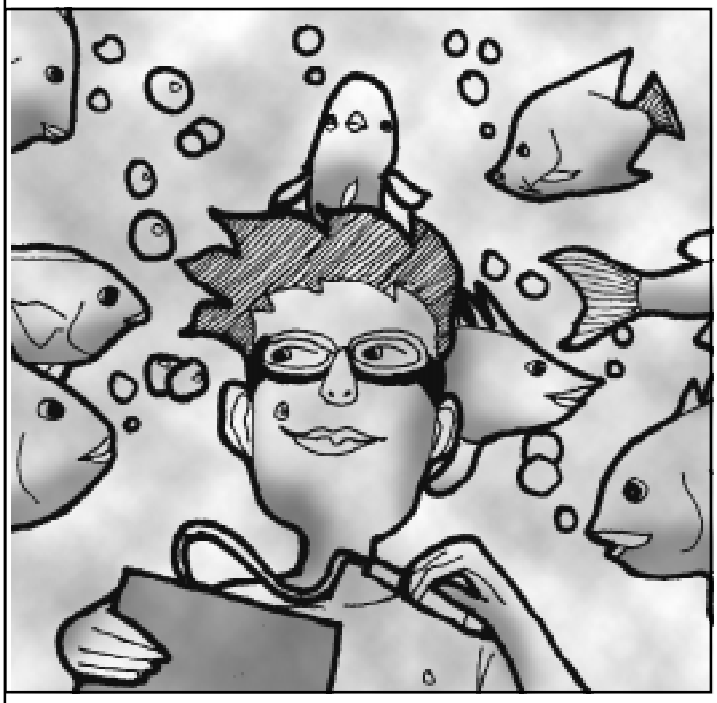
Observing Reef Fishes: Fish Visual Census

6



Definition

Fish visual census is the identification and counting of fishes observed within a defined area.

Purpose

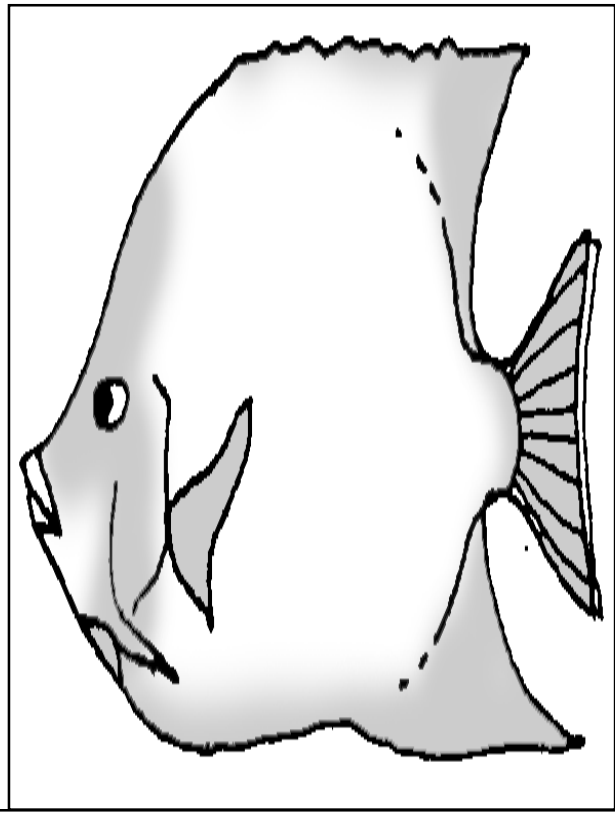
Fish visual census can be used to estimate the variety, numbers, and even sizes of common, easily-seen, easily-identified fishes in areas of good visibility. This information may reflect the health of the fish stocks within the surveyed coral reef areas.

Requirements

- ❑ Picture book of the animals (e.g. reef fishes) to be counted
- ❑ Goggles or mask and snorkel
- ❑ One or two 50-m lines each marked every 5 m
- ❑ Underwater slates with attached pencil

Optional

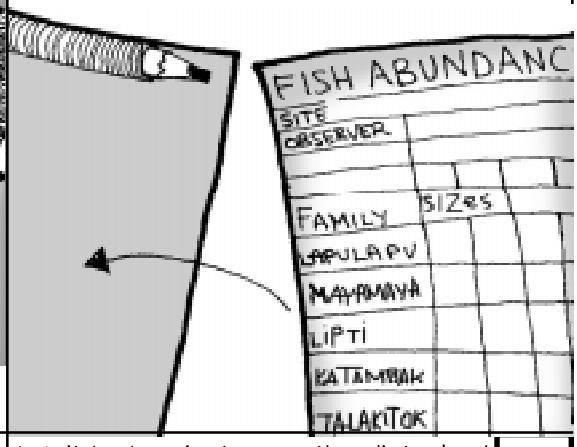
- ❑ Boat (depending on where the survey site is)
- ❑ Laminated fish identification guide (if observers are not familiar with the various fish types)
- ❑ Laminated butterflyfish identification guide (if indicator species are to be censused)
- ❑ Fins
- ❑ Life jackets



