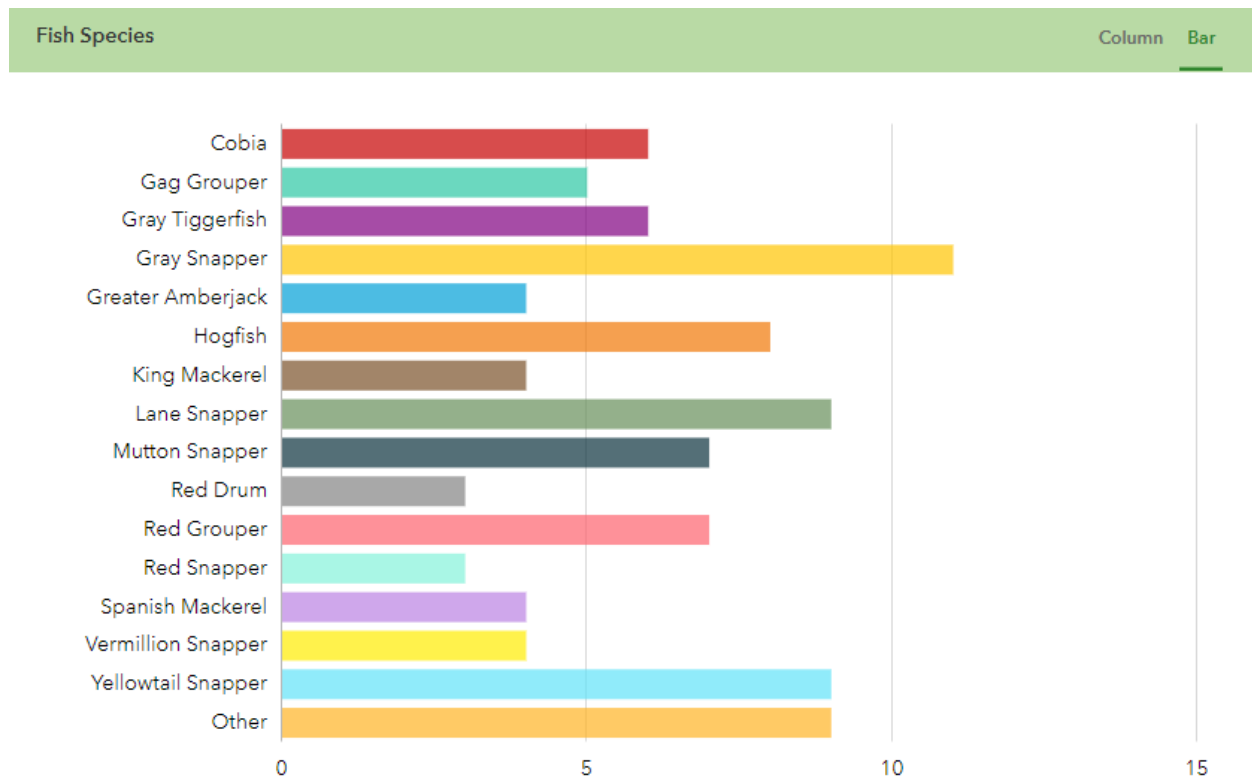
Figure 9. Fish species observed in the Gulf reefs.

The most common invasive species observed by the respondents were sponges followed by anemones, and lionfish (Figure 10). Yellow cup corals and carpet anemones were observed at limited sites.
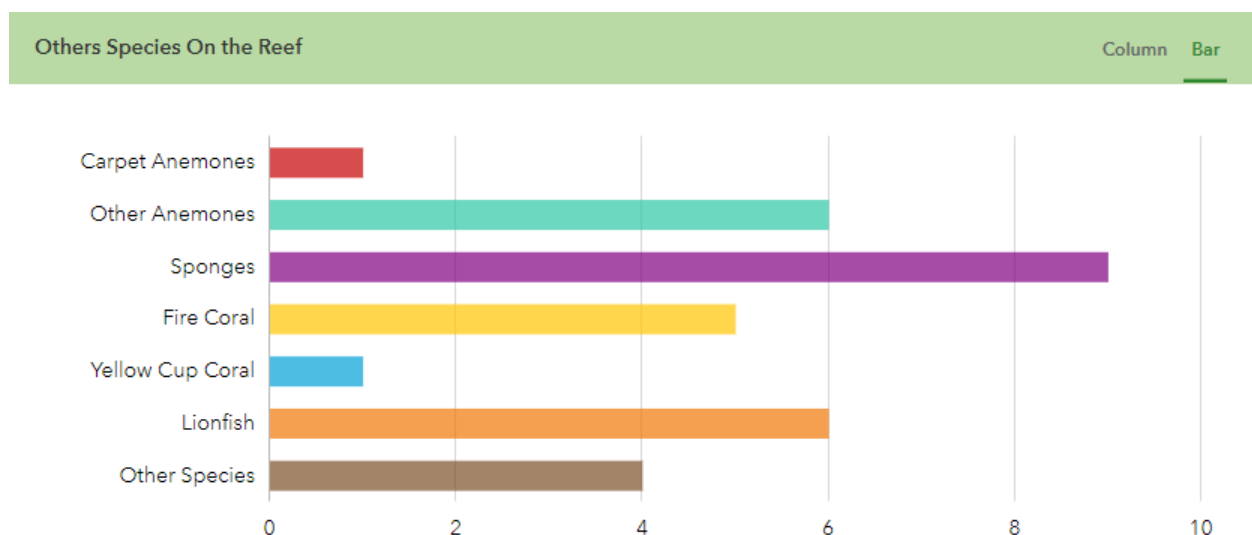
Figure 10. Name and frequency of invasive species observed in the Gulf.

4.1 Discussion

4.1.1 Reef conditions in the Gulf

Coral reef development in the Gulf of Mexico is limited due to the large inputs of sediment-laden freshwater from the North American continent. Shallow-water coral reefs in the Gulf occupy about 2,640 km^2 (<0.2% of Gulf) (Tunnell et al. 2007), whereas the extent of mesophotic corals, defined as light-dependent corals living at depths between 30–150 m (Hinderstein et al. 2010) is relatively low. About 85% of shallow-water corals in the Gulf are distributed along the coasts of Florida and Cuba (Tunnell et al. 2007), but the uniqueness and endemic nature of reefs throughout the Gulf makes them particularly important. The coral coverage on reefs within the Gulf is also variable, having both some of the lowest (around 2%) in the Florida Keys , and the highest coral cover (just above 10%) in the Flower Garden Banks National Marine Sanctuary, almost 60% in the Wider Caribbean Region (Gulf and Caribbean) (Tunnell et al. 2007; Schutte et al. 2010; Muller et al. 2020). Survey respondents indicated that reef habitats located in the Florida Keys and northern Gulf experienced the worst habitat condition, while reefs located away from the shores have the best habitat conditions.

