

**Release of the AGRRA (Atlantic and Gulf Rapid Reef Assessment)  
Database and Summary Products for 1997-2004 V1.5**

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**Introduction  
by Robert N. Ginsburg**

The release of this Database from 819 sites made during 39 assessments in the tropical north Atlantic and Brazil (see Fig. 1 below) is another milestone in the AGRRA Program. This accomplishment was only possible thanks to three essential elements. First and foremost was the collaboration of over a hundred partners from throughout the region who donated their time and energy to collect the basic data on the status of the fish and benthic communities (Ginsburg and Lang, 2003). Second was the major commitment of time and close attention by Scientific Coordinator Judith Lang to check the accuracy of the data, and by Kenneth Marks, Database Manager, to assemble the Database and make results accessible as a series of Summary Products. And third was the financial support of the organizations listed below.

***Major Contributors***

Bacardi Family Foundation, National Geographic Society's Committee for Research and Exploration, The Ocean Research and Education Foundation, World Bank/Netherlands Environmental Partnership Fund, National Oceanic and Atmospheric Administration, National Fish and Wildlife Foundation, National Center for Caribbean Coral Reef Research, Environmental Defense Fund.

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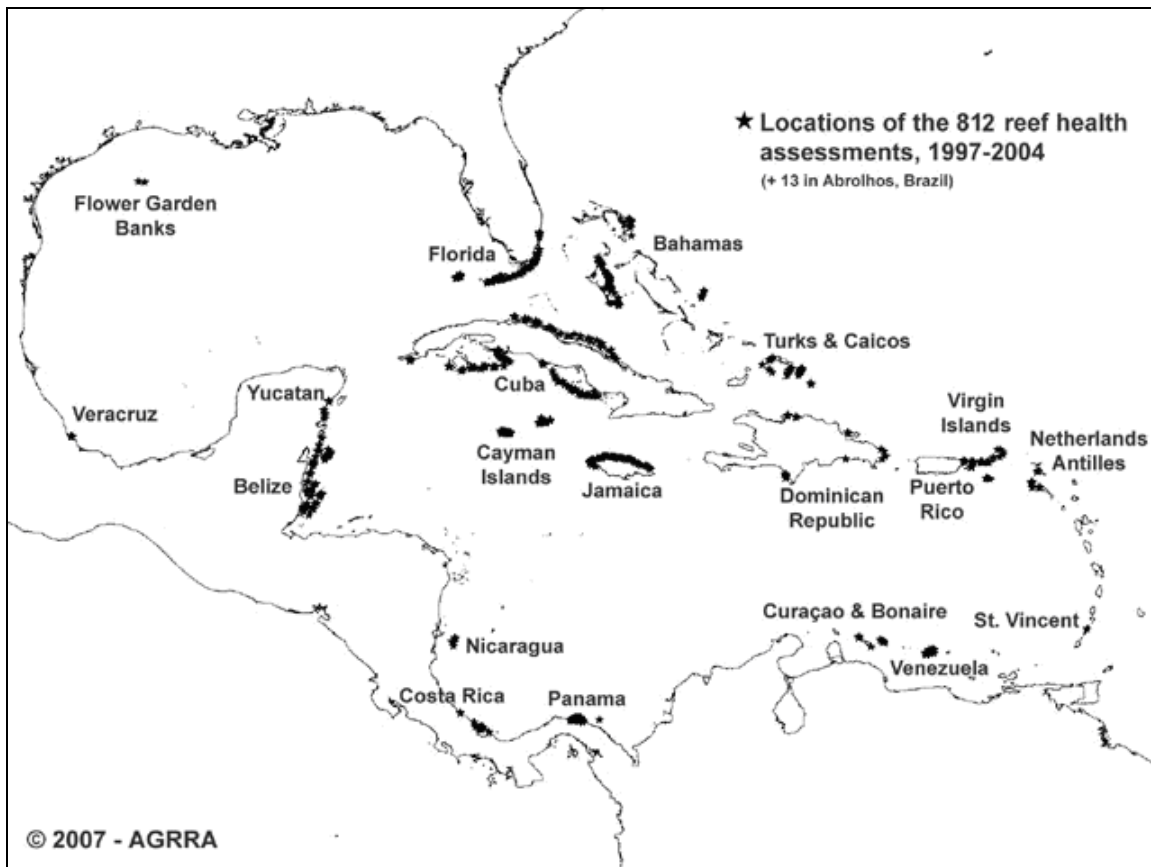


Fig. 1. Locations of AGRRA assessments.