1 Select the sampling stations and fish types to be censused.

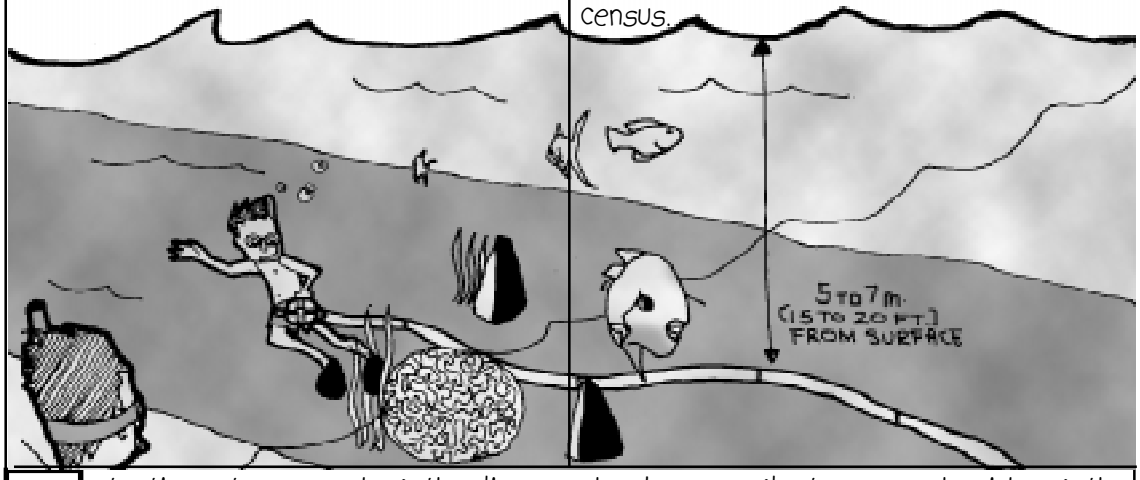
For each of the stations, do steps 2 to 6.

2 Copy the Data Form 5A onto the slates and draw columns for the different size classes.



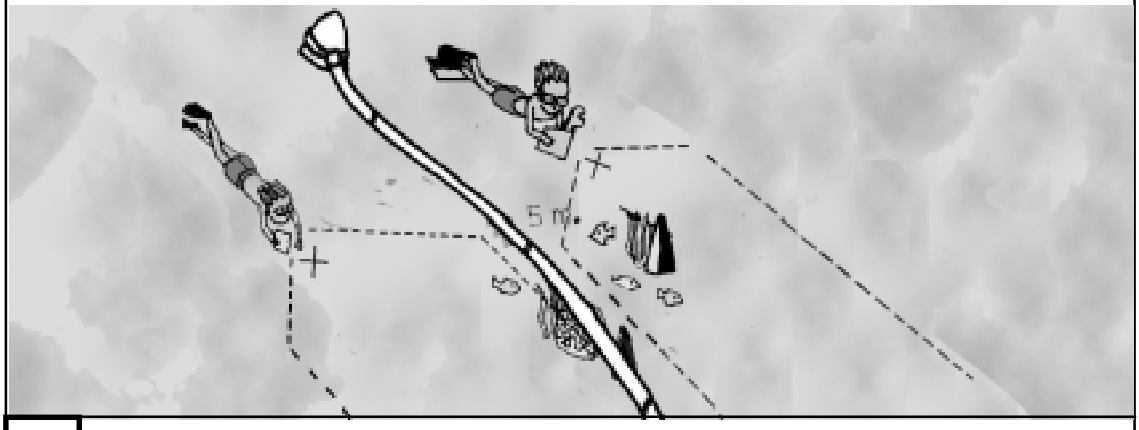
3 Lay the transect line on a constant depth contour. Record the depth.

4 Wait 10-15 minutes for the disturbed fishes to return. Be careful not to disturb the fishes during the census.

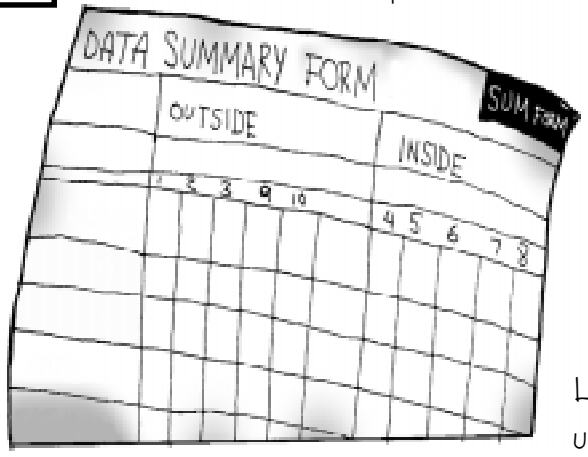


5 Starting at one end of the line, each observer floats on each side of the transect line while observing 5-m to his/her side of the transect and forward until the next 5-m mark.

6 Both observers swim to and stop every 5-m along the line to record the counts of fish per size class until the transect is completed. Generally, the faster moving fishes are counted before the slower moving fishes are counted. Each transect covers an area of 500 m^2 (50 m x 10 m width). Total counts on both sides and transcribe onto Data Form 5A.