4.1.2 Threats to coral reef habitats

Rising ocean temperatures, anthropogenic and non-climatic stressors (NCS), and invasive species are among the threats faced by coral reefs around the world and in the Gulf (Anthony et al. 2015). Increasing temperature potentially instigates coral habitat range shifts which might cause coral habitats to die off in one area while developing in another (Figure 11). Invasive species can cause severe and lasting damage to the habitats they invade by reducing the abundance of native species, as well as altering the ecosystem structure. They can rapidly spread in the ecosystem, compete for resources, and may introduce diseases to native species to which they themselves are immune. Common invasive species threatening the Gulf corals include various sponges, lionfish (*Pterois volitans, Pterois miles*), carpet anemone (*Palythoa caribaeorum*) and orange cup coral (*Tubastraea coccinea*). Furthermore, reef-building corals are increasingly being exposed to persistent non-climatic threats (e.g., oil spills, red tide events, hurricane-induced stress), threats that operate on both regional and global scales. Maps of invasive species (Figure 12) and non-climatic stressors (Figure 13) for coral reefs in the Gulf were produced as part of the activities in the Coral Reef Conservation Program Grant project and were utilized to identify whether stakeholder's perception matches with the threats faced by the coral reefs in the Gulf.
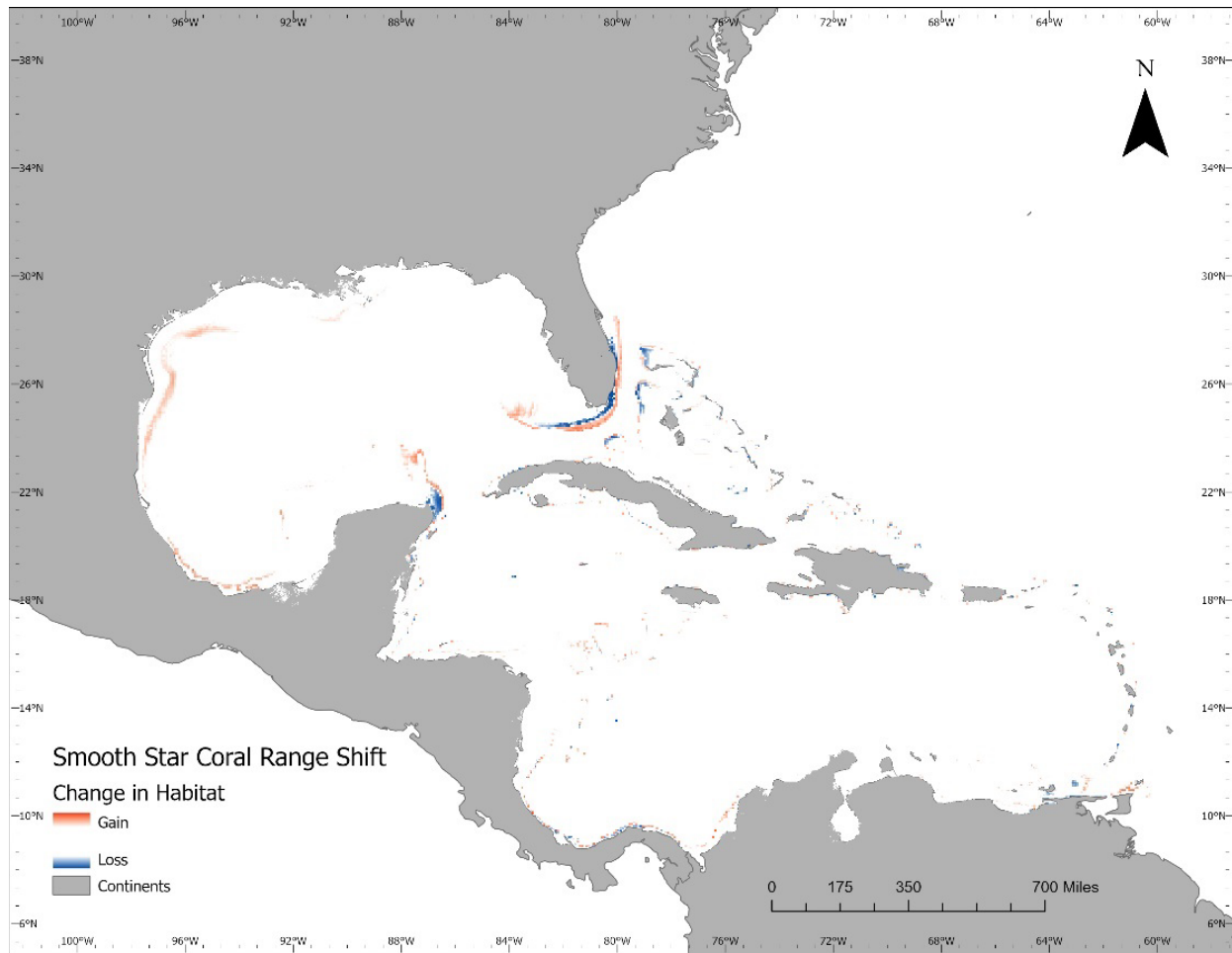
Figure 11. Potential changes in suitable habitat conditions of smooth star coral (*Solenastrea bournoni*) is derived from species distribution model in the present and future years. Areas that will become more suitable as habitat or where corals will gain habitat are marked as red, while areas where the habitat will be lost, or where coral habitats will contract, are marked as blue. (Source: Predicted Spatial Distribution of Corals in the Gulf of Mexico and the Caribbean, white paper, an interactive version of the maps available from https://bit.ly/3sFf9s3
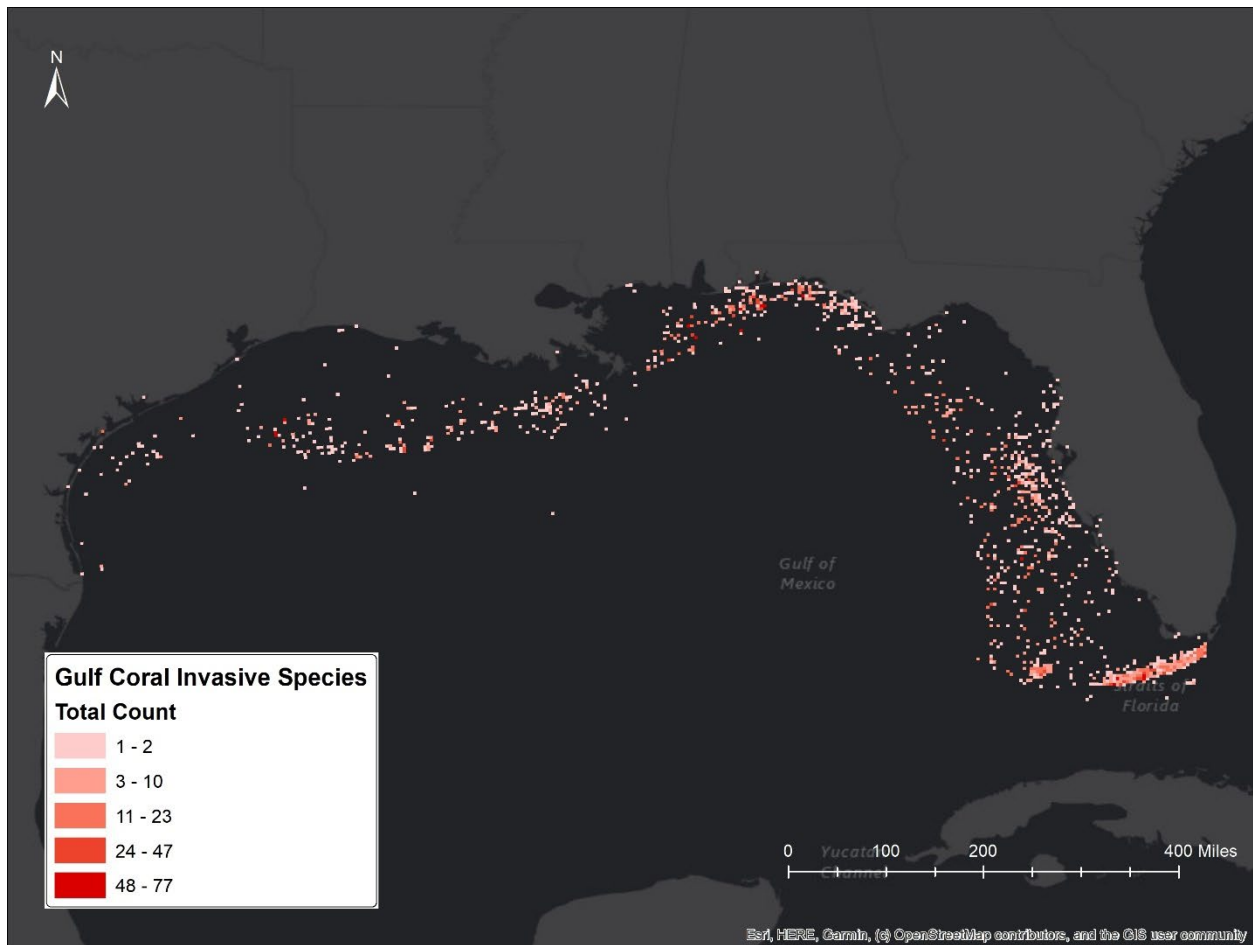
Figure 12. Presence of coral reef invasive species in the Gulf. Data compiled from multiple sources. Details about the compilation can be accessed from the URL https://portal.gulfcouncil.org/invasives/index.html
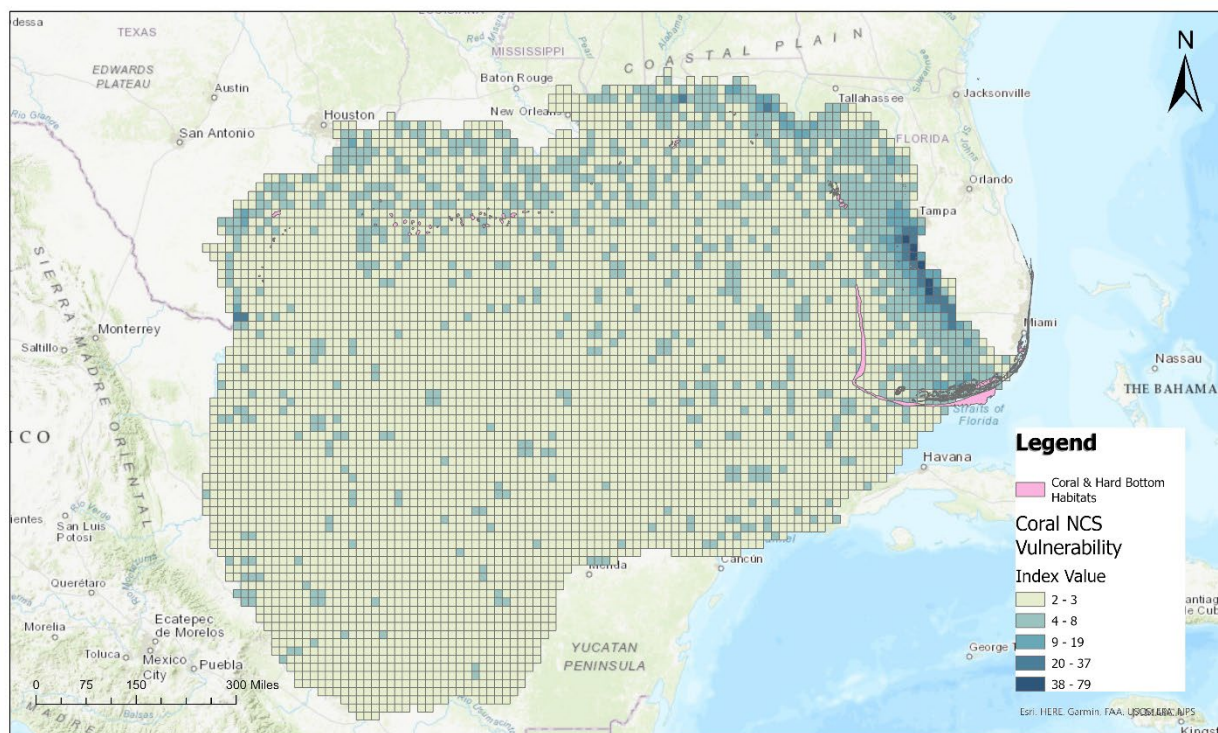
Figure 13. Coral reef non-climatic stressors vulnerability index shown in grid cells. Cells with darker shades indicate areas that are most vulnerable to NCS stress. Details about the index and the process used to develop it can be accessed from the URL https://portal.gulfcouncil.org/coralncs/