**Guidelines to AGRRA release V1.5**  
**by Judith C. Lang and Kenneth W. Marks**

We solicit comments from users who can help improve the accuracy or presentation of these data. (See end of document for a summary of changes in the 2007 release.)

Users are reminded that rapid assessments are designed to quickly provide baseline information, and are not intended to substitute for intensive monitoring protocols. Their strength lies in the synoptic perspective gained by the examination of many sites. Information recorded during AGRRA surveys is deliberately restricted to relatively simple indicators of the health and/or abundance of stony corals, benthic algal groups and certain reef fishes present in zones of maximum reef development, as described by Kramer (2003).

**Constraints**

1. The geographic coverage given here for some sub-regions of the tropical western Atlantic is still incomplete, and these assessments collectively span a period of seven years. Some early surveys were conducted on reefs that were being, or recently had been, severely impacted by the 1998 ENSO mortality and/or subsequent disease events—live coral cover is known to have since decreased in at least several of these areas. There is considerable, between-assessment variation in sampling effort relative to the areal extent of the reefs being characterized, and observer bias doubtless has contributed to some of the variance in the data (Kramer, 2003). Moreover if team members are consistent in their bias, mistakes will not be evident when

coefficients of variation at different scales are compared. Thus we ask you to employ *extreme caution* if you plan to interpret means at higher spatial scales than have been provided in the Summary Products files.

2. The AGRRA protocols have evolved over the years, with Version 4 having been released in June 2005 (see [www.agrra.org](http://www.agrra.org)). Versions cited in the posted data, and year of initial release, are as follows: V1 in 1997; V2 in 1998; V2.1 and V2.2 in 1999; V3 in 2000, V3.1 in 2001, and V3.2 in 2003. (The major methodological differences among these earlier versions are summarized in Richards Kramer and Lang, 2003.) Protocol changes further restrict comparisons among areas and/or among years.
3. The survey sites are characterized by the following simplified zone terminology:
  - BANK = offshore reef lacking a shallow crest;
  - CREST = reef crest, including any seaward *palmata* (or equivalent), reef flat and rear subzones, or summit of a chapeirão (Abrolhos, Brazil, only);
  - FORE = seaward of a crest, including any terrace, escarpment and slope subzones (includes the reef front);
  - LEE = lagoonward of the crest (and similar depth as fore reef);
  - PATCH = isolated reef, usually in a lagoon;
  - RC/FR = interface between crest and fore reef (specific to fringing reefs around offshore island in Abrolhos, Brazil);
  - RHOMB = rhomboid shoal reefs (specific to the lagoon in south-central Belize).
4. Habitat variation clearly affects a number of the AGRRA indicators (Kramer, 2003). It is hoped that on-going efforts to further partition the zones by orientation, slope, etc., will be reflected in future releases of the database and its summary products.

### Summary Products

1. Each Excel file contains two sheets. In the *Key* sheet, the column headers of the corresponding *Data* sheet are described, along with any additional notes or filters used to standardize the data. If you are confused about the formatting in any file, don't hesitate to contact Judy Lang or Ken Marks at [info@agrra.org](mailto:info@agrra.org), but first—check the corresponding *Key* sheet to see if an explanation has already been provided.
2. The *Batch* file includes the following summary information for each of the 1997-2004 assessments (hereafter termed batches): country and year of survey; area included in the surveys; version(s) of the protocol and data-entry spreadsheet; method of stratified site selection, from *unbiased* (= random) to *strategic* (= deliberate); the names and email addresses of team leaders or other participants who could be contacted for further information; and references to all AGRRA publications that are known to us.
3. The *-ByTransect* files contain the processed data for each transect in every site, expressed as the average (= mean) for any parameter with an  $n > 1/\text{transect}$ . Corresponding standard deviations are provided for any parameter with an  $n > 2/\text{transect}$ .

The *-BySite* files contain totals, averages and standard deviations based on the transect values in the *-ByTransect* files. Sites with fewer than 4 benthic transects are omitted from the benthos files, and sites covering less than 400 m<sup>2</sup> are omitted from the fish files.

For each reef zone in every batch that contains four or more sites, the totals, averages and standard deviations of the site averages in the *-BySite* files are given in the *-ByZone* files.