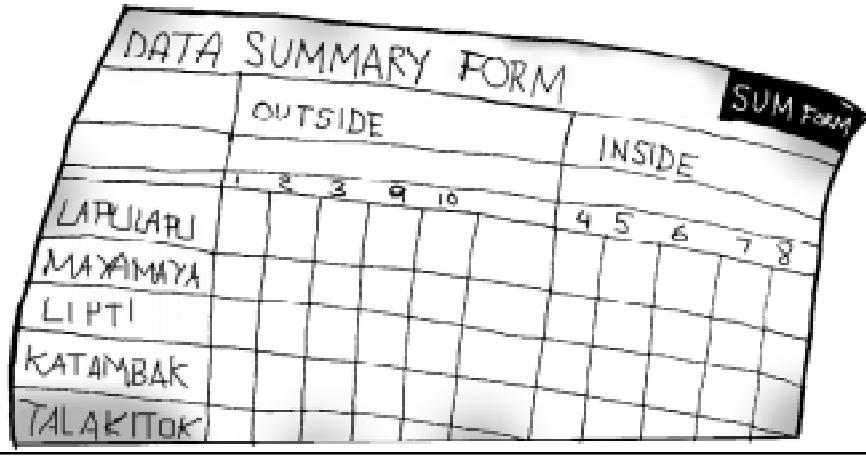
7 Classify the various transects according to your purpose for data summarization. For example:



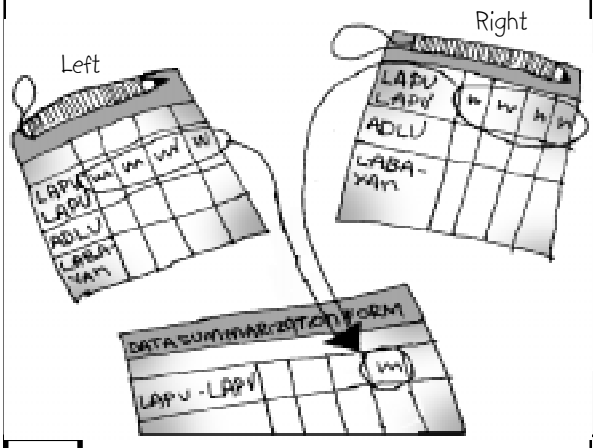
* reef zones or types (e.g. reef flat, reef slope, fringing reef, offshore reef, etc.),
* time of sampling (e.g. year 1/dry season, year 1/wet season, year 2/dry season, etc.)
* management or use zones (e.g. sanctuary, fishing grounds), and/or
* intensity of impacts (e.g. high pollution, medium pollution, low pollution)

List the transects by groups along the upper portion of the Summary Form.

8 List the fish groups or fish types (by groups) along the left side of the Summary Form.



9 Total the counts of the different size classes for each type of fish per transect.



10 Write these sub-totals onto the appropriate boxes on a copy of the summary form.

SALT 1	TRANSECT 2	TRANSECT 3	TRANSECT 9	TRANSECT 10	TOTAL	AVERAGE
12	11	5				
4	7	8				
2	12	14				

11 Sum sub-totals for each fish type/ group for each transect group.

SUB-TOTAL

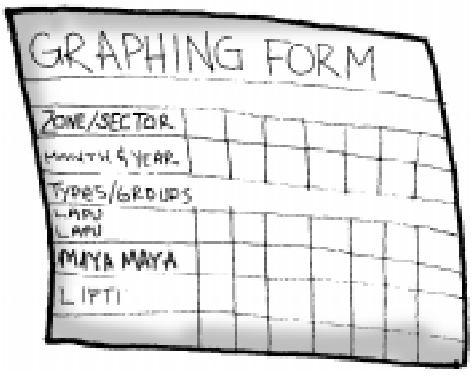
	2	3	4	10	TOTAL	AVERAG
2	11	5	3	5	36	
4	7	8	5	1	25	5
2	12	14	0	2	30	6

12 Standardize the sub-total by sample size: Divide the total counts by the number of transects actually observed.

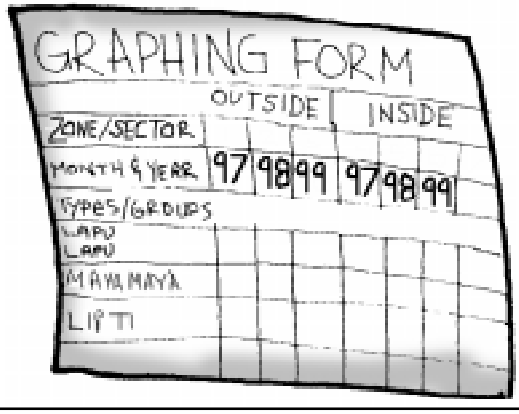
Example:

$$\frac{12 + 11 + 5 + 3 + 5}{5 \text{ transects}} = 7 \text{ fishes/transect}$$

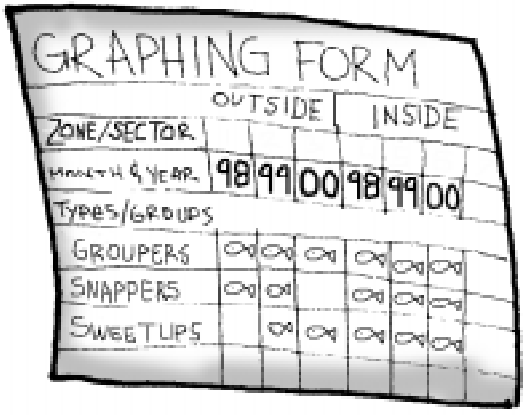
13 Choose a few fish types of interest and list these along the left side of the Fish Graphing Form.