4.1.3 Comparison of perception with known habitat condition in the Gulf

Overlaying the reported reef locations with coral invasive species (Figure 14) and NCS vulnerability index maps (Figure 15) showed the in-field conditions match with stakeholders' perceptions. Studies suggested long term effects of invasive species on coral habitats and reef fish populations are potentially severe (Green et al. 2012; Côté and Bruno 2015). Among the respondents' observations, reefs that were located in vulnerable NCS zones and areas with high invasive species presence showed degraded habitat quality (Figure 14, 15).
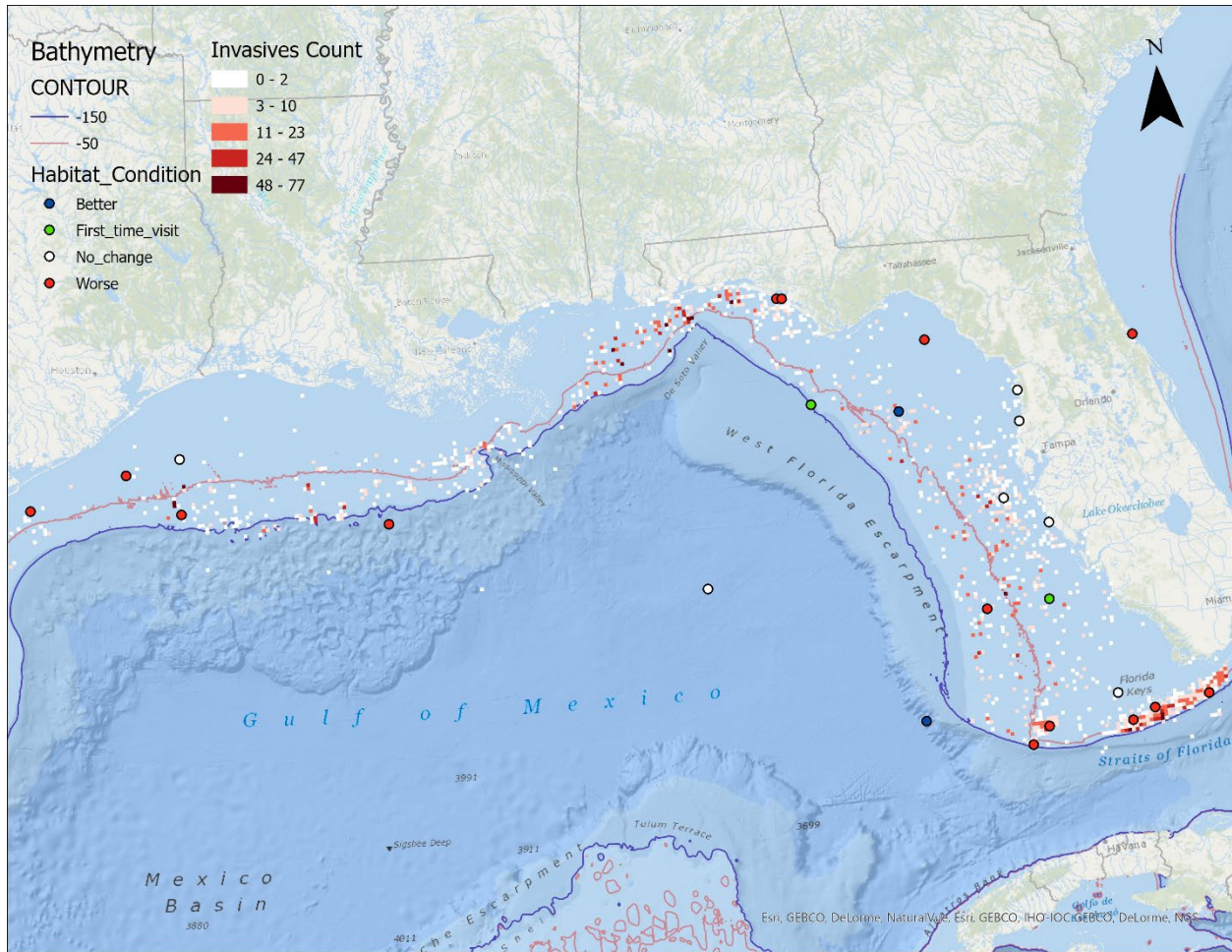
Figure 14. Reef habitat conditions reported by stakeholders in relation to current concentration of coral reef invasive species in the Gulf.
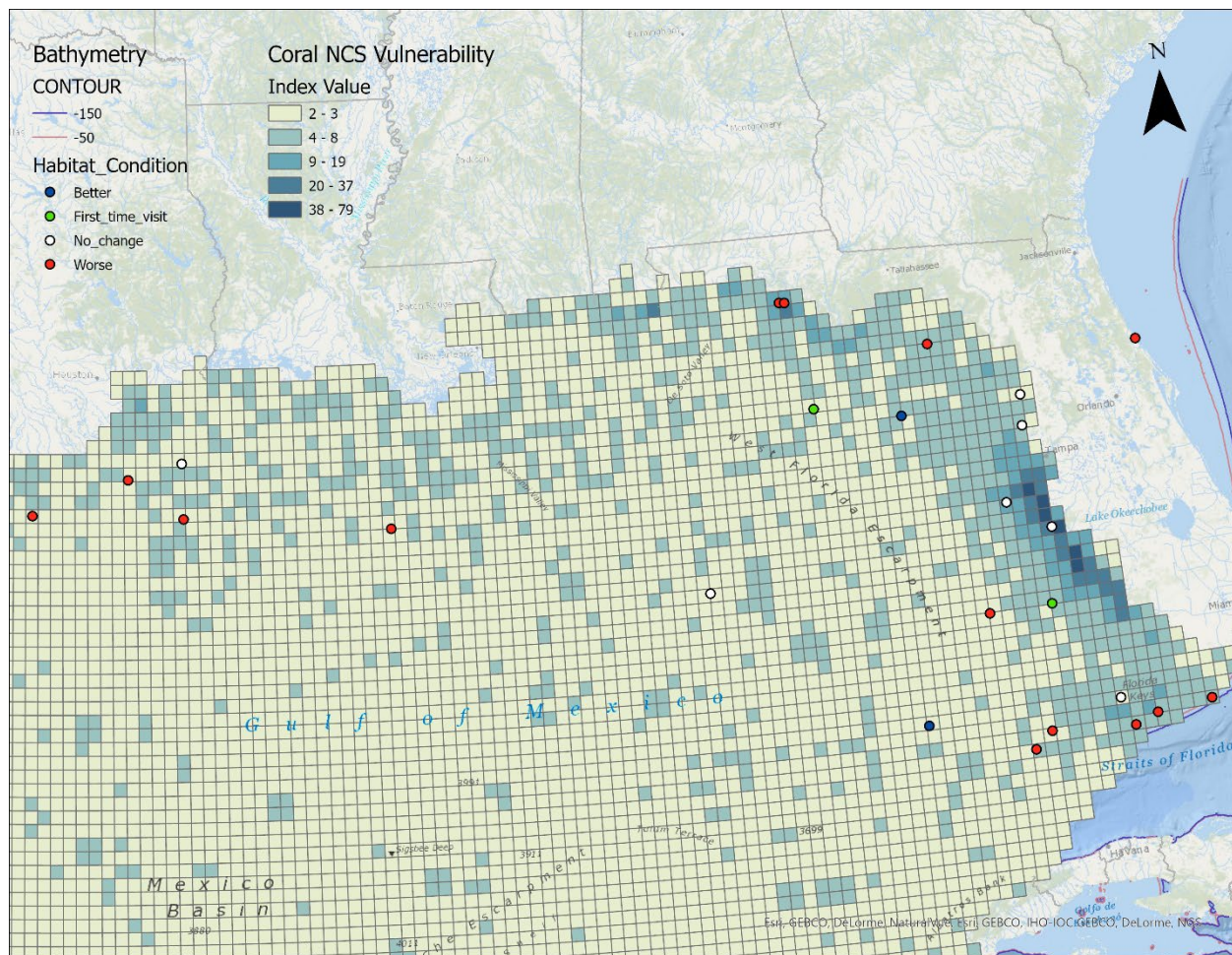
Figure 15. Reef habitat conditions reported by stakeholders in relation to non-climatic stressors vulnerable zones in the Gulf.