## Benthos Files

### *Line transects*

1. In the *LinearIntercept* files, *live stony coral cover* is absent from all batches employing Version 1, as this parameter had not yet been added to the AGRRA benthos protocol. *Maximum relief*, a proxy for reef rugosity that was introduced with Version 3, was assessed as the maximum height in cm of the reef within a 1-m radius of either three (1,5,9) or five (1,3,5,7,9) of the meter marks along the transect line.
2. Standardized assessments of the health of *individual corals* are a key component of the benthos protocol, yet colony boundaries are not always distinguishable in habitats dominated by easily fragmented species such as ramose acroporids and poritids or columnar *Montastraea annularis*. Relatively large misjudgments, even on the part of experts, are inevitable, particularly during surveys of reef crests in which *Acropora palmata* is beginning to recover over its own dead branches. The *CoralComposition* data, which is based on numbers of colonies counted, can be used in conjunction with the *CoralMortality* data to identify sites in which some of the data for individual corals may be suspect due to inaccuracies in the assignment of colony borders. (In Version 4, greater prominence is given to substituting point counts for individual-coral assessments whenever colonies are not distinct.)
3. Some transects in the Panama-2002 batch contained monospecific clumps of corals that were assessed using a point-count method because their colony margins were ambiguous. These data, which are currently incompatible with the measurements for individual corals, have been excluded from the database, and are listed in the *PointCountCoral* file. Transects that were predominantly composed of point-count clumps were not included in the standard product summaries for individual corals (*CoralComposition*, *CoralDisease*, *CoralMortality*, and *CoralSize*).
4. *Diameter* means the maximum projected diameter of the live and dead parts of a stony coral perpendicular to its axis of growth in the *CoralSize* files. *Height* is the maximum height of the live and dead parts of the coral parallel to its axis of growth. [A few heights that appear to have been coding errors (e.g., <5 cm in >50 cm diameter, massive corals) were deleted from these data summaries.]
5. A significant change in the benthos protocol in 2000 was the uniform adoption of 10 cm as the minimum diameter for assessing individual-coral health. (Minimum diameter for a number of the earlier surveys was 25 cm; occasionally other size cutoffs were used.) Hence two summary files are provided for the *CoralComposition*, *CoralDisease*, *CoralMortality*, and *CoralSize* data:
  - A. *25 cm*—to enhance compatibility among all the 1997-2004 batches, a filtering restriction removed any coral that is less than 25 cm in diameter;
  - B. *10 cm*—restricted to batches in which the minimum diameter was 10 cm.
6. *Coral Diseases* are assessed solely on the basis of externally visible signs. However, considerable uncertainty remains regarding their correct designation and nomenclature in the field, particularly for the white *Acropora* syndromes (here called white-band and white spot/patchy necrosis). Some entries that were clearly misidentified in the field (e.g., colonies of *Montastraea* assessed as having white-band disease in an area with a known outbreak of white plague) were reassigned, and acroporids coded with white plague were transferred to the *unknown* category.

7. *Recently dead* means that a coral's white skeleton is either exposed or covered with no more than a thin layer of algae or sediment. *Old dead* means that a coral's skeletal structures are no longer white, and either lost or covered over by epibenthic organisms that are not easily removed (see Lang, 2003, for details).

In the *CoralMortality* files:

- A. *Standing dead* refers to the *number of corals* that were completely old dead *over the entire surface of the coral*, still more or less in growth position, and identifiable at least to genus. Not included are any corals that were completely recently dead *over the coral's entire surface*.
- B. *Recent partial mortality* is estimated as the *percentage of the outward-facing surface of the coral* that is recently dead. 100% recent mortality is very rare (but see the Bahamas-1998B, Congo Town, D24 site).
- C. *Old partial mortality* is estimated as the *percentage of the outward-facing surface of the coral* that is old dead, and is calculated both with (OSD), and without (O), any standing dead corals.
- D. *Total partial mortality* ( $= \sum \text{old} + \text{recent partial mortality}$ ) is calculated both with (TSD), and without (T), any standing dead corals.

### **Quadrats**

1. Following a specification first given in Version 2 of the AGRRA benthos protocol (Richards Kramer and Lang, 2003), all quadrats in which *other* (*i.e.*, not algae) exceeded 20% have been removed from the summary files.
2. The algal groups surveyed in Versions 1 and 2 were *crustose corallines*, *algal turfs* and *macroalgae*; in Version 3, algal turfs were deleted, and macroalgae were subdivided into *fleshy* and *calcareous macroalgae*—each having its own estimate of mean *height*. To facilitate comparisons among all the AGRRA sites, a combined average of the fleshy + calcareous macroalgal components of Version 3 are given in the same columns as the macroalgae of Versions 1 and 2.
3. The *percent* data of the different algal functional groups do **not** portray the cover of algae on the reef as a whole (Lang, 2003) but rather were intended to indicate the relative abundances of the different algal functional groups. (In Version 4, coverage of crustose corallines, fleshy macroalgae and calcareous macroalgae are directly assessed as intercept lengths under the transect line.)