14 List the zone/sector, month, and year on the designated space on the form.



15 Use the following guide to represent the average number of fishes observed in each zone/sector and month/year.



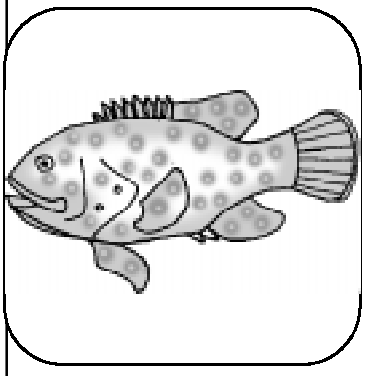
NUMBER OF FISHES	PICTOGRAPH
>0-5	
>5-25	
>25-125	
>125-625	
>625	

STRENGTHS

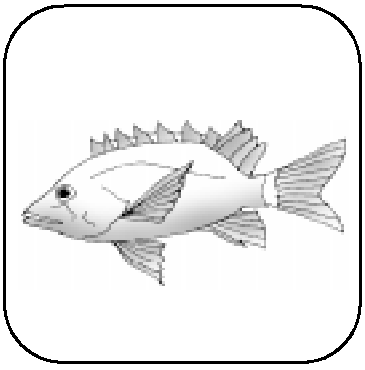
1. Useful for simultaneously censusing many species
2. Can also be used for other organisms like crown-of-thorns starfish and urchins.

LIMITATIONS

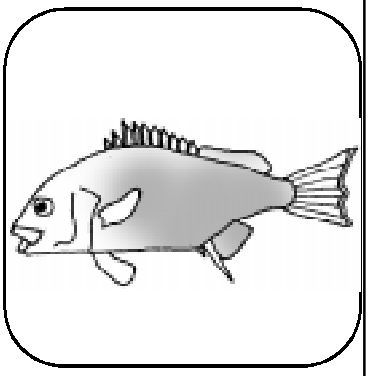
1. Only the shallower depths (upper 3-7 m [15-20 ft] depending on visibility) may be censused by non-divers.
2. Fishes may be frightened by or attracted to the census takers thus biasing observations.
3. Not suitable for cryptic, sparse or highly mobile fishes.



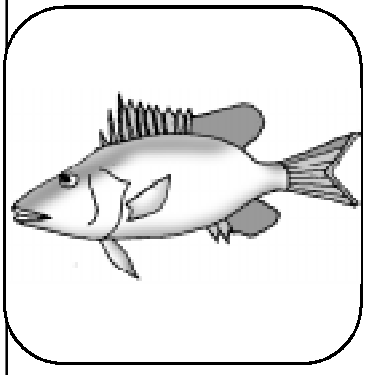
EPINEPHELINAE
groupers,
lapu-lapu, *pogapo*,
sono



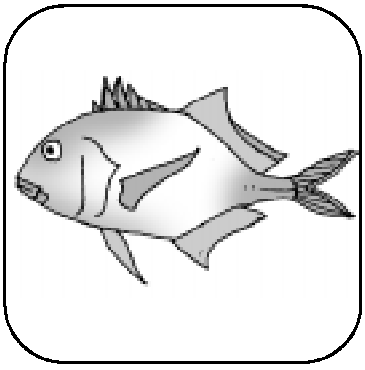
LUTJANIDAE
snapper,
katambak, *awoman*,
maya-maya, *islawan*



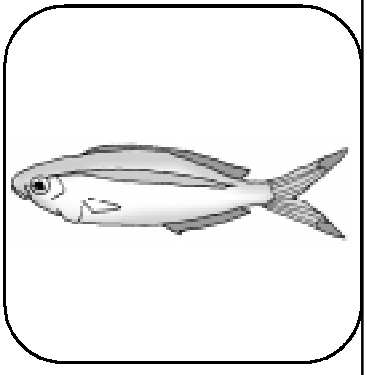
HAEMULIDAE
sweetlips, grunts,
lipti



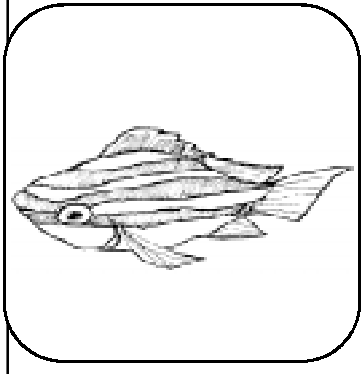
LETHRINIDAE
emperors,
katambak, *dugso*



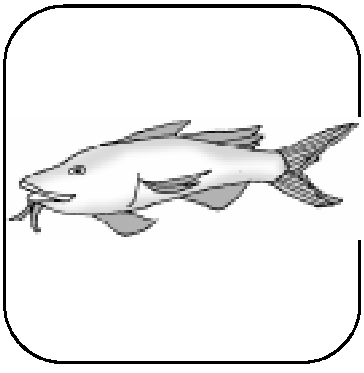
CARANGIDAE
jacks, trevallies,
talakitok, *mamsa*