Many studies in recent years identified elevated temperature as one of the reasons behind the loss of corals, thus it is not surprising to find these habitats being lost due to increased temperature (Munday et al. 2008; Meissner et al. 2012; Spalding and Brown 2015; Graham et al. 2020). The projected overall increase of 2º C temperature in the region by the year 2100 (Biasutti et al. 2012), may make more northern areas suitable for coral habitat in the Gulf than the present suitable areas which are mostly located in the tropics around the Florida Keys, and the Caribbean. Models produced using projected climatic conditions, along with the earth circulation models for selected coral species in the Gulf, indicated a range shift in the northern Gulf (Figure 11). A combined habitat range shift map when overlaid with stakeholders' observation of habitat conditions, portrays locations that experienced poor habitat conditions and agree with the projected range shift locations that indicate potential loss of habitat in those locations in the future (Figure 16).
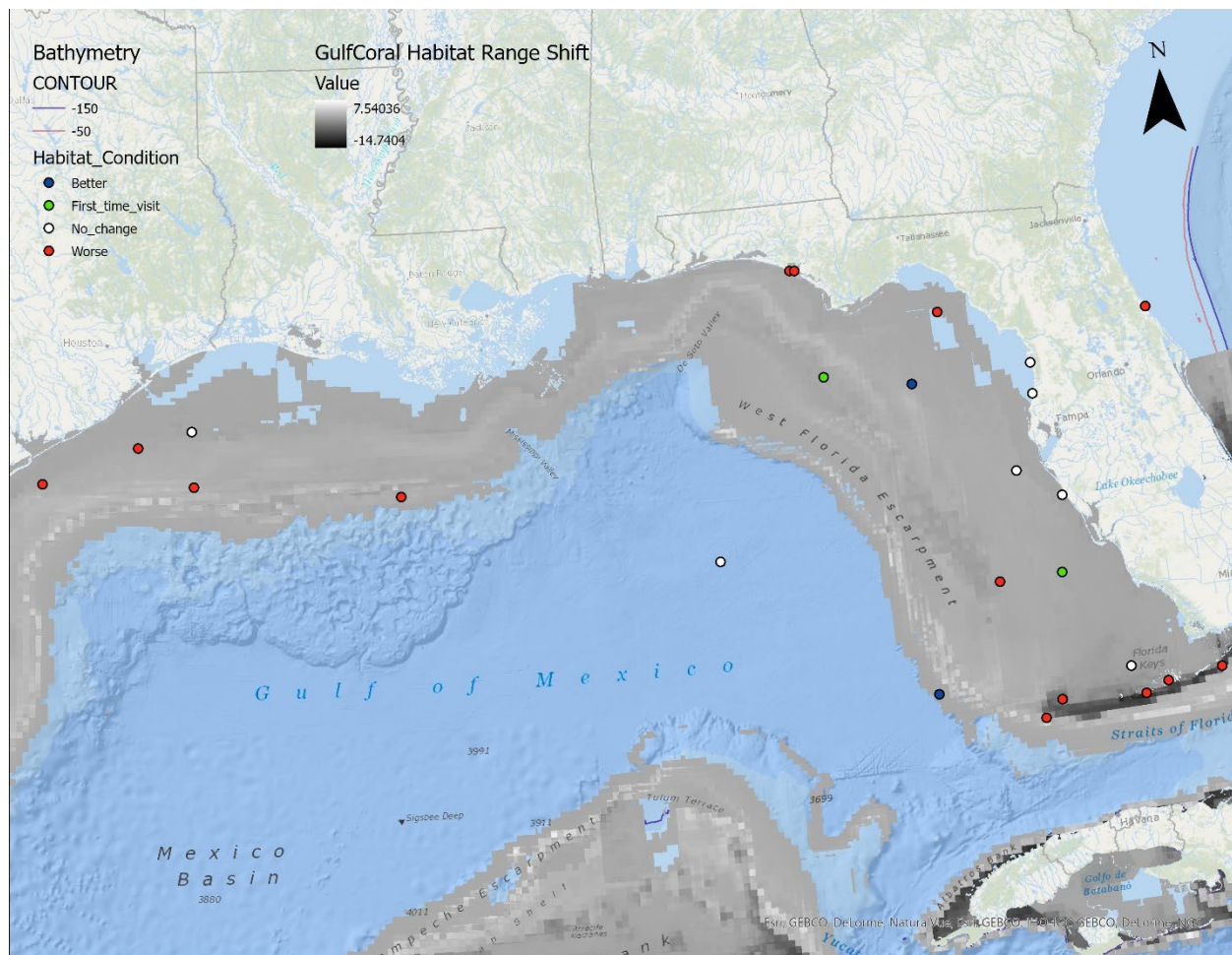
Figure 16. Reef habitat conditions reported by stakeholder in relation to projected coral reef habitat range shift of selected Gulf coral species (dark indicates habitat loss and white/light grey indicates habitat gain).

Habitat services provided by the reefs were most frequently perceived as being changed and were consistently ranked the most important service by stakeholders. These visible changes in reef condition connect to stakeholders' wider ecological knowledge of how reefs underpin services such as habitat provisioning. This is shown, for instance, in one stakeholder's statement: "*Bleaching and pieces of dead coral are prevalent everywhere I go. The fishery has also been affected. There are fewer and fewer fish as the habitat continues to degrade. Something needs to be done fast before we lose it all*". Understanding perceptions of change in supporting services can nonetheless provide a useful basis for management, as it confirms that stakeholders recognize the importance of coral reef ecosystems for other valued services, and may therefore be more likely to engage with management measures that support reef recovery (Bennett 2016; Forster et al. 2017).

Perceptions of change related to fishery services capture changes in target fish species (ecosystem service providers) and the practice of fishing itself. Fishers experience changes in

coral reef habitats on a much broader scale than changes that are often visible in scientific analyses and assessments. Responses to descriptions of reef habitat condition vary and should be interpreted with caution. Results from a similar study focused on perceptions of ecosystem services change associated with climate change in corals (Woodhead et al. 2021) show places where natural resource management may be limited in maintaining ecosystem services when drivers of change are not environmental. With one third of reef building corals facing elevated extinction risk from climate change and localized impact (Carpenter et al. 2008), agencies managing resources for the future, should therefore seek to engage in much broader multi-disciplinary approaches to ensure effective management practices are deployed to attain maximum conservation of this important habitat.

5.1 References

Aanesen, M., C. W. Armstrong, H. J. Bloomfield, and C. Röckmann. 2014. What does stakeholder involvement mean for fisheries management? Ecology and Society 19(4):35.

Adger, W. N., S. Dessai, M. Goulden, M. Hulme, I. Lorenzoni, D. R. Nelson, L. O. Naess, J. Wolf, and A. Wreford. 2009. Are there social limits to adaptation to climate change? Climatic change 93(3):335–354. Springer.

Anthony, K. R. N., P. A. Marshall, A. Abdulla, R. Beeden, C. Bergh, R. Black, C. M. Eakin, E. T. Game, M. Gooch, N. A. J. Graham, A. Green, S. F. Heron, R. van Hooidonk, C. Knowland, S. Mangubhai, N. Marshall, J. A. Maynard, P. Mcginnity, E. Mcleod, P. J. Mumby, M. Nyström, D. Obura, J. Oliver, H. P. Possingham, R. L. Pressey, G. P. Rowlands, J. Tamelander, D. Wachenfeld, and S. Wear. 2015. Operationalizing resilience for adaptive coral reef management under global environmental change.

Bennett, N. J. 2016. Using perceptions as evidence to improve conservation and environmental management. Conservation Biology 30(3):582–592. Wiley Online Library.