### **Fish Files**

1. Starting with Version 2.1, a minimum total length of 5 cm was specified for all species of haemulids (grunts) and scarids (parrotfishes). All <5 cm individuals of these two families have been removed from the summary *FishSize* files, and were omitted from the *FishBiomass* estimates.
2. The 6-10 cm size category represents a size range of 3-10 cm in the México-1999C batch, and no 0-5 cm individuals were recorded (Núñez-Lara et al., 2003).
3. *FishBiomass* estimates are based on previously established length-weight relationships for Western Atlantic fishes (see Marks and Klomp, 2003).

4. FishBase (<http://www.fishbase.org>) was used to determine the percentage of the diet of each species that consists of various food items, each of which, in turn, was assigned to one of three broad categories—Plants, Invertebrates, or Fishes. The estimated biomass of each species was then partitioned among the *Herbivore*, *Invertivore*, and *Piscivore* columns in proportion to the percentage of its diet in each category.
5. *Commercially Significant* species in the *FishDensity* and *FishBiomass* files correspond to those listed in FishBase as either having a *Commercial* or a *Highly Commercial* fishery. We are sadly aware that in some areas of the Caribbean a larger number, or even virtually all, fishes in the AGRRA species list are captured for human consumption by fishers.

### **Database**

1. Definitions of the columns of the various tables in the database are stored in the structure of the tables. By viewing a table in Design View, the column descriptions may be seen.
2. The connections (joins) between the tables in the database can be viewed by choosing Relationships from the Tools menu.
3. Summary Products have not been generated for the following columns that are in tables in the Benthos Database:
  - A. Comments about the habitat (provided for a few surveys);
  - B. Additional comments about the appearance or condition of the corals that were assessed as individuals (provided for some surveys);
  - C. The composition of the substratum in the quadrats (provided for many surveys);
  - D. Additional comments about the quadrats (provided for some surveys);
  - E. The density of any *Diadema antillarum*, expressed as numbers/10 m<sup>2</sup> in a belt transect centered on the line (provided for all surveys in most batches).

### **Acknowledgments**

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### **References**

Available as pdf files at [www.agrra.org](http://www.agrra.org)

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#### **Changes from the initial AGRRA release to V1.1 in 2005.**

- An error was fixed in the fish biomass calculations in which a typo had caused the piscivore biomass to be the same as the herbivore biomass. The piscivore biomass is now calculated correctly in the FishBiomass products.
- A few quadrats with fleshy and/or calcareous macro algal canopy heights of zero were set to NULL so as not to underestimate the overall macro canopy height which also corrected the corresponding value for macroalgal index in the Algae products.

#### **Changes from AGRRA release V1.1 to V1.2 in September 2006.**

- Three new batches of data from 2004 were added: Dominican Republic; Broward County, Florida; and Dry Tortugas, Florida.
- Errors in the fish data for one Venezuelan site (Dos Mosquises Sur) were corrected.
- Correct signs for latitude and longitude were added to prepare coordinates to transition into a GIS environment.
- CoralCompositionByTransect product was added.
- FishSizeBySpecies product was added.
- Coral species codes were changed from 5 letters to the 4-letter CARICOMP code of first letter of genus followed by first three letters of species name.
- CoralCover products were modified to LinearIntercept to facilitate transition to the V4 protocol.
- Algal products were renamed AlgalAbundance to more accurately represent the data.

**Changes from AGRRA release V1.2 to V1.3 in October 2006.**

- Addition of mean depths to –ByZone products.
- Errors in the fish data for one Venezuelan site (Dos Mosquises Sur) were corrected.

**Changes from AGRRA release V1.3 to V1.4 in May 2007.**

- Addition of Dominican Republic 2003 batch.
- Addition of GIS shapefiles for the sites as well as the derived products.
- Removed data from the 10 cm versions of the coral products for the batches where the corals were only measured down to the 25cm cutoff.
- Addition of some Millennium Map attributes (ecoregion, shelf, etc.) to the Site table.
- Minor data errors corrected.

**Changes from AGRRA release V1.4 to V1.5 in October 2007.**

- Deleted USA-2004A from the database and Summary Products as the sites surveyed are no longer considered to be reasonably representative of the survey area.
- Deleted Bahamas-1997 fish data as it was consistently underestimated.
- Removed coral recruit data as we have learned that their densities are underestimated in rapid assessments.