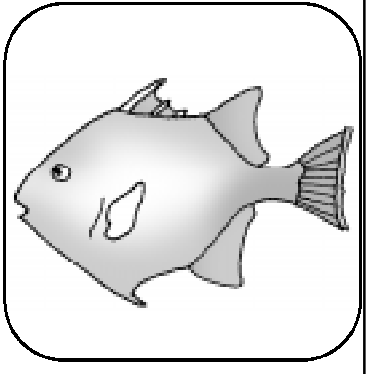
CAESIONIDAE
fusiliers,
dalagang-bukid, *solid*



NEMIPTERIDAE
coral breams,
silay

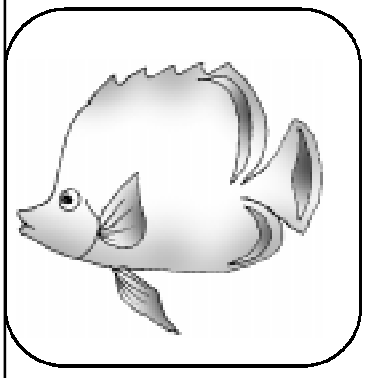


MULLIDAE
goatfish,
timbongan

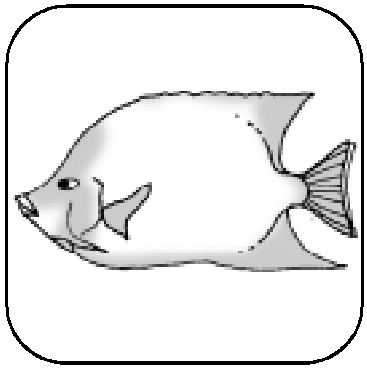


BALISTIDAE
triggerfish,
pakol, *pugot*

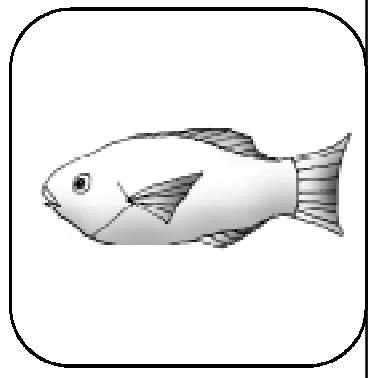
Fish Families



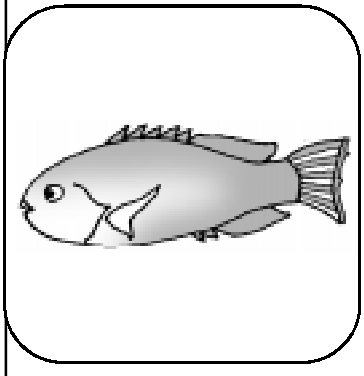
CHAETODONTIDAE
butterflyfish,
alibangbang,
pisos-pisos



POMACANTHIDAE
angelfish,
adlo

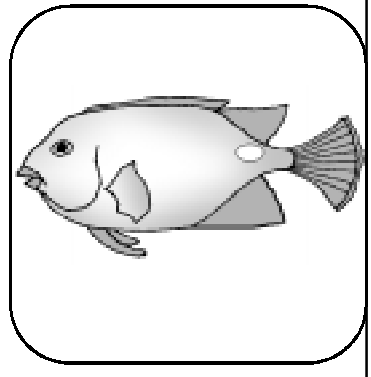


LABRIDAE
wrasses,
labayan

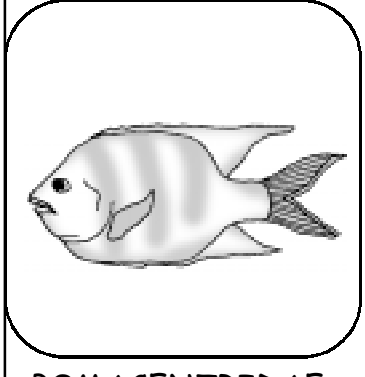


SCARIDAE
parrotfish,
molmol

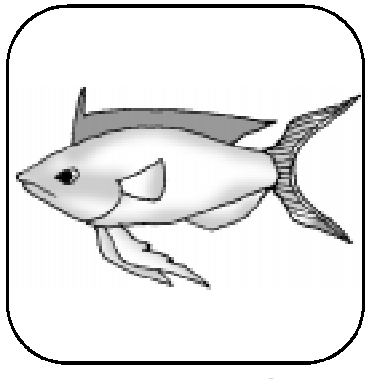
ACANTHURIDAE
surgeonfish,
indangan, *labahita*,
sunghan, *bagis*



