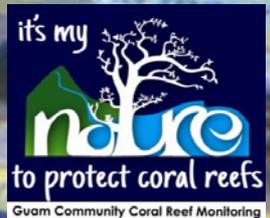
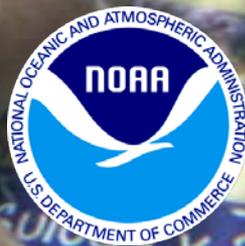


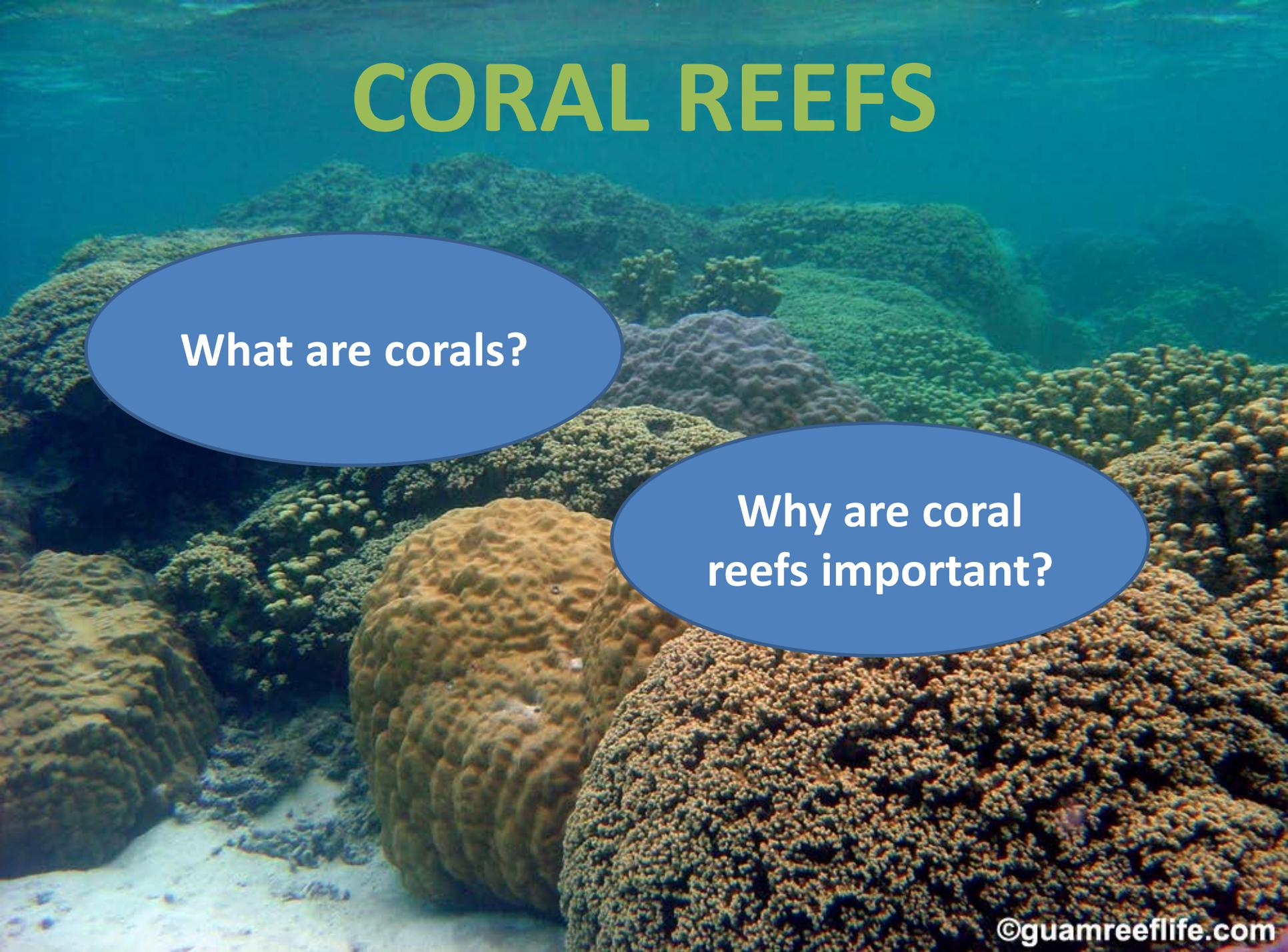
Community Coral Reef Monitoring Training



Val Brown
Marybelle Quinata
Guam Community Coral Reef
Monitoring Program
NOAA Fisheries



CORAL REEFS

An underwater photograph of a coral reef. The water is clear and blue. In the foreground, there are large, rounded coral structures with a textured, brownish-orange surface. In the background, there are more diverse coral formations, including branching and plate-like corals, in various shades of green and brown. The overall scene is vibrant and shows a healthy reef ecosystem.

What are corals?

Why are coral reefs important?

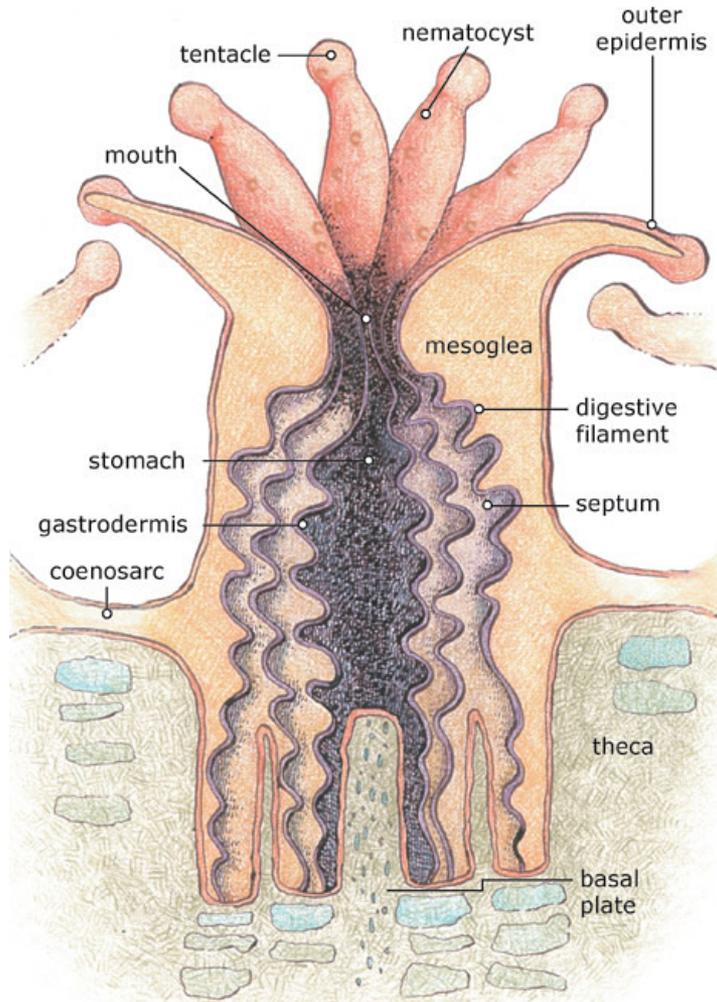
Introduction to Guam's coral reefs

- 108 km² (42 mi²) of shallow reef area within 0-3 miles; 110 km² between 3-200 miles
- Several different types of reefs on Guam: fringing reefs, barrier reefs, patch reefs, submerged reefs, offshore banks
- Over 5100 marine species; over 350 species of coral, > 1000 reef-associated fish species
- Possesses one of the most species-rich marine ecosystems of any U.S. jurisdiction

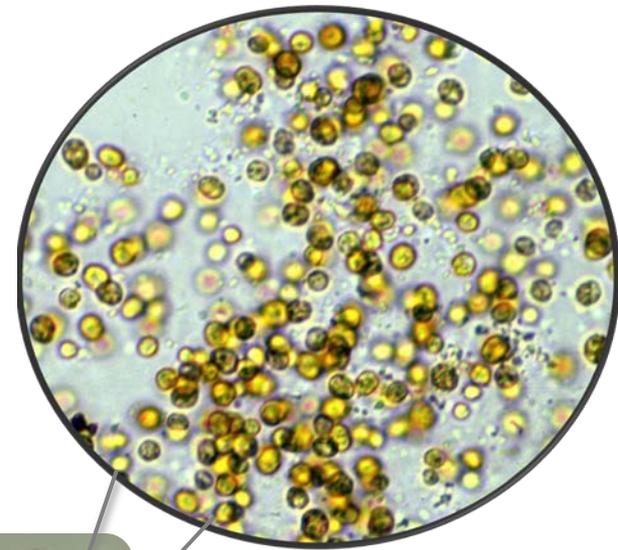


Quickbird satellite imagery provided by DigitalGlobe

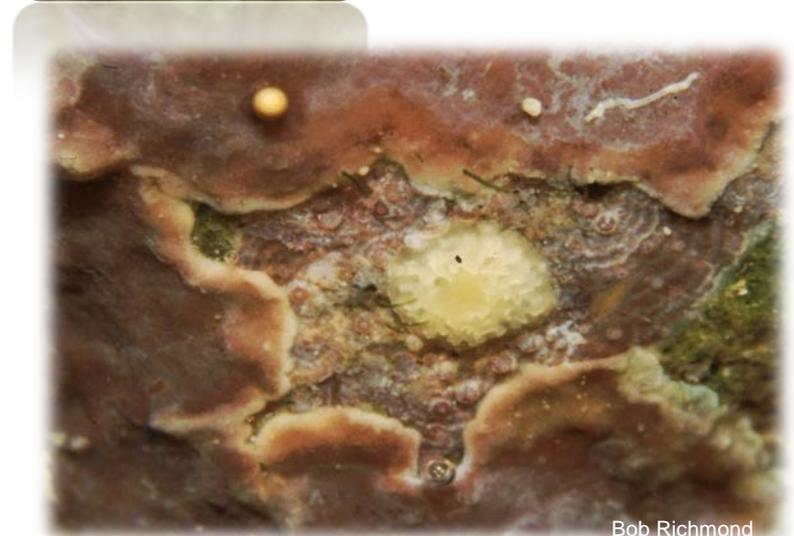
What is a Coral?



