

Benthic Marine Ecology The Atlantic Gulf Rapid Reef Assessment (AGRRA) Fish Protocols

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Research Question

How are AGRRA fish protocols used to assess fish biomass, determine the health of coral reef ecosystems, and influence management decisions?

Introduction

The Atlantic Gulf Rapid Reef Assessment (AGRRA) is an international collaboration of scientists, managers, and supporters aimed at improving conditions of reefs in the West Atlantic and Gulf of Mexico by providing protocols to monitor reef conditions. AGRRA fish protocols focus on studying the abundance, size and distribution of fish populations to understand changes in reef dynamics and to understand how humans affect fish populations. This is done by performing a visual census of fish along no less than 10, 30m long by 2m wide belt transects and in more detailed studies measuring the relief of the reef. Researchers then have the opportunity to upload their data into the AGRRA database found on their website (Lang, J. et al., 2010).

Equipment

- SCUBA gear with depth gauge
- 15cm x 23cm UW slate
- copies of Basic or Detailed FISH-UW-V5.4 datasheet printed on UW paper
- optional for detailed level: copy of FISH List-V5.4 list printed on UW paper
- graduated T- bar with a 60cm long handle, and two equal length arms marked in 10cm intervals providing total width across top of 1m
- D-ring or clamp attached to weight belt or BCD
- a weighted, 30m fiberglass transect tape



(Pollard, 2020b)

Methods

- Determine level of survey (basic or detailed)
- At each site, record the surveyor code, date, site name, day #, site #, AGRRA code, latitude, and longitude on your datasheet
- At the site, randomly choose a starting point and place the weighted end of tape into a small crevice, then clip the reel to the D-ring
- Record start time, start depth and bottom temperature and release 30m tape while swimming and holding T-bar in front of you
- Pause at each 2m segment on transect and count AGRRA fish located within the 2m width of T- bar and use 10cm increments to estimate fish length and assign it to size category
- Assess fish schools by placing each taxon into a size category rounding to nearest 10 or 100
- For detailed surveys, use your T-bar to measure vertical height of the tallest coral or reef rock above the lowest point of substratum, pausing to measure every 5m on your transect (Lang, J. et al., 2003).
- To upload the data sheet, a Team Lead will contact the AGRRA team to gain log in credentials to upload site details of the survey and will set up log ins for each surveyor where they will have access to the data entry where they can record specific data from the transects (AGRRA, 2018).

Data Sheet

Surveyor:	Date:	Site Name:	AGRRA Code:
Trans #:	Start Time:	Start Depth:	End Depth:
Max Relief:	FT / M	FT / M	C / F
Species	0-5 cm	6-10 cm	11-20 cm
			21-30 cm
			31-40 cm
			> 40 cm (cm intervals)

Reports

Turks and Caicos (TCI)

- 28 sites were surveyed.
- Density and size of fish were generally highest in West Caicos and lowest in Muchoir Bank where illegal poaching and destructive fishing occurs.
- Species richness of fish positively correlated with species richness of stony coral with diameters greater than 10cm.
- TCI is understudied and results are the first systematic census of key fish species and act as baseline for future monitoring (Hoshino et al., 2003).

Cuba

- Conducted surveys on fringing reef at no take reserve in Maria La Gorda, Cuba.
- Damselfish, who destroy live coral, were the most abundant family, and could be due to overfishing of piscivores.
- Medium-large species of fish were scarce although habitat conditions seemed excellent because of illegal fishing (Claro and Ramos, 2003).

Atlantic and Wider Caribbean

- Assessment of 247 fish sites were completed between 1998 and 2000.
- Low large bodied groupers and snappers were recorded, suggesting that the entire region is overfished.
- More remote reefs showed as much evidence of reef degradation as reefs more proximal to human coastal development (Kramer, 2003).



(Pollard, 2020a)

Management Application

AGRRA protocols have been used to conduct 3 surveys since 2016 in two marine protected areas (MPA's) and one future MPA in Antigua and Barbuda. These surveys highlighted the variation between sites which is crucial in making management zoning decisions. These surveys also provided useful baselines that allowed for monitoring of invasive species recovery on one of the islands. Many Small Island Developing States (SIDS) lack sufficient data to allow for effective management of MPA's. AGRRA has provided a platform for SIDS to better assess and understand their marine ecosystems. These surveys also revealed the lack of larger bodied Scaridae observed which is concerning due to their role of algal regulation. This insight can aid reef managers in establishing fish conservation zones and provide evidence for developing fisheries regulations and restrictions within the protected areas (Camacho et al., 2020).

Conclusion

Fish play important roles in coral reef ecosystems as herbivores and top predators and can be great indicators of a reefs health. AGRRA fish monitoring protocols help to provide a snapshot of fish indicators and can act as a baseline to understand future studies and assist in decision making on how to best protect these ecosystems (Kramer, 2003).

References

- AGRRA. (2018, March 21). *Online data entry*. <https://www.agrra.org/data-explorer/online-data-input/>
- Camacho, R., Steele, S., Challenger, S., & Archibald, M. (2020). Status of coral reefs in Antigua & Barbuda: Using data to inform management. *PeerJ*, 8, 1-20. <https://doi.org/10.7717/peerj.9236>
- Claro, R., & Ramos, K. C. (2003). Rapid assessment of coral communities of Maria la Gorda, Southeast Ensenada de Corrientes, Cuba (Part 2: Reef fishes). *Atoll Research Bulletin*, 496(16), 278-293. <https://doi.org/10.5479/si.00775630.496-16.278>
- Hoshino, K., Brandt, M., Manfrino, C., Riegl, B., & Steiner, S. C. (2003). Turks and Caicos Islands. Assessment of the coral reefs of the Turks and Caicos Islands (Part 2: Fish communities). *Atoll Research Bulletin*, 496(26), 480-499. <https://doi.org/10.5479/si.00775630.496-26.480>
- Kramer, P. A. (2003). Synthesis of coral reef health indicators for the Western Atlantic: Results of the AGRRA program (1997-2000). *Atoll Research Bulletin*, 496(3), 1-57. <https://doi.org/10.5479/si.00775630.496-3.1>
- Lang, J., Marks, K., Kramer, P., Kramer, P., & Ginsburg, R. (2010). AGRRA protocols version 5.4. *ReVision*, 1-32. https://www.researchgate.net/publication/265148106_Agrra_protocols_version_54
- Pollard, M. (2020a). *School* [Photograph via email]
- Pollard, M. (2020b). *Triggerfish* [Photograph via email]