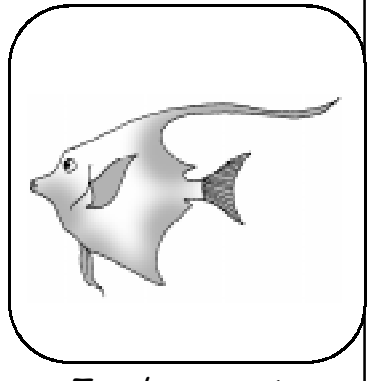
SIGANIDAE
rabbitfish,
danggit, *kitong*,
samaral



POMACENTRIDAE
damselfishes,
pata, *kapaw*, *palata*



ANTHIINAE
fairy basslets,
bilong-bilong



Zanclus cornutus
Moorish idol,
sanggowanding

Sample data for the Fish Abundance Data Form showing data from one transect

FISH ABUNDANCE DATA FORM — Form 5A

Site Name: TUKA I (BUFFER ZONE)		**Municipality & Province:** Kiamba, Sarangani	
Transect No.: 10	**Depth (m):**	**Coordinates:** 5°59.10' N, 124°36.71' E	
Date (mo/day/yr): 3/20/99	**Time:**	**Left observer:** Ben Banquil	**Right observer:** Andre U.
Habitat notes:		**Horizontal visibility (m):** 3.5	**Angle of slope:** 15-20° / **Transect orientation:** East

FAMILY	Species	Record number of fishes per size class			
		1-10 cm	11-20 cm	21-30 cm	specify sizes for >30 cm
<EPINEPHELINAE> groupers; lapu-lapu		2			
Barramundi cod; senorita					
<LUTJANIDAE> snappers; *maya-maya*		12			
<HAEMULIDAE> sweetlips; grunts; *lipti*					
<LETHRINIDAE> emperors; *katambak*		1			
CARANGIDAE jacks; trevallies; *talakitok*					
CAESIONIDAE fusiliers; *dalagang bukid; solid*					
NEMIPTERIDAE coral breams; *silay*		4			
MULLIDAE goatfishes; *timbongan*		7	2		
BALISTIDAE triggerfishes; *pakol*		11			
CHAETODONTIDAE butterflyfishes; *alibangbang*		24			
POMACANTHIDAE angelfishes; *adlo*					
LABRIDAE wrasses; *labayan*		26			
Humphead wrasse; *mameng*					
[SCARIDAE] parrotfishes; *molmol*		4			
Bumphead parrotfish; *taungan*					
[ACANTHURIDAE] surgeonfish; *indangan*		33			
[SIGANIDAE] rabbitfishes; *kitong*; *danggit*			1		
[KYPHOSIDAE]* rudderfishes; *ilak*			1		
POMACENTRIDAE damselfishes; *palata*		670			
ANTHIINAE fairy basslets; *bilong-bilong*		12			
Zanclus cornutus Moorish idol; *sanggowanding*					
sharks					
rays					
sea turtles					
others	cardinal fish	6			
	filefish	3			
	soldierfish	3			
	flutemouth		1		

Legend: <fishes> = major reef carnivores; [fishes] = major reef herbivores, **fishes** = fishes which are indicators of hard corals

DATA SUMMARY FORM

Form 5B

Site Name: Tuka Reef (Barangay Poblacion) | **Municipality & Province:** Kiamba, Sarangani

Zone/Sector:	Outside							Inside						
Month & year:	March 1999							March 1999						
Transect #:	1	2	3	9	10			4	5	6	7	8		
Types/groups	**Sub-total**					**Total**	**Avg.**	**Sub-total**					**Total**	**Avg.**
Groupers	5	0	2	3	2	12	2.4	5	2	3	2	6	18	3.6
Snappers	5	0	1	2	13	22	4.4	3	7	4	1	1	16	3.2
Sweetlips	1	0	0	1	0	2	0.4	0	0	0	0	0	0	0
Emperors	0	0	2	0	1	3	0.6	16	0	5	1	1	23	4.6
Jacks	0	0	1	2	0	3	0.6	0	0	1	10	1	12	2.4
Fusiliers	13	0	0	35	0	48	9.6	0	0	1	0	0	1	0.2
Spinecheeks	1	0	2	14	4	21	4.2	12	0	14	3	2	31	6.2
Goatfishes	22	18	21	36	9	106	21.2	7	23	16	5	0	51	10.2
Triggerfishes	33	20	41	36	11	141	28.2	9	15	21	34	27	106	21.2
Butterflyfishes	82	43	54	49	24	252	50.4	21	55	50	24	58	208	41.6
Angelfishes	26	16	21	15	0	78	15.6	9	45	20	12	4	90	18
Wrasses	69	65	83	272	26	515	103	30	619	239	64	128	1080	216
Parrotfishes	11	8	0	2	4	25	5	2	12	13	2	51	80	16
Surgeonfishes	122	74	44	118	43	401	80.2	61	215	227	33	264	800	160
Rabbitfishes	5	0	1	0	0	6	1.2	1	10	9	2	2	24	4.8
Damselfishes	1032	1157	1420	617	670	4896	979.2	868	972	686	662	439	3627	725.4
Fairy basslets	13	18	3	45	12	91	18.2	4	1	12	9	1	27	5.4
Moorish idol	3	2	2	6	0	13	2.6	1	12	11	0	3	27	5.4
Cardinal fishes	76	0	0	0	6	82	16.4	3	0	2	2	1	8	1.6
Filefishes	3	0	7	0	3	13	2.6	0	0	0	7	2	9	1.8
Soldier fishes	38	1	9	0	3	51	10.2	9	0	10	0	10	29	5.8
Hawkfishes	3	2	0	0	1	6	1.2	0	0	5	0	0	5	1

