

Fish Censusing Method Guidelines  
(Adapted from Bohnsack & Bannerot, 7/86)

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These guidelines have been compiled from literature reviews, field trials, and training sessions conducted by Jim Beets, Fish & Wildlife Service both at West Indies Laboratory and in the field at Buck Island Reef NM. The following guidelines are for use in the field at Buck Island Reef NM (BUIIS) during the Cooperative WIL/NPS BUIIS Coral Reef Project annual quarterly censuses, and to be adapted to the needs for the "Aquaris" Mission, 89-3, April 10-25, 1989 in Salt River, St. Croix, USVI.

### Frequency of Censusing

NURP - As criteria, Jim Beets has indicated that at least 20 samples should be taken at each site, preferring 24 for statistical analysis (determined by previous use of this method in Florida). During the April mission, to complete both a baseline fish list for the area for this time of year fish censusing should be conducted every dive day and cover the entire diurnal cycle in the canyon.

Therefore, frequency will be everyday, sampling each site in AM and PM, collecting at least 20 censuses per site total for the mission. The censuses at each site will be conducted by a dive team making 10 census per dive. Normally each censusing diver is inside a 16 meter diameter cylinder and conducts a census alone, but within 20 meters of their buddy, but due to mission guidelines, buddy pairs must remain within 5 meters of each other. To comply with this rule censusing divers will remain together in the census cylinder and perform simultaneous censuses which will be compared for confirmation of species identification for that census. Team member Hillis will conduct all censuses at all locations with other mission divers/buddy as back up. This will increase census continuity and reliability.

Field practice at BUIIS has indicated that to start censuses take approx. 15-20 minutes with divers becoming faster with practice, within two days censuses will take only 10 minutes each. With 2 divers making simultaneous censuses in each cylinder, 5 censuses will be made every 45 minutes. But with increase bottom time allowed by saturation this same team should be able to complete 10 censuses on the AM dive in less than 1 1/2 hours. In PM this will be followed up by same dive team returning to same site to collect last 10 censuses for this site. On two dives 20 censuses per site will be collected.

Total 6 sites = 12 dives; 2 dives/site = 20 census/site.

## Site Selection

NURP - After review of previous fish census studies at Salt River Canyon, most species are found at 60, 90, 120 foot depths. To match this data with new sampling method described here 6 of the 8 study sites chosen for this mission will be censused, as time and man-power permit. Three sites on the East Wall (Station 3), including site 10 at 60', 11 at 90', and 12 at 120', and three sites on the West Wall (Station 2), 4 at 60', 5 at 90', and 6 at 120'. Sites 2 and 8 will not be censused because they occasionally effected by inshore runoff and as visibility is critical to the results of this method, i.e. it can not be conducted with less than 20 meters visibility, these sites will not be included.

## Sample Census Schedule:

Site selection at 4 mission stations will be conducted during the pre-saturation dives of the canyon. On the first day of mission, 4/14/89, the first PM census will be conducted at station 2/60' prior to drilling activities which will follow. Once stations transects at 60', 90', 120', have been selected and marked off censusing can begin at these sites and should be conducted as first activity at each site each day to minimize any disturbances in the fish community at that site. Censuses should be alternated with other mission activities to minimize any bias created in course of other diver actions.

## Sample Census Schedule: "TENTATIVE"

|            | West Wall                                                                                   |       |        | East Wall |        |         |
|------------|---------------------------------------------------------------------------------------------|-------|--------|-----------|--------|---------|
| Date-April | 14                                                                                          | 15    | 16     | 17        | 18     | 19      |
| Station 2  |                                                                                             |       |        |           |        |         |
| Sites      | 4/60'                                                                                       | 5/90' | 6/120' | 10/60'    | 11/90' | 12/120' |
|            | (Area of Census/Date dependent on where other team member working and minimal disturb site) |       |        |           |        |         |
| Census AM  | 10cen./site . . .                                                                           |       |        |           |        |         |

PM 10 cen./site . . . (Census/site does not have to be completed on same day).

~~xxxxxx~~  
Total 20 census/site for mission.

AM Census = 0800 to 1200; PM Census = 1300 to 1600; Visibility limited censuses require certain light levels to be conducted.

## METHOD

The objective of the Bohnsack & Bannerot method essentially is to obtain stratified random point sampling of the fish community within a depth and habitat zone. This method also provides for changes over time and space, and adds the demension of biomass from size estimates.

To describe this method I will narrate what a dive team will do beginning to end on one fish census in one area. Assume site has

already been pre-selected and this is AM census, divers just arrived on site to conduct the first of 10 random point censuses in this area.

#### One Census:

Diver on site, along transect, pre-selected depth, e.g. 60' depth (55 to 65' range) and within one habitat zone area. Diver chooses 1st census site randomly, will orient to the wall, calling the wall - "the bottom" and conduct census perpendicular to the wall.