NOAA National Ocean Service

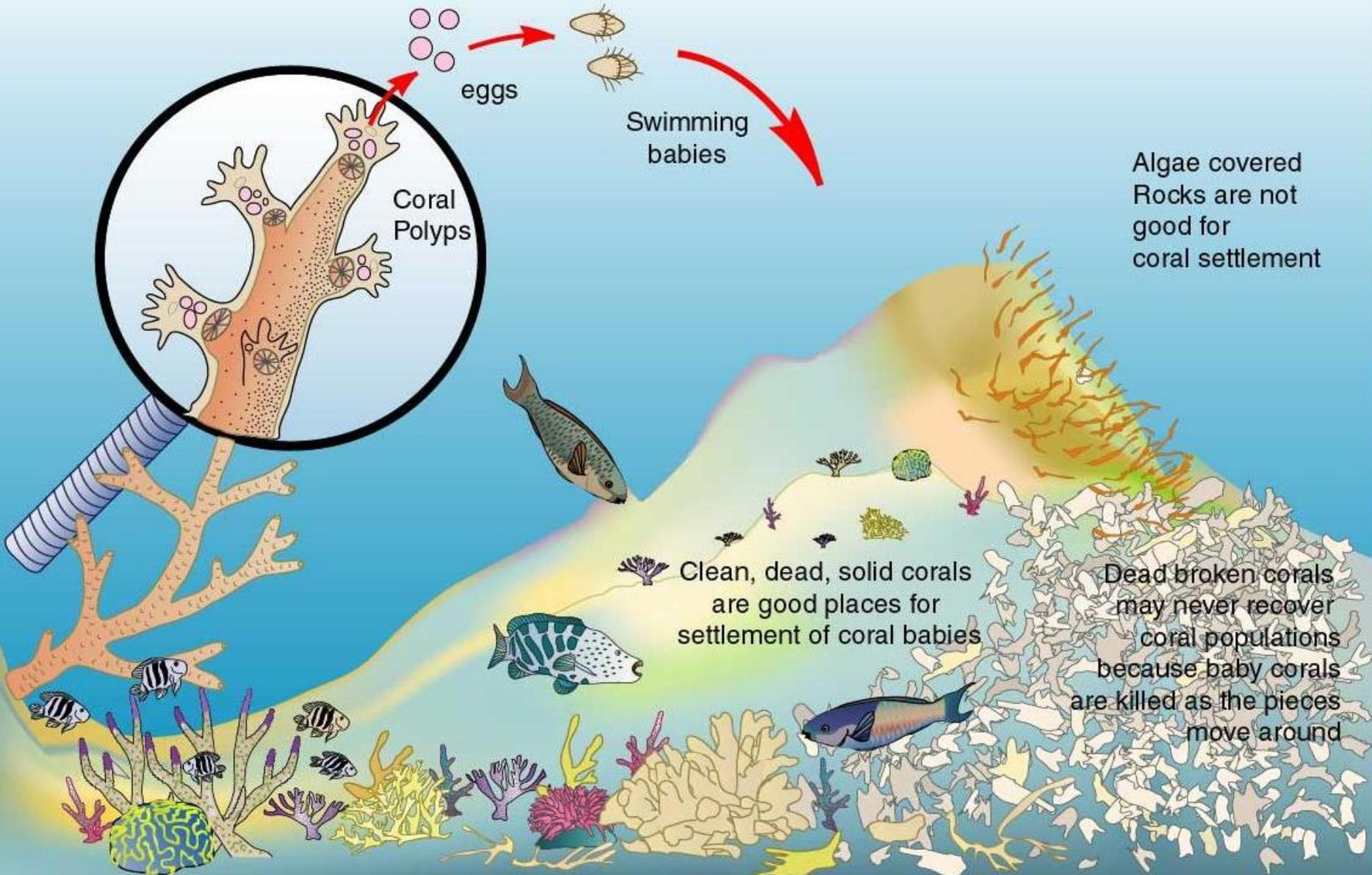


NOAA CRCP



Bob Richmond

Baby corals need hard, clean rock surfaces to settle on and begin growing

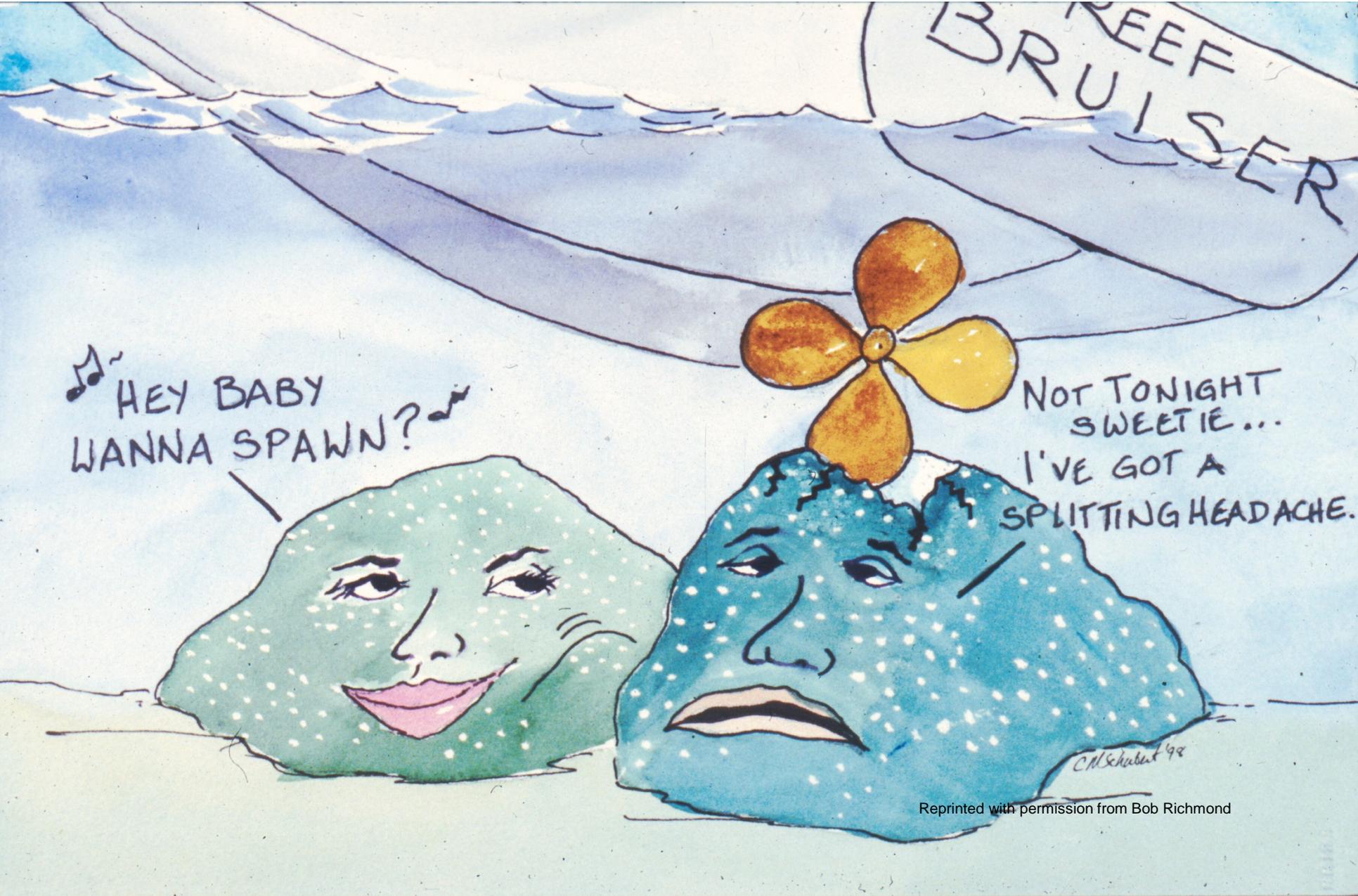


Sensitive to Temperature



86°F / 30°C

Coral Bleaching



REEF
BRUISER

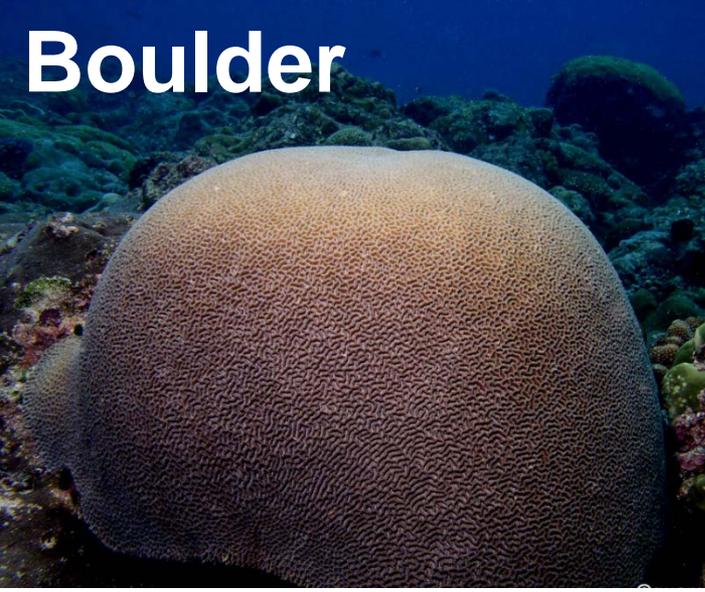
HEY BABY
WANNA SPAWN?

NOT TONIGHT
SWEETIE...
I'VE GOT A
SPLITTING HEADACHE.