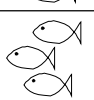
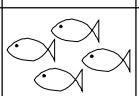
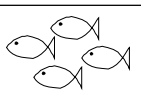
Sample summary data of fish abundance from 10 transects in Tuka, Kiamba, Sarangani

FISH GRAPHING FORM

Form 5C

Site Name: Tuka Reef

Municipality & Province: Kiamba, Sarangani

Zone/Sector:	Outside	Outside	Outside		Inside	Inside	Inside	
Month & Year:	Oct. 1998	Mar. 1999	Apr. 2000		Oct. 1998	Mar. 1999	Apr. 2000	
Types/groups								
Groupers								
Snappers								
Sweetlips								
Jacks								
Fusiliers								
Parrotfishes								
Surgeonfishes								
Rabbitfishes								

Sample graph using pictographs of fish abundance

Learning Laboratory

Write the local names for each of the various fish species in each fish family. Learn the English family name for that family. Do this for each of the fish families on the Data Form.

Picture	Local Names	English Family Name
1.		
2.		
3.		
4.		
5.		
6.		
7.		
8.		
9.		
10.		

Trainer's Tips for Chapter 6

Explain that species that are closely related are grouped into families.

Be careful not to disturb the fishes before and during the census. So, detailed benthos monitoring (this does not include manta towing) should be done after the fish census.

Check accuracy of count and size estimates. Fish dummies of different lengths may be used to train observers to estimate fish lengths underwater. Count estimates by the local team and by the trainers should not differ by more than one log5 abundance category (on page 43).

Some ways to collect more detailed information:

1. **Fish Length Observation.** Estimating the fish size to the nearest cm or inch is particularly effective for assessing marketable food species. However, close attention must be paid to standardizing the length estimates and adjusting the tendency for objects to look larger underwater than in reality. Prior to using this variation, the team must practice estimating underwater with fish models of known lengths. Even though having only one observer yields more consistent results, having a team is more sustainable and participatory.
2. **Indicator Butterfly Species.** Approximately half the species of butterflyfishes feed almost only on corals and so the number and variety of butterflyfishes is sometimes used as an indicator of the health and biodiversity of a coral reef. Simply list the kinds (species) of butterflyfishes observed on the transect and report this on Form 5D.

Other sampling units (e.g. 7-m radius cylinders) other than 50-m transects are also used by other visual census practitioners. When comparing your data with data from others using different sizes of transects, convert all their data to the same sampled volume (e.g. 2,500 m^3) first.

Review Questions:

1. If our marine fishery reserve is managed properly, what do you expect will happen to the fish counts inside the reserve? What about fish counts outside?
2. What should you use to estimate the width of the transect to be observed?

Trainer's Tips for Chapter 7

Invertebrates are counted over a 250 m^2 area while fishes are counted over a 500 m^2 area. You must convert the counts to density to make them comparable. For example, if 5 groupers were counted in a 500 m^2 area and 10 *Diadema* urchins were counted over a 250 m^2 area:

$$\frac{5 \text{ groupers}}{500\ m^2} \times \frac{10{,}000\ m^2}{1 \text{ hectare}} = \frac{100 \text{ groupers}}{\text{hectare}}$$

$$\frac{10 \text{ urchins}}{250\ m^2} \times \frac{10{,}000\ m^2}{1 \text{ hectare}} = \frac{400 \text{ urchins}}{\text{hectare}}$$

Observing Invertebrates

7

Definition

Invertebrate census is the identification and counting of animals without backbone (vertebrae) observed within an area of interest.

Purpose

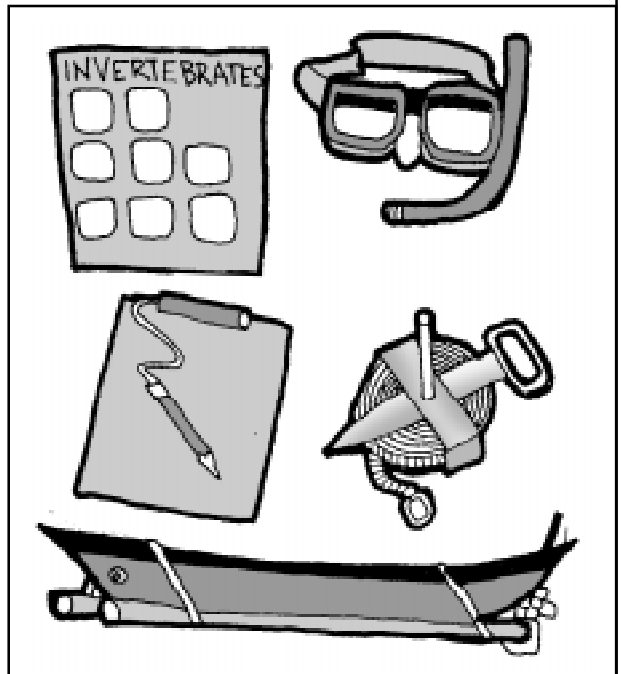
Invertebrate census can be used to estimate the numbers of non-cryptic invertebrates in areas of good visibility (although many invertebrates hide during the day). This information may reflect the health of the coastal resource stocks as well as the extent of invertebrate collection in the area.