Biasutti, M., A. H. Sobel, S. J. Camargo, and T. T. Creyts. 2012. Projected changes in thephysical climate of the Gulf Coast and Caribbean. Climatic Change 112(3):819–845 Available from: https://doi.org/10.1007/s10584-011-0254-y.

Carpenter, K. E., M. Abrar, G. Aeby, R. B. Aronson, S. Banks, A. Bruckner, A. Chiriboga, J. Cortés, J. C. Delbeek, and L. DeVantier. 2008. One-third of reef-building corals face elevated extinction risk from climate change and local impacts. Science 321(5888):560–563. American Association for the Advancement of Science.

Cinner, J. E., C. Folke, T. Daw, and C. C. Hicks. 2011. Responding to change: using scenarios to understand how socioeconomic factors may influence amplifying or dampening exploitation feedbacks among Tanzanian fishers. Global Environmental Change 21(1):7–12. Elsevier.

Côté, I. M., and J. F. Bruno. 2015. 16 Impacts of invasive species on coral reef fishes. Ecology of Fishes on Coral Reefs:154. Cambridge University Press.

Daw, T. M., J. E. Cinner, T. R. McClanahan, K. Brown, S. M. Stead, N. A. J. Graham, and J. Maina. 2012. To fish or not to fish: factors at multiple scales affecting artisanal fishers' readiness to exit a declining fishery. PloS one 7(2):e31460. Public Library of Science San Francisco, USA.

Fluharty, D. 2000. Habitat protection, ecological issues, and implementation of the Sustainable Fisheries Act. Ecological Applications 10(2):325–337. John Wiley & Sons, Ltd Available from: https://doi.org/10.1890/1051-0761(2000)010[0325:HPEIAI]2.0.CO.

Forster, J., R. A. Turner, C. Fitzsimmons, A. M. Peterson, R. Mahon, and S. M. Stead. 2017. Evidence of a common understanding of proximate and distal drivers of reef health. Marine Policy 84:263–272. Elsevier.

GMFMC. 2016. Including Review of Habitat Areas of Particular Concern and Adverse Effects of Fishing and Non-Fishing in the Fishery Management Plans of the Gulf of Mexico Final Report 5-Year Review of Essential Fish Habitat Requirements Available from: http://sero.nmfs.noaa.gov.

Graham, N. A. J., J. P. W. Robinson, S. E. Smith, R. Govinden, G. Gendron, and S. K. Wilson. 2020. Changing role of coral reef marine reserves in a warming climate. Nature Communications 11(1):2000 Available from: https://doi.org/10.1038/s41467-020-15863-z.

Green, S. J., J. L. Akins, A. Maljković, and I. M. Côté. 2012. Invasive lionfish drive Atlantic coral reef fish declines. PLoS ONE 7(3):e32596.

Hinderstein, L. M., J. C. A. Marr, F. A. Martinez, M. J. Dowgiallo, K. A. Puglise, R. L. Pyle, D. G. Zawada, and R. Appeldoorn. 2010. Theme section on "Mesophotic Coral Ecosystems: Characterization, Ecology, and Management." Coral Reefs 29(2):247–251.

Meissner, K. J., T. Lippmann, and A. Sen Gupta. 2012. Large-scale stress factors affecting coral reefs: Open ocean sea surface temperature and surface seawater aragonite saturation over the next 400 years. Coral Reefs 31(2):309–319.

Muller, E. M., C. Sartor, N. I. Alcaraz, and R. van Woesik. 2020. Spatial Epidemiology of the Stony-Coral-Tissue-Loss Disease in Florida. Frontiers in Marine Science 7:1–11 Available from: https://www.frontiersin.org/article/10.3389/fmars.2020.00163/full.

Munday, P. L., G. P. Jones, M. S. Pratchett, and A. J. Williams. 2008. Climate change and the future for coral fisheries. Fish & Fisheries 9:261–285.

Rassweiler, A., M. Lauer, S. E. Lester, S. J. Holbrook, R. J. Schmitt, R. Madi Moussa, K. S. Munsterman, H. S. Lenihan, A. J. Brooks, and J. Wencélius. 2020. Perceptions and responses of Pacific Island fishers to changing coral reefs. Ambio 49(1):130–143. Springer.

Schutte, V. G. W., E. R. Selig, and J. F. Bruno. 2010. Regional spatio-temporal trends in Caribbean coral reef benthic communities. Marine Ecology Progress Series 402:115–122.

Serpetti, N., A. R. Baudron, M. T. Burrows, B. L. Payne, P. Helaouët, P. G. Fernandes, and J. J. Heymans. 2017. Impact of ocean warming on sustainable fisheries management informs the Ecosystem Approach to Fisheries. Scientific Reports 7(1):13438 Available from: https://doi.org/10.1038/s41598-017-13220-7.

Spalding, M. D., and B. E. Brown. 2015. Warm-water coral reefs and climate change. Science 350(6262):769–771. American Association for the Advancement of Science.

Tunnell, J. W., E. A. Chávez, K. Withers, and S. Earle. 2007. Coral reefs of the Southern Gulf of Mexico. Page Coral Reefs of the Southern Gulf of Mexico.

Woodhead, A. J., N. A. J. Graham, J. P. W. Robinson, A. V Norström, N. Bodin, S. Marie, M.-C. Balett, and C. C. Hicks. 2021. Fishers perceptions of ecosystem service change associated with climate-disturbed coral reefs. People and Nature 3(3):639–657. John Wiley & Sons, Ltd Available from: https://doi.org/10.1002/pan3.10220.

6.1 Appendix A

6.1.1 Survey Questionnaire

Name*
Enter your name for our records

Email*
Enter your email for our records

Location (Coral Reef Location) *

Set the approximate location where you observed the coral reef habitat. If you are not certain of the GPS coordinates but know the general location on a map, zoom in to the approximate location on the map below and drop a pin. The coordinates will automatically be captured.

Date and Time
Mention the approximate date and time of the observation

Observation Note*
Tell us about what you've noticed. We're hoping you'll share information about whether you are seeing more or less coral than you have in past years. We want to know approximately how many different types of coral you're seeing, what species you're seeing, what fish you've observed in the area, and whether or not you think the habitat is in good condition.

Rate Coral Reef Habitat Condition*
How you rate the overall condition of the coral reef habitat in this location (1 worst condition - 10 best you have ever seen)

Habitat Condition Compared to Last Visit
If you visited the same area before, then how you rate the habitat condition now compared to past visit

Better | Worse | No change| First time visit

Submit an image
If you want to share an image of the observation then you could attach it here.