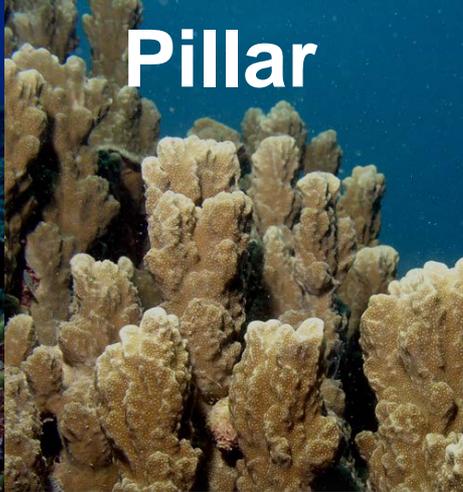
C.M. Schubert '98

Reprinted with permission from Bob Richmond

Boulder



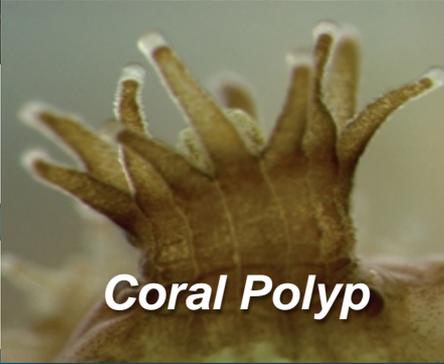
Pillar



Plate



Colonies



Coral Polyp



Colonies

Branching



Soft



Encrusting





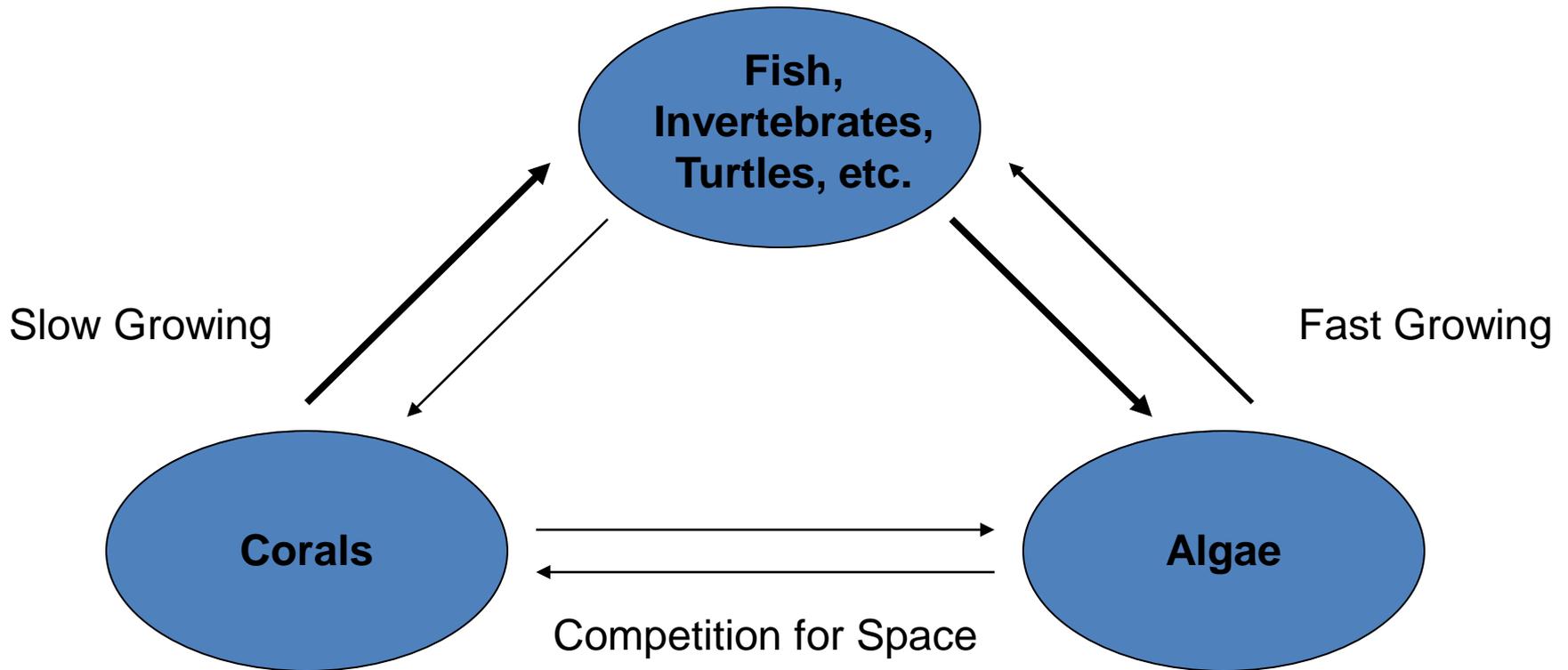








Simplified View of a Reef



- Structure
- Protection
- Food

- Food
- Structure
- Protection

Corals and Algae in a Reef Without Herbivores....



(Hughes et al 2007)

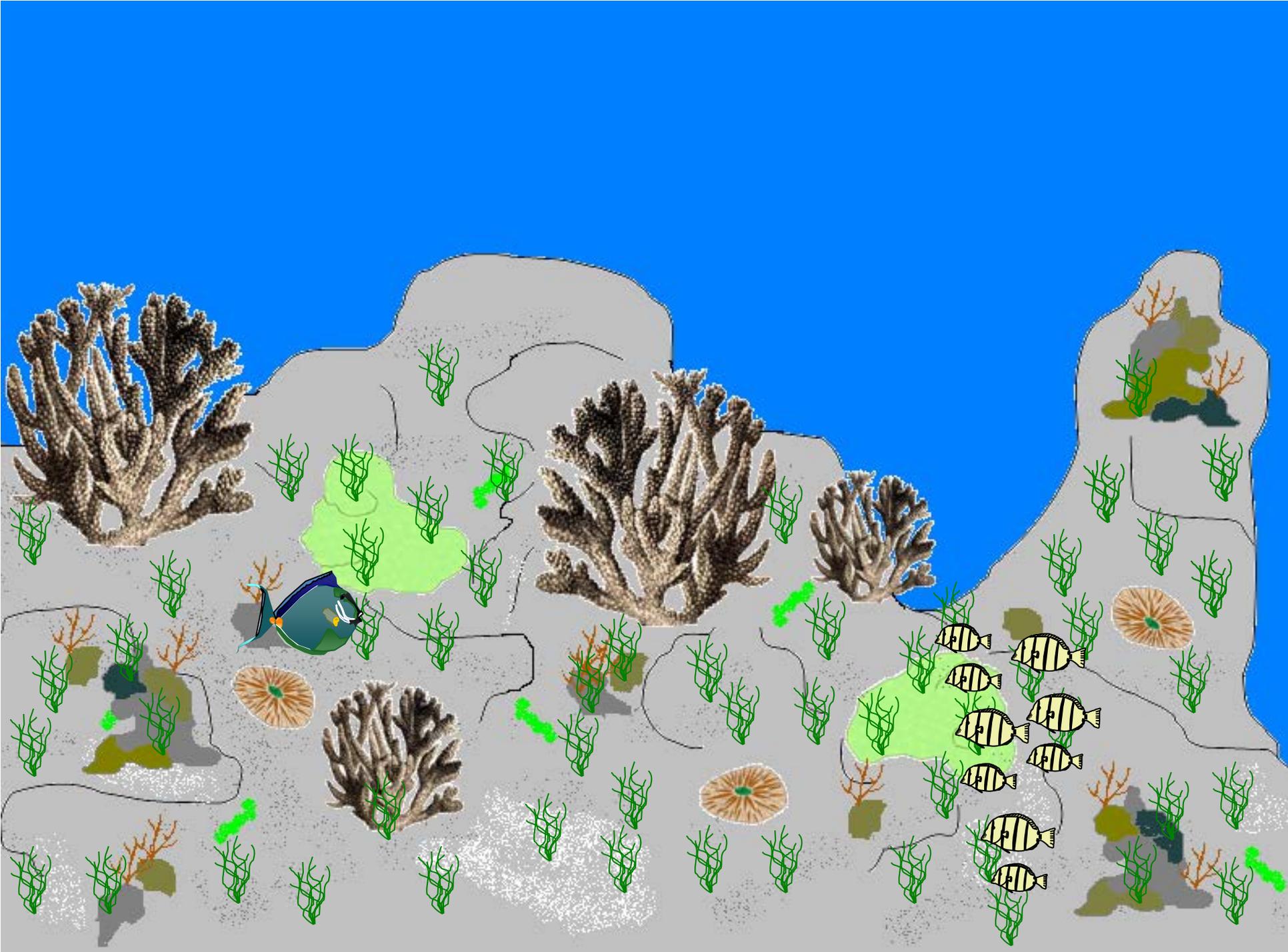
Corals and Algae in a Reef Without Herbivores....



(Hughes et al 2007)