Requirements

- ❑ Pictures of the animals (see next page) to be counted
- ❑ Goggles or mask & snorkel
- ❑ 50-m transect line marked every 5 m
- ❑ Underwater slates with attached pencil

Optional

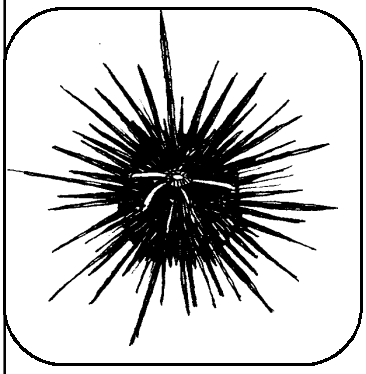
- ❑ Boat (depending on where the survey site is)



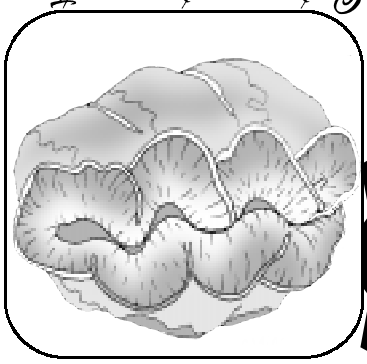
Step-by-step Procedure

Simply use the procedure for monitoring fish but count invertebrates instead (use Form 4A to record data and Form 5C to graph data). Look for invertebrates under overhangs and inside crevices. Sizes of invertebrates may or may not be recorded or monitored.

Invertebrates to be observed

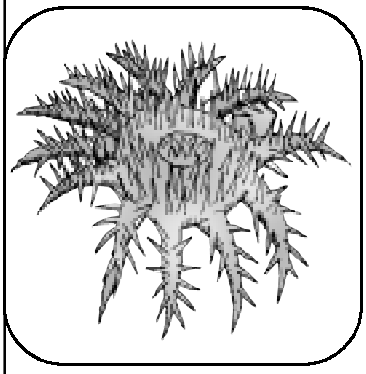


DIADEMA URCHIN
tuyom, para-para

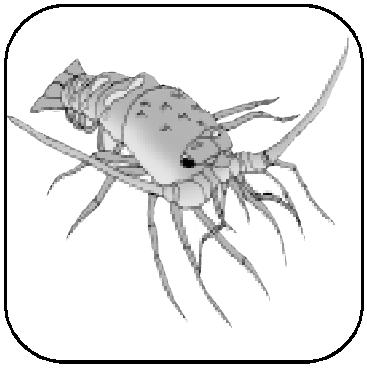


GIANT CLAMS
taklobo

Since invertebrates are not as mobile as fishes, 5-m transect width is used instead of 10-m transect width (total area sampled is 250 m^2)

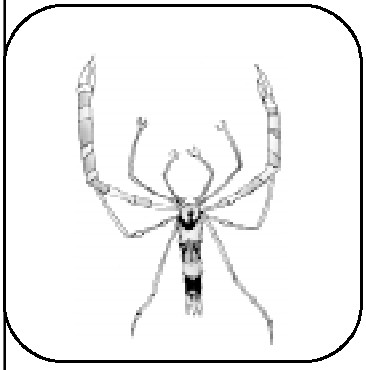


CROWN-OF-THORNS STARFISH
dap-ag, salamay

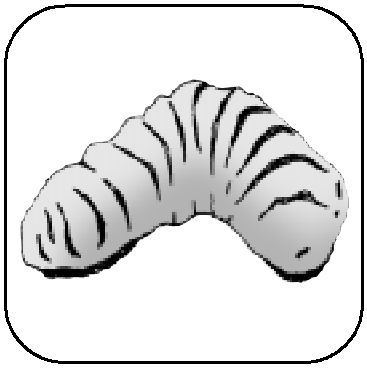


LOBSTER
banagan

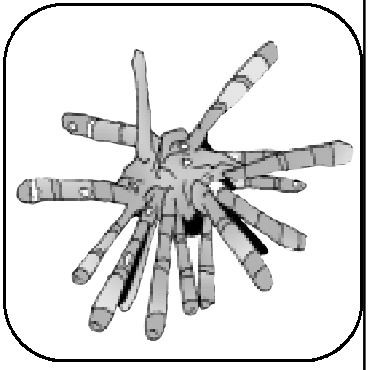
TRITON
tambuli



BANDED CORAL SHRIMP



SEA CUCUMBER
balat



PENCIL URCHIN