Coral Cover
Select an estimated percentage of live coral coverage you observed in the location

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0-10 % | 10-20% |20-30% |30-40%| 40-50% | 50% +

Number of Coral Species Observed
Enter the number of hard coral species you noticed in this location

1 | 2 | 3| 4| 5 or more

Coral Species
Select the type of corals you observed in this location. You can check the Gulf coral guide here for a list of common corals found in the Gulf with their images

Boulder Brain | Boulder Star| Blushing Star | Elliptical Star | Elkhorn| Great Star | Grooved Brain Lettuce| Lobed Star | Knobby Brain | Massive Starlet | Maze | Mountainous Star | Pillar | Rough Cactus | Smooth Flower | Smooth Star |Staghorn | Symmetrical Brain

Fish Species
Select the fish/fishes observed in the area

Cobia| Gag Grouper | Gray Triggerfish | Gray Snapper | Greater Amberjack | Hogfish | King Mackerel | Lane Snapper | Mutton Snapper | Red Drum | Red Grouper | Red Snapper | Spanish Mackerel | Vermillion Snapper |Yellowtail Snapper

Other
Others Species On the Reef
Select any other species seen on the reef

Carpet Anemones | Other Anemones | Sponges | Fire Coral |Yellow Cup Coral| Lionfish | Other Species

Comments
If you have any additional comments related to the coral reef habitat for this location include them here

6.1.2 Survey Responses

ObjectID	Global	CreationD	Observations	Rate_Coral_Habitat	Habitat_Co	Extended_Survey	Coral_Cover	Number_of_species	Coral_Species	Fish_Species	Other_Fishes	Others_Speecies	Other_objects	Comments	x	y	Group
2	9c98db	#########	Less fish life for sure on all the wrecks and artificial reefs. The anglers I see are bringing up less live coral or bottom species in general.	3	Worse	Yes	3	3		Gray_Snapper,Vermillion_Snapper,Yellowtail_Snapper,other	great,barracuda				-83.4901	26.15686	Pub
3	06acc3!	#########	We dive the production platforms. in the GOM These platforms are a wonderful and important habitat for our local flora and fauna. They are one of the few cases were man positively affects the environment. Unfortunately, current governmental regulations m	6	Worse	No	0	0							-94.1908	28.03525	Pub
4	49e161	#########	Live bottom is not nearly as active this fishing season.	4	Worse	No	0	0							-85.8325	30.19164	Pub
5	fc1a0fe	#########	corals in the gulf northwest of key west are doing pretty well considering the amount of poor quality water discharged from the lake . I see new growth all the time . I mainly dive in 15-60 ft of water . plate corals seem to dominate most spots with hi	8	Better	Yes	6	5	Boulder_Brain,Boulder_Star,Elkhorn,Mountainous_Star,Pillar	Cobia,Gag_Grouper,Gray_Triggerfish,Gray_Snapper,Hogfish,King_Mackerel,Lane_Snapper,Mutton_Snapper,Red_Grouper,Yellowtail_Snapper,other	bermuda,chubs	Carpet_Anemones,Other_Anemones,Sponges,Fire_Coral,Lion_Fish,other	porgies,/,grunts,/,porkfish,/angels/parrotfish		-84.4679	24.88854	Pub
6	687f3fe	#########	The coral (staghorn I think), appears to be growing the same as it has for the last few years. Small pieces grow on top of hard bottom and get to 8" or 10" high and usually fall over or stop growing for whatever reason. Sometimes I'll see a piece that	6	No_chang	Yes	1	1	Staghorn	Gag_Grouper,Gray_Snapper,Hogfish,Lane_Snapper,Red_Grouper,other	Grunt	Sponges			-82.5116	27.09757	Pub
7	93ef40!	#########	Along the Texas coast, with the exception of the banks 40 miles offshore, most of the hard substrate that corals require are in the form of oil platforms. In the past year, 10 of the few platforms that we had left were pulled and brought to shore. Coral	1	Worse	Yes	1	0		Cobia,Gray_Tiggerfish,Gray_Snapper,Greater_Amberjack,Red_Snapper,Vermillion_Snapper,other	lionfish	Other_Anemones,Sponges,Fire_Coral,Lion_Fish,other	jewel,boxes		-96.2422	28.08787	Pub

ObjectID	GlobalID	CreationDate	Observations	Rate_Coral_Habitat	Habitat_Co	Extended_Survey	Coral_Cover	Number_of_species	Coral_Species	Fish_Species	Other_Fishes	Others_Speecies	Other_objects	Comments	x	y	Group
8	98b51d	#########	I have been a fishing guide in the Lower Keys for 26 years. It is disheartening to see the degradation of our corals over such a short period in the grand scheme of time. Wether it be out on the ice side reef tract or the gulf side, I would estimate t	1	Worse	Yes	2	2	Boulder_Brain,Grooved_Brain	Cobia,Gag_Grouper,Gray_Triggerfish,Gray_Snapper,Greater_Amberjack,Hogfish,King_Mackerel,Lane_Snapper,Mutton_Snapper,Red_Drum,Red_Grouper,Spanish_Mackerel,Yellowtail_Snapper,other	Tarpon,,bonefish,,permit,,	Other_Anemones,Sponges,Lion_Fish			-81.4781	24.67384	Pub
9	01b563	#########	I have been snorkeing on the coral heads inside the swim area off Fort Jefferson, in the patch reefs inside the harbor at the fort (south end of the harbor) and east of Bush Key for years. They are dominated by star coral but other species are present	5	Worse	Yes	3	5	Boulder_Brain,Boulder_Star,Elliptical_Star,Elkhorn,Great_Star,Grooved_Brain,Mountainous_Star,Staghorn	Gray_Snapper,Hogfish,Lane_Snapper,Mutton_Snapper,Red_Grouper,Spanish_Mackerel,Yellowtail_Snapper		Other_Anemones,Sponges			-82.8795	24.63258	Pub
10	7567cb	#########	Fewer triggerfish than ever before., I'm assuming red snapper ate all the smaller ones as well as the baby grouper. Not enough artificial reefs in the 20-50 mile range from Freeport,Texas.	6	Worse	No	0	0						Need to open recreational red snapper season before for-hire. More days for red snapper and more artificial reefs.	-94.9406	28.51701	Pub
11	3cd11b	#########	the location is not just specific as far up or down the coast as I've been ranges from north of cedar key to south of clearwater/st pete.. the water used to be green/blue there 20+ years ago. now its brown as it is on the east coast from flagler to vero	2	No_chang	Yes	1	4	Boulder_Brain,Elkhorn,Lettuce,Staghorn	Cobia,Hogfish,Lane_Snapper,Mutton_Snapper,Red_Drum,Vermillion_Snapper,Yellowtail_Snapper,other	varieties,,sheepshead,,skates,,trout,var.,etc				-82.686	28.73987	Pub
12	cc2edd	#########	For the past several years we have noticed that on several local natural reefs all of the growth appears to be removed or crushed. I believe this is from trawling or other human activity. The fans, hard coral and sponges all appear to be bulldozed off t	3	Worse	No	0	0							-85.7612	30.18585	Pub
13	e60e46	#########	Whatever reefs are in Pasco County are probably over 30 yrs old. and well sanded over.	1	No_chang	No	0	0						Wwll past time to upgrade offshore waters	-82.7181	28.36587	Pub
14	7670b5	#########	Fishing in this area has not recovered since the red tide event of 2014.	3	Worse	No	0	0						Don't know the condition of the coral, but the fishing is nothing like before the 2014 red tide.	-83.8636	29.49064	Pub