Scrapers/Small Excavators



©guamreeflife.com

Grazers/Detritivores



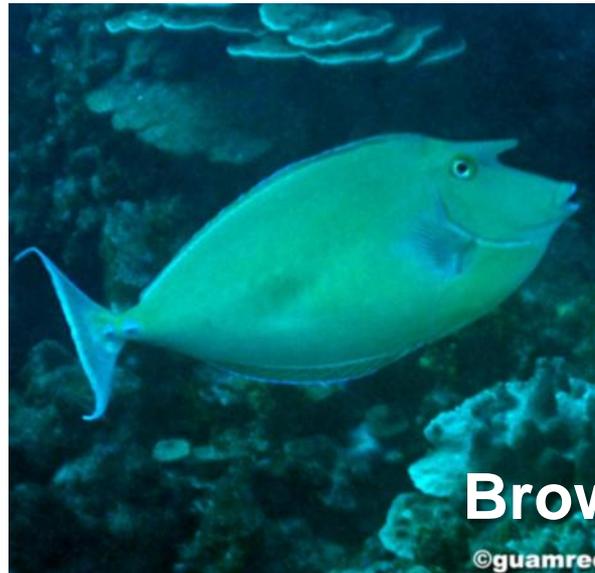
©guamreeflife.com

©guamreeflife.com

Fish Jobs

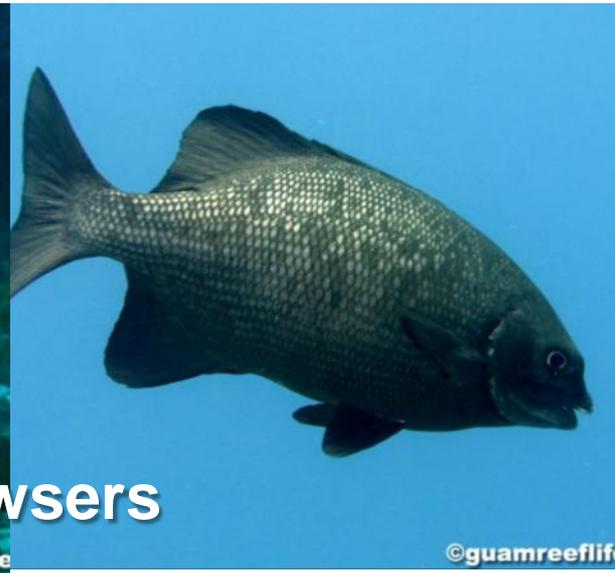


Large Excavators/Bioeroders



Browsers

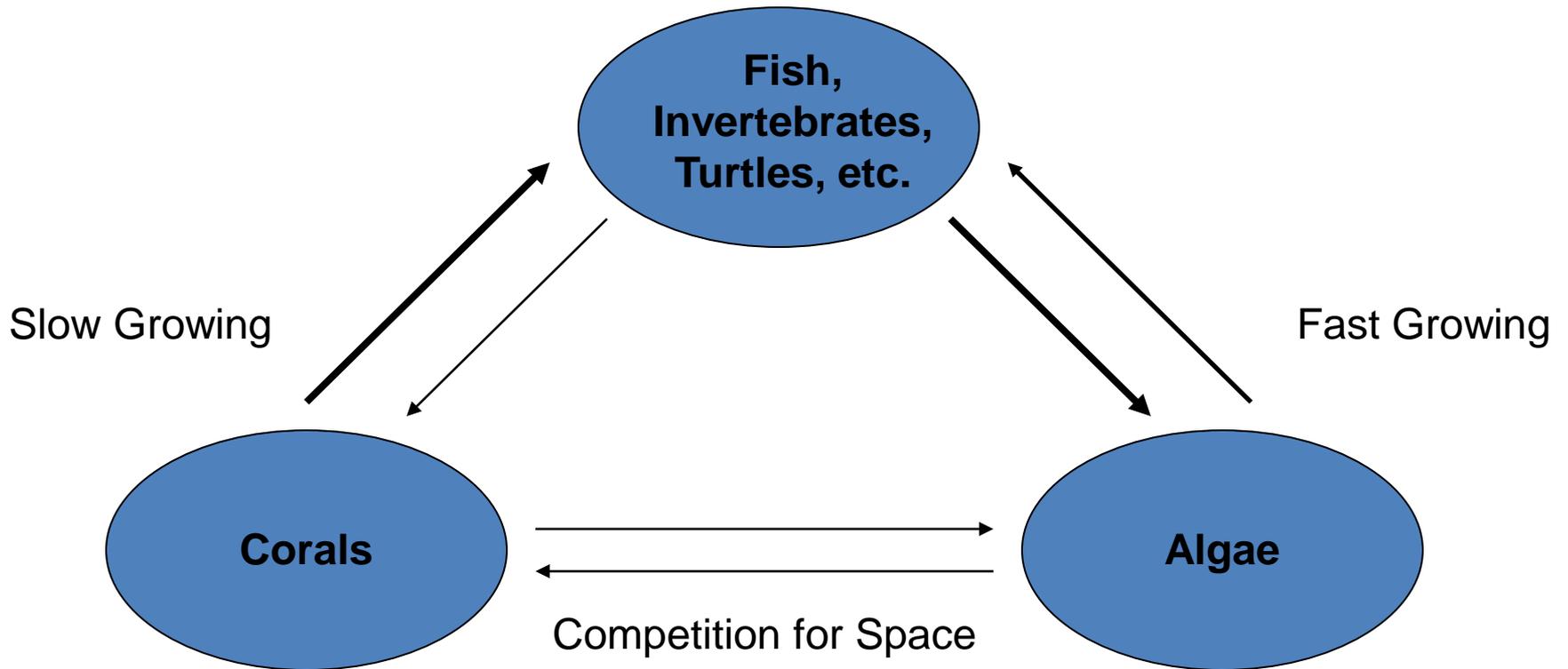
©guamree



©guamreeflife

Photos: Guamreeflife.com

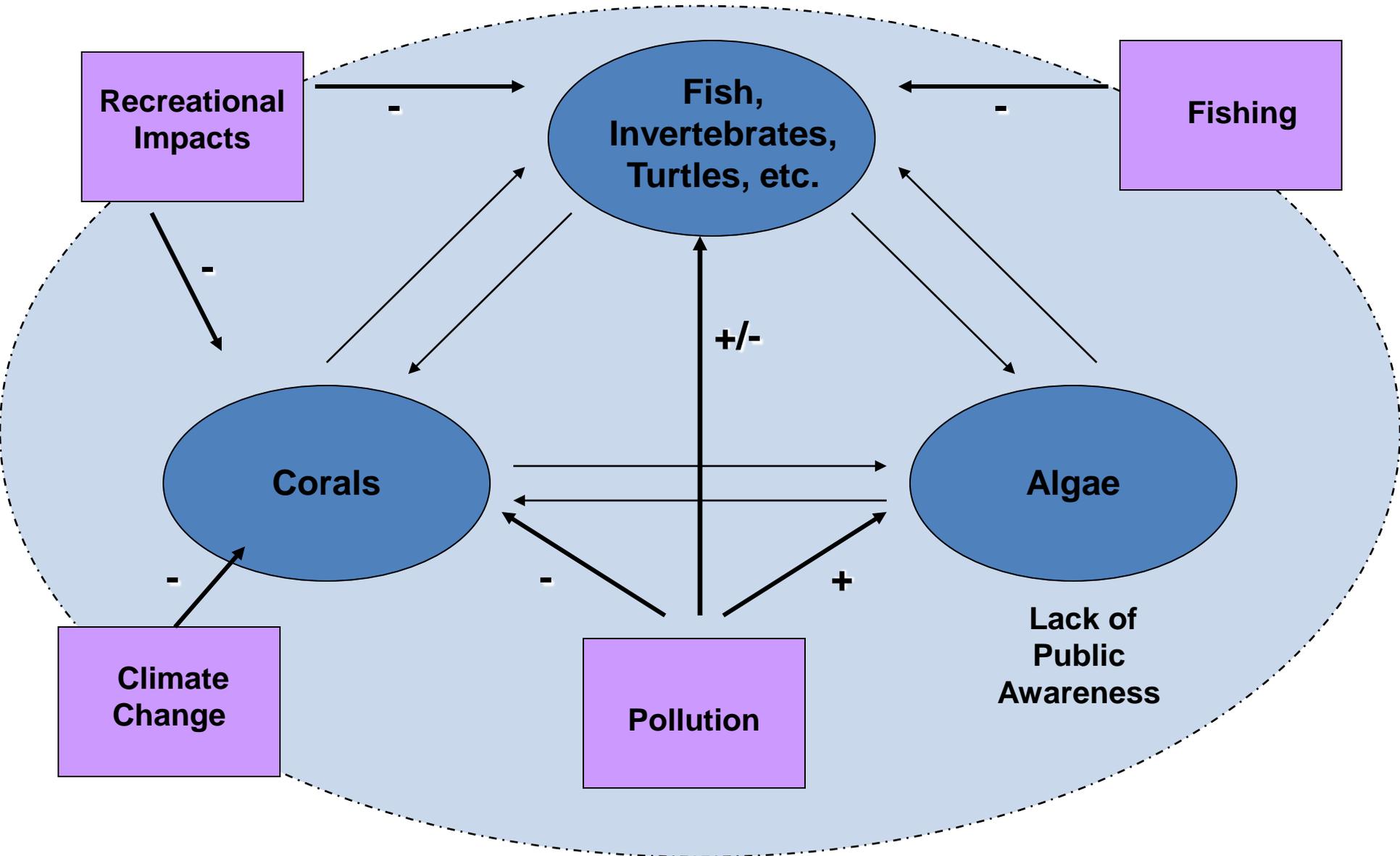
What's missing?