Diver will lay out meter tape along wall/bottom, out 16 meters which is full census cylinder diameter, weight it with rebars (painted green) cut to 15cm length, also put out several additional 15 cm rebars as size gauges (these will only be used until divers become familiar with size estimates at distance of cylinder).

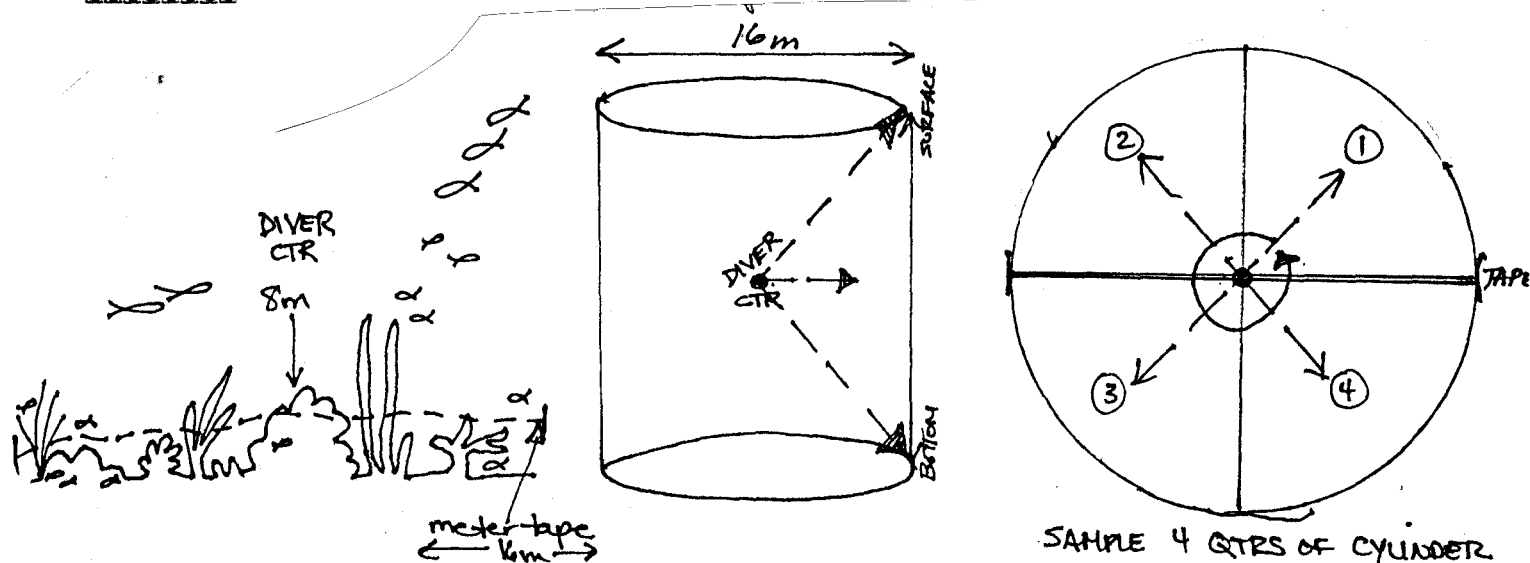
Diver positions himself at center (8meters) of cylinder. For 1 minute dive team, simultaneously notes all fish species seen in 1st quarter of the cylinder, writes names of fish seen (using shorthand common fish names), numbers of individuals, and estimates sizes as time permits and number of fish species allows. (If fish are too numerous, spend minute writing down species seen and go back at end of census and put in numbers of individuals and sizes). At end of 1st minute diver rotates to next quarter of the cylinder and again notes all fish and numbers seen in that cylinder, scanning bottom and up to surface, also note fish which swim through cylinder, i.e. schools of tangs, etc. Diver team continues 1 minute /quarter until all cylinder census is complete. At end of 4 minutes, all 4 quarters finished, diver takes 1 final minute and reviews full cylinder and records any fish not noted before and writes in sizes and numbers diver did not have time to in initial 1 minute observation periods.

At end of 5 minute census diver can go back and fill in numbers of fish seen and sizes and if seen any additional fish in area not previously recorded, write them down in "other" category; these will contribute to complete species list for area, but not statistics of census. Last activity at this census site will be to estimate percent composition of bottom under census cylinder and draw into circle grid. See drawings following.

Dive team will continue to do censuses until 10 are done for this area in the AM. Dive teams will complete census for this transect area and depth, picking random areas, NOT OVERLAPPING EACH OTHER, MAY BE CONTIGUOUS, and will be spread out along transect line.

Please note drawings on following page.

# DRAWINGS



Note: Fish census work should alternate with other mission activities at each site to minimize disturbances to fish community.

Example drill on Station 1 and census at Station 2, etc. Also if do AM census on Site 4, do PM census on site 3 so as to minimize effect of diver activity on fish composition. Never census in area after drilling. Maybe even alternate walls; do census on east wall first half of week and drill on West and visa versa second half of week.

Thank you.

Zandy