ObjectID	Global	CreationD	Observations	Rate_Coral _Habitat	Habitat_Co	Extended _Survey	Coral_Cover	Number _of_species	Coral_Species	Fish_Species	Other_Fishes	Others_Speecies	Other_objects	Comments	x	y	Group
15	751c28	#########	Good bait population and the snapper fishery is excellent with more than robust numbers. Very hard to get to the grouper and AJ due to the sheer numbers of red snapper.	8	Better	No	0	0						I believe lack of pressure during both COVID and the inclement weather in the spring have both helped the fishery numbers	-84.3324	28.67013	Pub
16	c90491	#########	Starting to have big run off water events that are I believe are affecting the health of our coral eco systems in the eastern gulf.	8	No_chang	No	0	0						Please move forward with coral amendment 10	-94.2045	28.70681	Pub
17	f017d9	#########	I dove on a hardbottom habitat in 88 feet of water off Fort Myers and observed scattered colonies of blushing star coral, Stephanocoenia intersepta, with few other hard corals present. On the same trip we also stopped at the Foote family artificial reef	2	First_time	Yes	1	3	Blushing_ Star	Gray_Snapper,Greater_Amberjack,Lane_Snapper,Mutton_Snapper,Red_Grouper, other	Goliath,Grouper,Slippery,Dick	Sponges,Lion_Fish ,other	There,were,patches,of,paddlegrass,,Halophila,decipiens,,at,the,88',deep,site,,as,well,as,a,lot,of,macroalgae.,The,Foote,reef,had,many,Arbacia,punctulata,urchins.		-82.6549	26.17218	Pub
18	4334e8	#########	I have observed a general decline in most of the near shore reef sytems from Marathon to Cudjoe Key . Dead Corals & Algae are increasing	4	Worse	Yes	5	3	Boulder_Brain,Elkhorn	Gag_Grouper,Gray_Snapper,Hogfish,Yellowtail_Snapper		Sponges,Fire_Coral			-80.7555	24.74989	Pub
19	37ff6d	#########	I cannot say if the Coral Reefs have being affected, but according with my fishing experience from several years before (about 20- 25 years and more) that I cashed fish easy and quick, that is not happening within the last 4 or 5 years. So, if the fish p	2	Worse	Yes	0	0		Gray_Tigerfish,Gray_Snapper,Lane_Snapper,Mutton_Snapper,Red_Snapper,Yellowtail_Snapper,other	Grunts				-79.9141	25.50984	Pub
20	d6dca9	#########	I have not noticed a change in coral cover or size since I began diving in the gulf in 2013. This area of the gulf does not have hermitypic corals. So to rating "coral reef" habitat seems sort of odd. But in general the oculinas, siderastreas, cladocoras	3	No_chang	Yes	1	5	Blushing_ Star,Massive_Starlet	Cobia,Gag_Grouper,Gray_Triggerfish,Gray_Snapper,Greater_Amberjack,Hogfish,King_Mackerel,Lane_Snapper,Red_Drum,Red_Grouper,Red_Snapper,Spanish_Mackerel,Vermillion_Snapper,Yellowtail_Snapper,other	Scamp,,Goliath,,snook,,almaco,,sharks,,rays,,grunts,,sheepshead	Other_Anemones,Sponges,Fire_Coral,Lion_Fish			-83.0717	27.46659	Pub
21	a9f269	#########	A lot of red snapper.	8	First_time	No	0	0							-85.5198	28.87282	Pub

ObjectID	Global	CreationD	Observations	Rate_Coral _Habitat	Habitat_Co	Extended _Survey	Coral_Cover	Number_of_spe cies	Coral_Spe cies	Fish_Spe cies	Other_Fi shes	Others_S peecies	Other_ob jects	Comments	x	y	Group
22	07b50d	#########	the crappy lake Okeechobee water is back again . I thought the storm (elsa) would have moved some the slime out , but it persists . my landings are so far down it is ridiculous . why ? I can't shoot fish I can't see . now snot , colored water blankets	8	No_chang	No	0	0						coral planting a scam , parrotfish eat it like candy , it is "bite size" . coral has survived 5 major extinction periods over the past 250 millions years , if volcanic action , asteroids , and ice ages didn't kill it off , humans aren't going to	-81.93	24.91843	Pub
23	0747df	#########	brown muck over all the coral. little if any sealife. coral looks dead i dont see how it could be alive smothered by muck.. very few sea or in-water grasses. i think indian river, hailifax river and the gulf side ive seen from Homosassa up to cedar	2	Worse	No	0	0						next observation i will	-81.0109	29.20648	Pub
24	c34a52	#########	The general habitat is in good condition, I've notice no change in the last 10 years. Neither corals nor fishes have shown dramatic changes instead of the presence of two invader fish (lionfish and regal damoiselle) and one coral species (Tubastraea coc	7	No_chang	Yes	3	5	Boulder_B rain,Bould er_Star,Bl ushing_St ar,Elkhorn ,Great_Sta r,Lettuce,L obed_Star ,Knobby_B rain,Massi ve_Starlet ,Mountain ous_Star,S taghorn,Sy mmetrical _Brain	Cobia,Gr ay_Tigger fish,Gray _Snapper ,Hogfish, King_Mac kerel,Lan e_Snapp er,Mutto n_Snapp er,Red_G rouper,S panish_ Mackerel ,Yellowta il_Snapp er		Other_A nemones ,Sponges ,Fire_Cor al,Yellow _Cup_Cor al,Lion_Fi sh,other	Neopom acentrus, cyanomo s		-96.0461	19.12271	Pub
25	ae8cdd	#########	My qualifications: I have been fishing and diving the NW Gulf for +25 years. Red Snapper are over populated and decreasing reef diversity. We are now catching Red Snapper regularly at 600ft depths when deep dropping which usually kills these fish e	8	No_chang	No	0	0							-87.1595	26.77711	Pub
31	1a8b78	#########		1	Worse	Yes	5	5	Grooved_ Brain,Smo oth_Star	Vermillio n_Snapp er,other	Golden,ti le,	Sponges, Fire_Cora l		Deep water shrimp boats for red shrimp destroy all deep water coral	-91.3863	27.83708	Ex
31	96dbf5	#########		2	Worse	Yes	2	4	Boulder_B rain,Bould er_Star,Kn obby_Brai n,Pillar	Gray_Sna pper,Hog fish,Mutt on_Snap per,Red_ Grouper, Yellowtai l_Snappe r		Sponges, Lion_Fish		it is amazing to witness the amount of loss that has occurred over the time that I have been diving, about 40 years, tragic.	-83.1221	24.43426	Ex
33	46506e	#########		1	Worse	Yes	1	5	Boulder_S tar,Blushi ng_Star,El khorn,Gre at_Star,Lo bed_Star, Massive_S tarlet,Mou ntainous_ Star	Hogfish, Mutton_ Snapper, Yellowtai l_Snappe r		Sponges, Fire_Cora l,Lion_Fis h		stony coral tissue loss disease is decimating at least 22 species of corals. Brain corals are notably absent. MCAVs are holding on the best, OANN is showing some signs of recovery. MMEA is pretty much non-existent. Some PCLI recruitment	-81.7858	24.5638	Ex