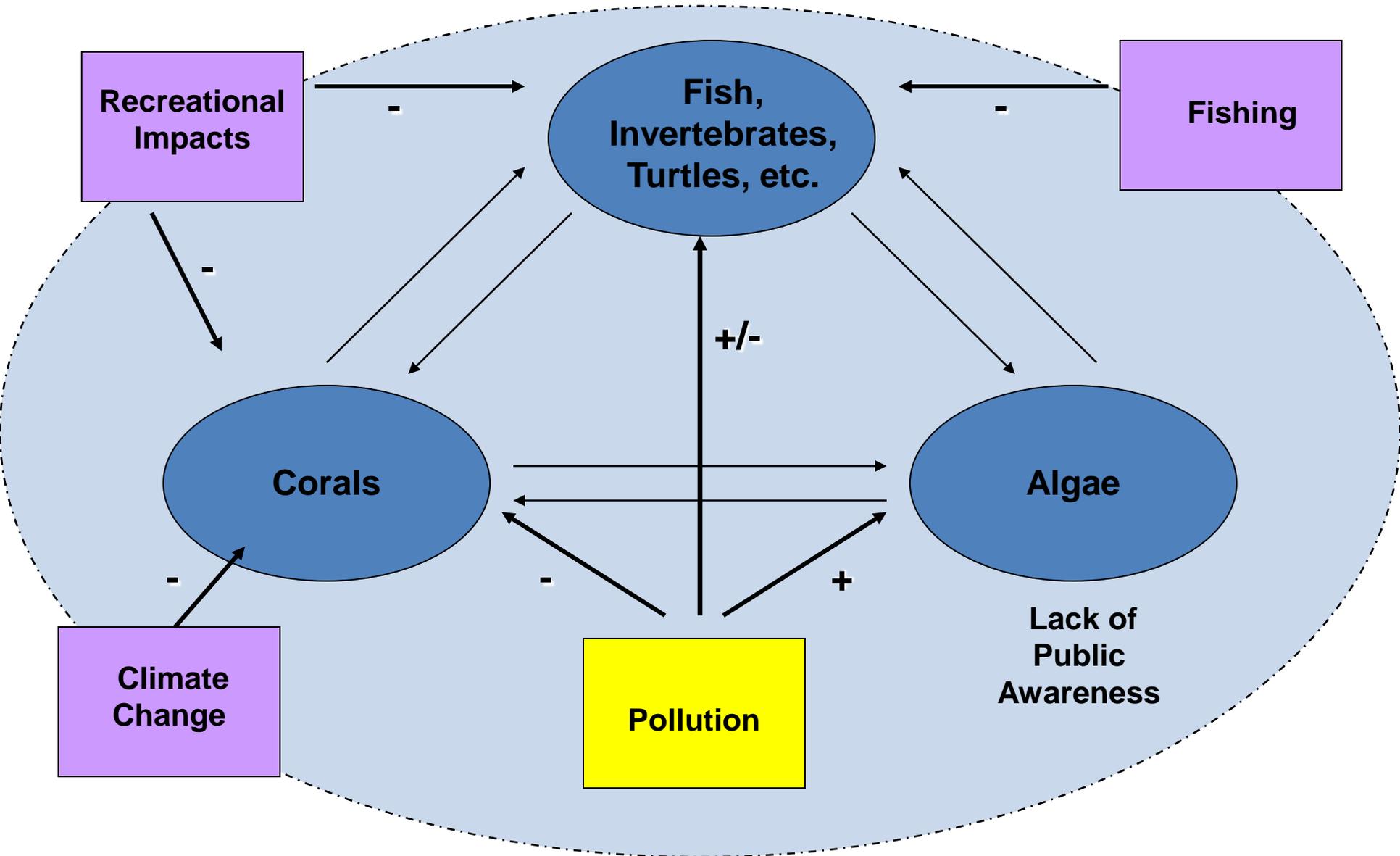
- Structure
- Protection
- Food

- Food
- Structure
- Protection

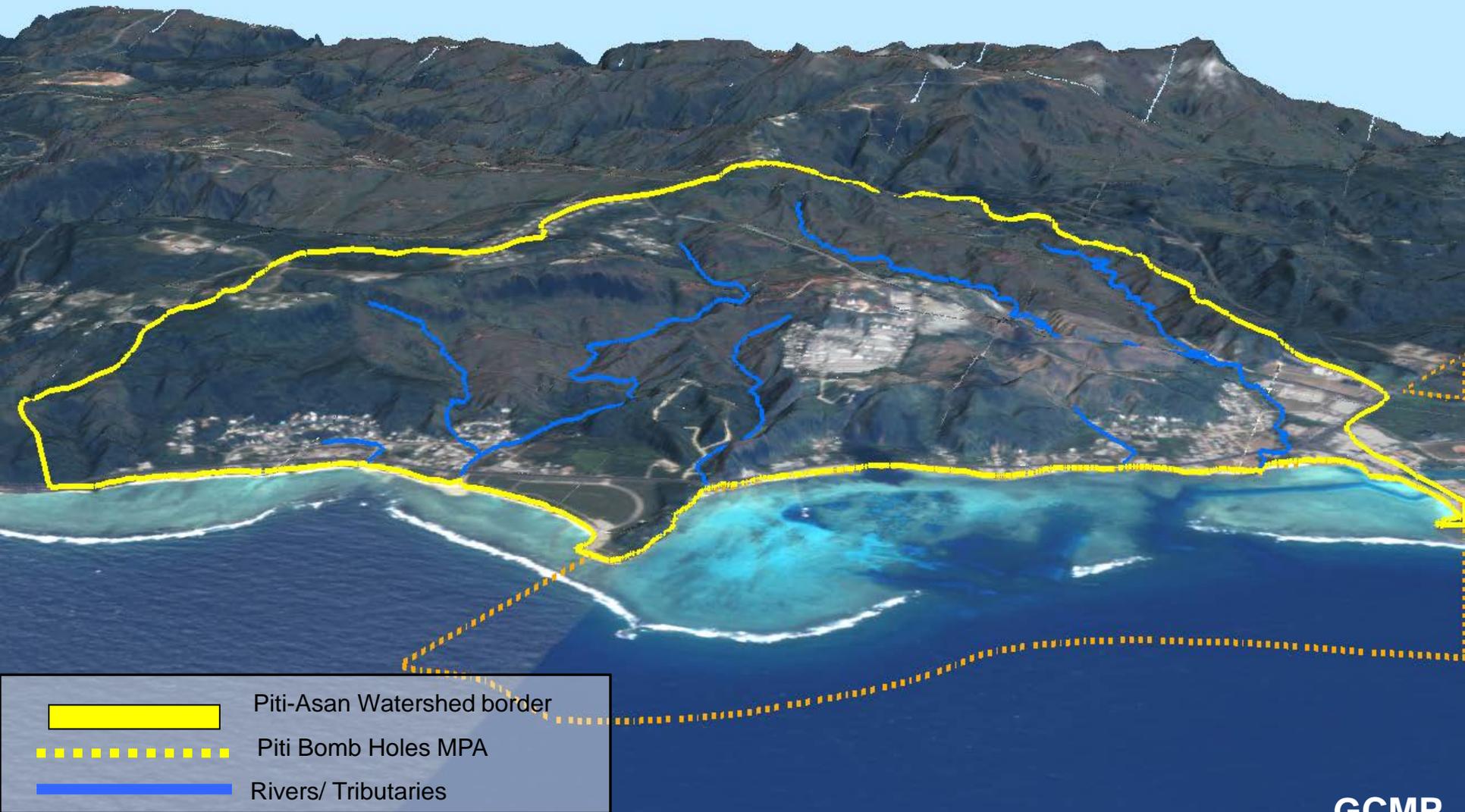
Human Activities Alter this Balance

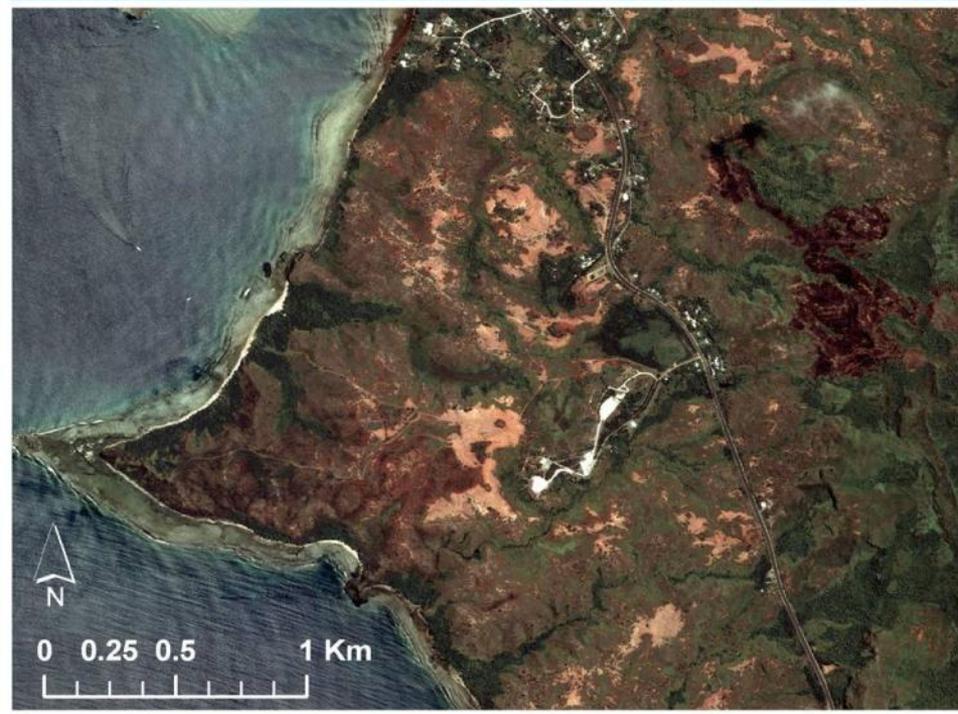


Human Activities Alter this Balance



Ridge to Reef Approach

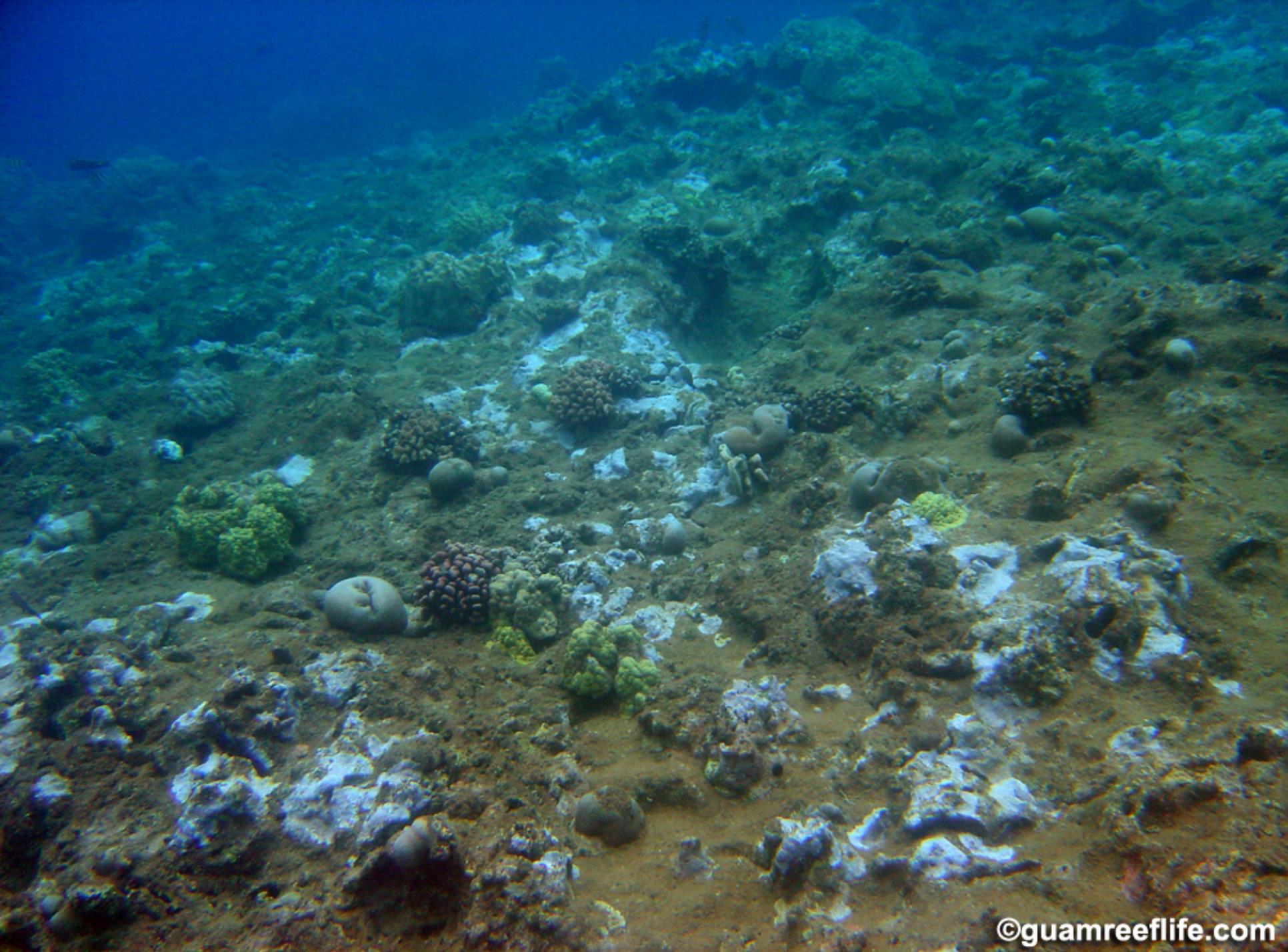




Manell Watershed







Rain Gardens



Tree Planting



Tree Planting

Sediment Sock



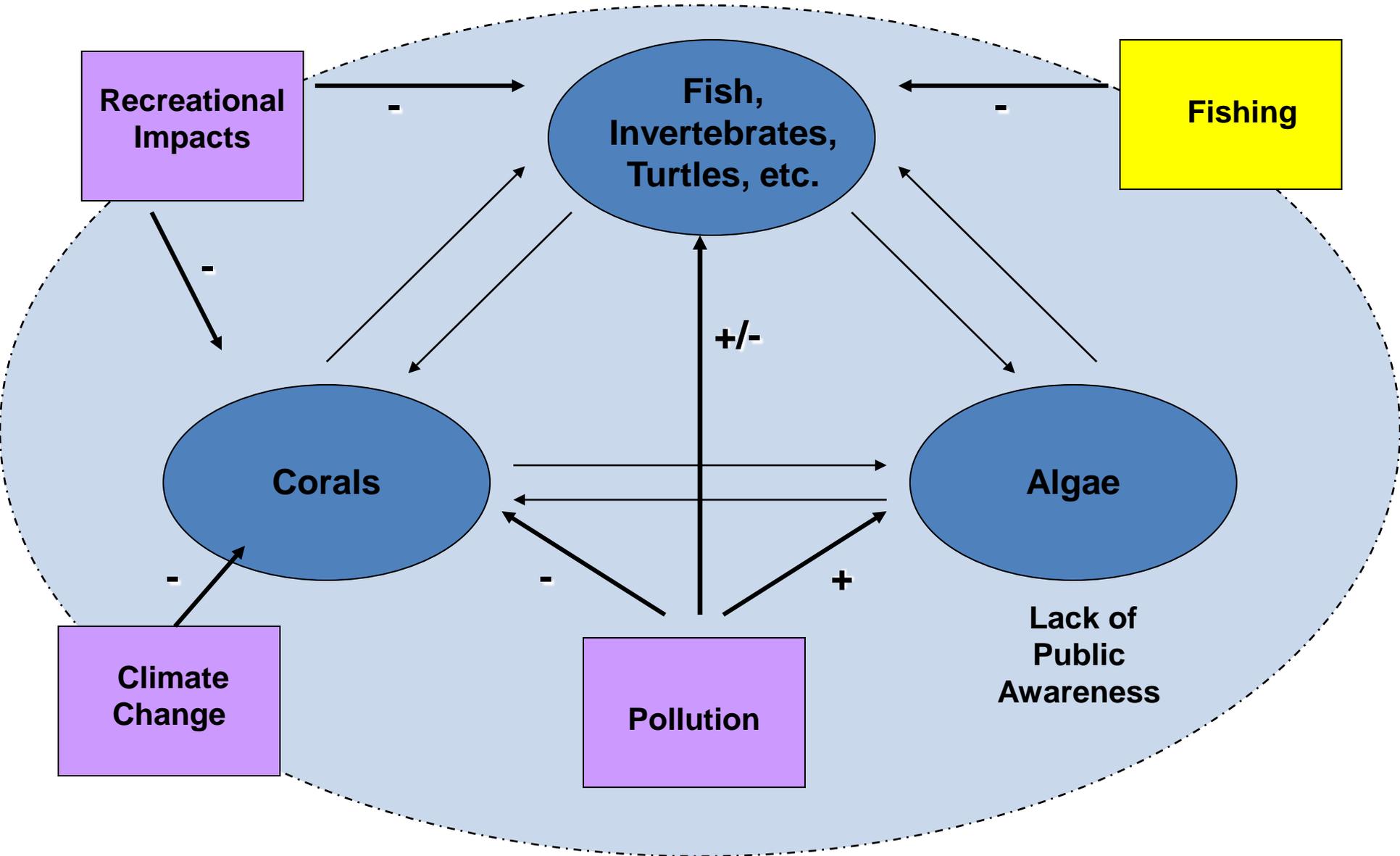


Beach and River Clean-Ups

Spreading awareness

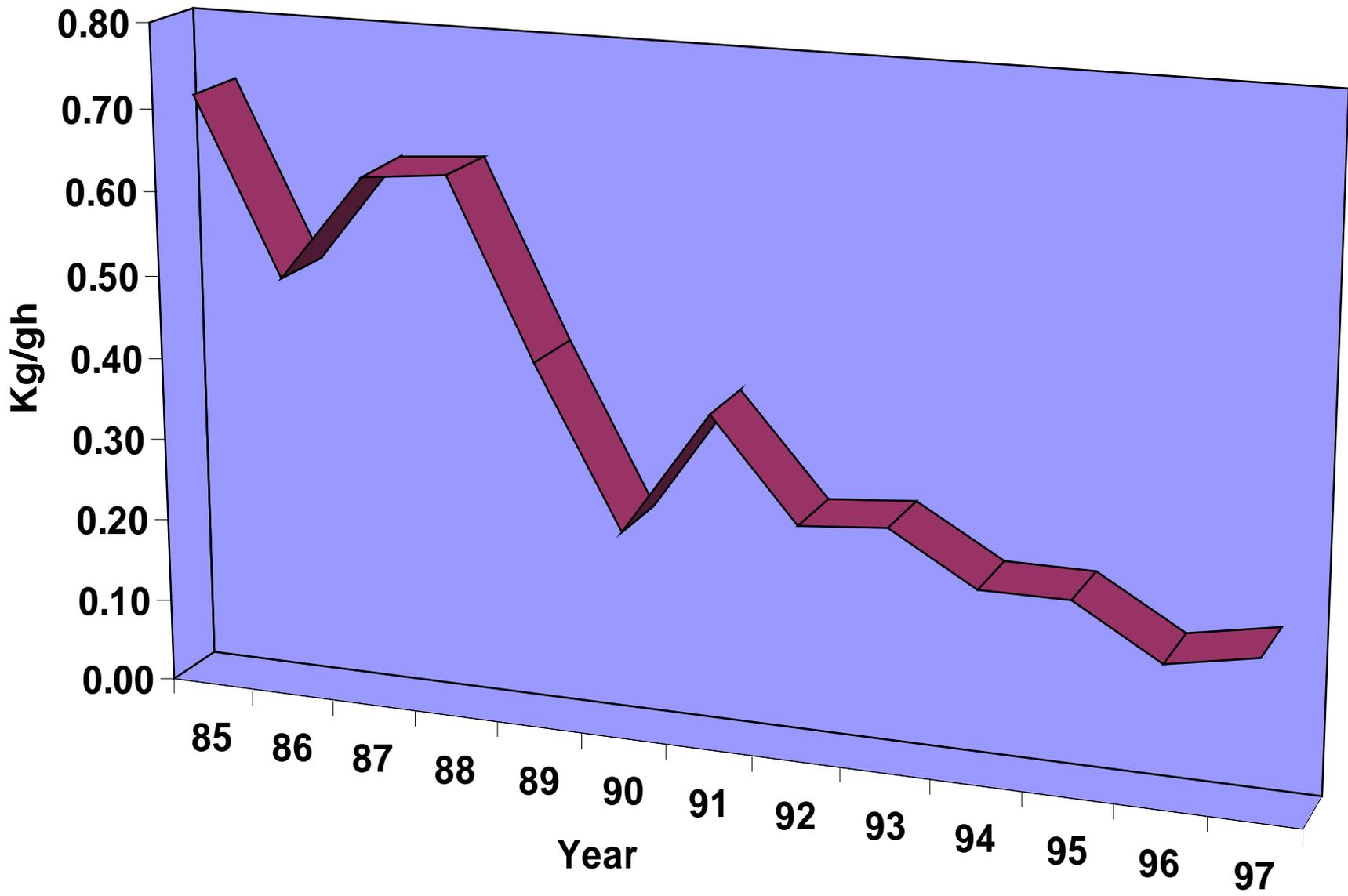


Human Activities Alter this Balance





Dipity.com



70% Decline in Catch Per Unit Effort

Guam's Marine Preserves



PATI POINT



TUMON BAY



SASA BAY



PITI BOMB HOLES



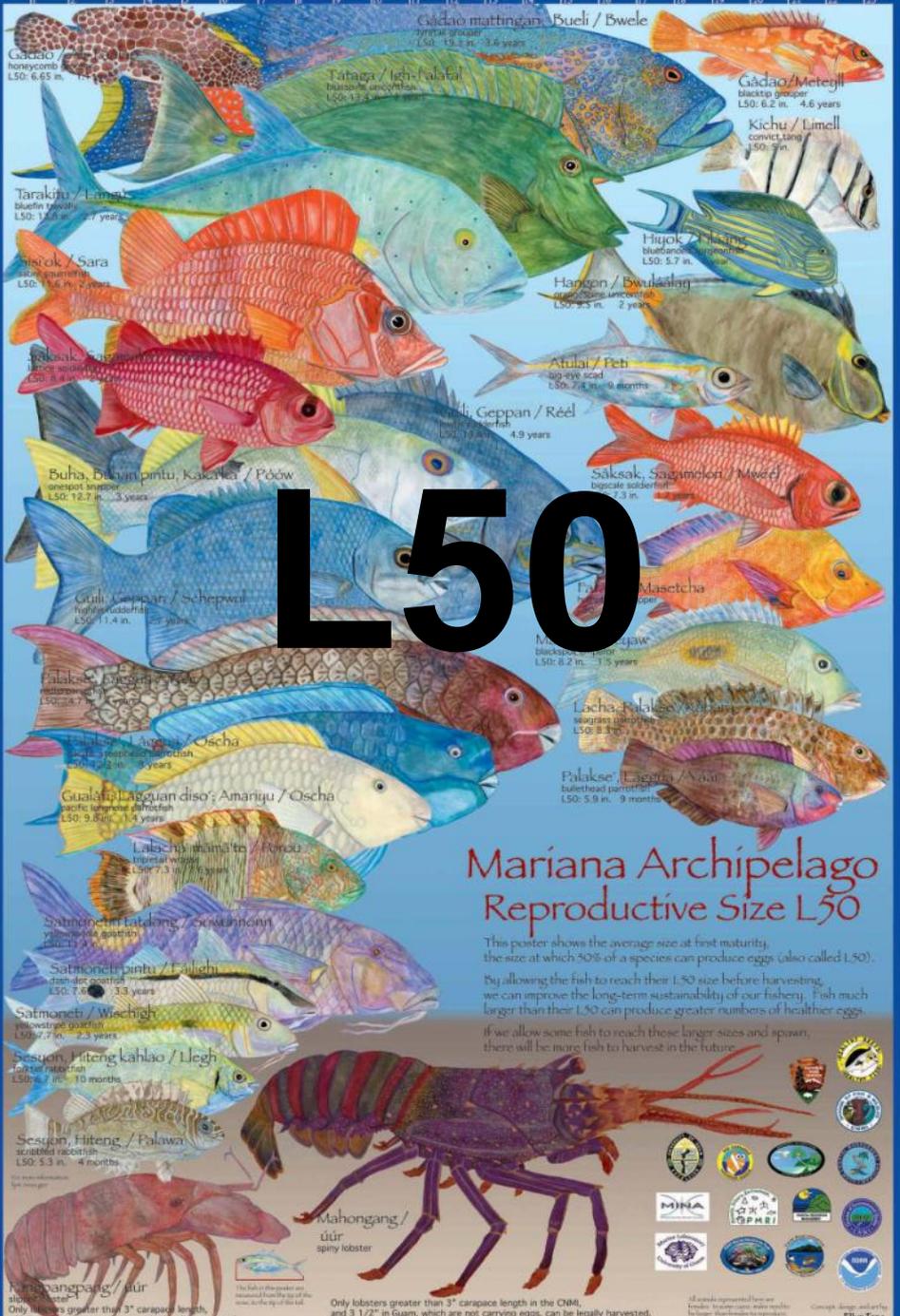
ACHANG



§63116.1.

Purpose of Marine Preserves

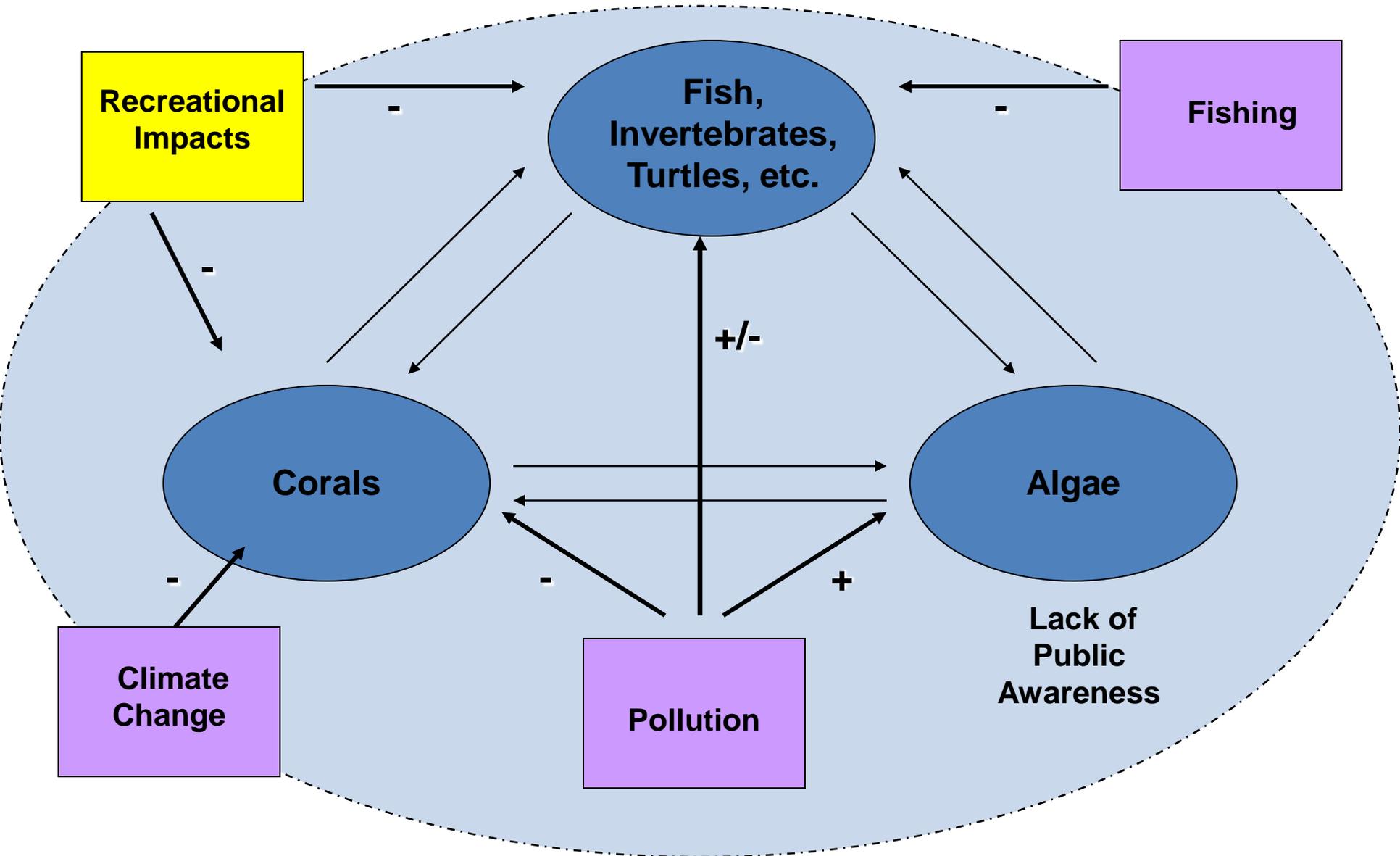
The purpose of the marine preserve is to protect, preserve, manage, and conserve aquatic life, habitat, and marine communities and ecosystems, and to **ensure the health, welfare and integrity of marine resources for current and future generations** by managing, regulating, restricting, or prohibiting activities to include, but not limited to, fishing, development, human uses.”



Responsible Fishing

- Take what you need
- Don't leave gear behind
- Don't take fish that are too small to reproduce – let them grow and make babies

Human Activities Alter this Balance





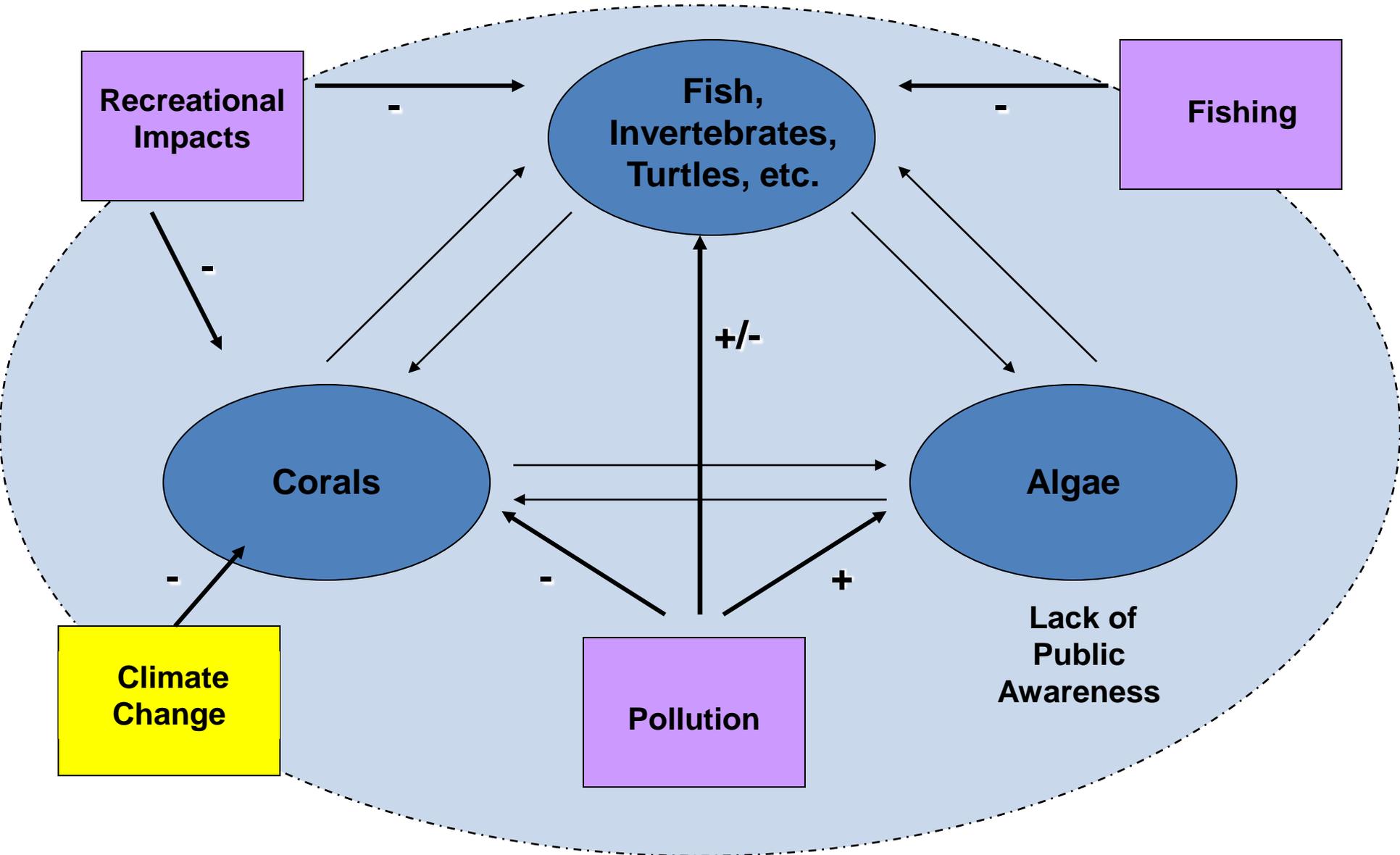
Burdick et al. 2008

Reef Etiquette

- Take only pictures, leave only bubbles
- Watch where you step
- Leave nothing behind
- Keep your distance



Human Activities Alter this Balance



Ypao Beach, Aug. 2007





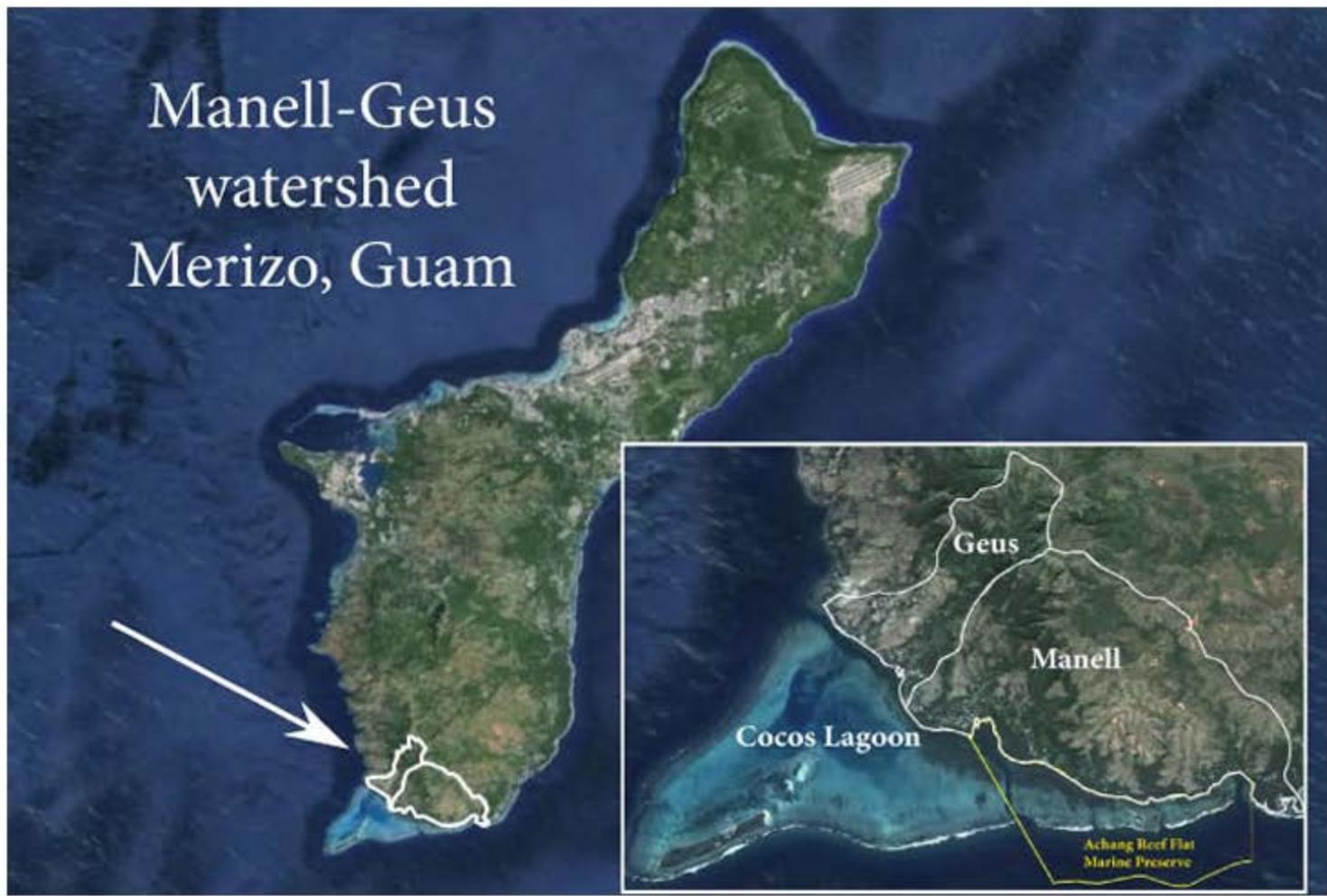
A framework to improve habitat for fisheries, marine life, and coastal communities

- Home
- About the Habitat Blueprint
- Fact Sheets
- Habitat Focus Areas
- Healthy Habitat Objective
- Regional Habitat Initiatives
- Frequently Asked Questions
- Habitat Blueprint Intranet (NOAA only)

Test Your **Habitat IQ**
www.habitat.noaa.gov

Tweets [Follow](#)

NOAA Habitat @NOAAHabitat 15h
 Our ocean is under threat. Join people all over the world and make a difference. #OurOcean2014 thndr.it/1tP7rrQ



How do we know we're making a difference?



02/23/2013 09:38

Next Session

- Monitoring Survey Methods
- Marine Species ID
- Practice Exercises

Benthic Monitoring

Benthic Cover Survey
What's on the sea bottom?



Includes:

- Sand
- Algae
- Corals
- Rubble
- Rock

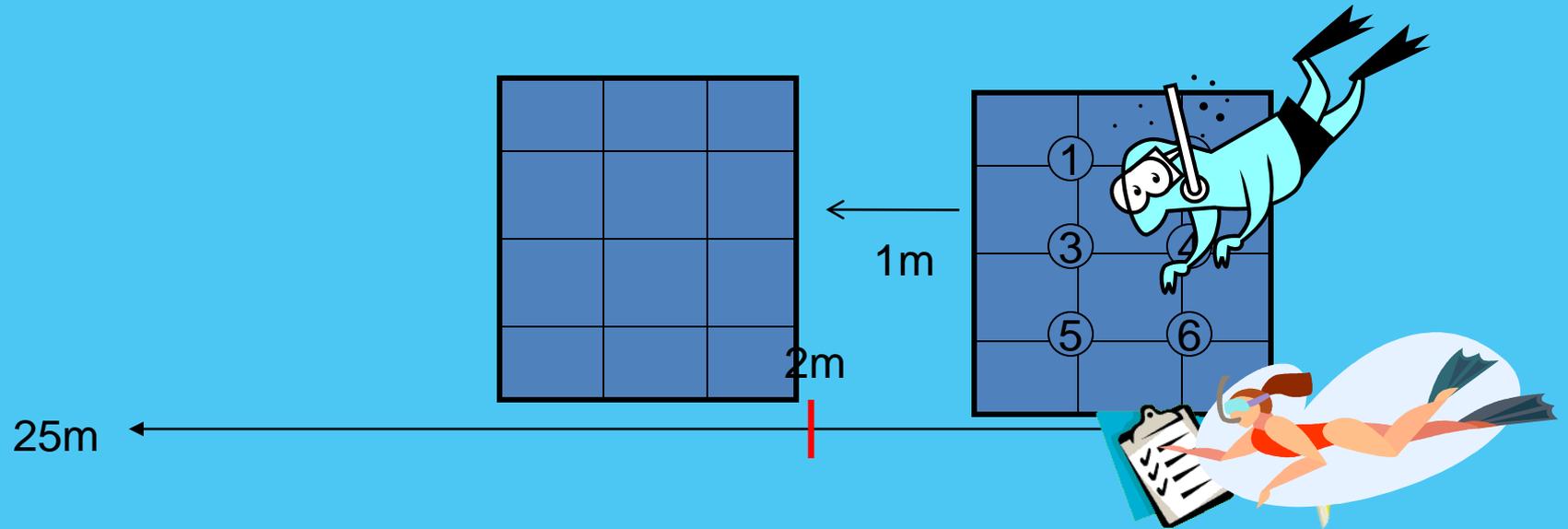
Materials

- Transect tape
- ½ m Quadrat
- Benthic Datasheet
- Field Guide
- Clipboard & pencil
- Snorkel gear
- Camera & Housing

Procedure

1. Lay out 25m transect
2. Attach weights to both ends of transect tape
3. Place quadrat at **1m** on ***RIGHT*** side of transect tape
4. Record benthic cover under each intersecting point (6 Benthic ID) on datasheet
5. Move to next meter

Benthic Monitoring with $\frac{1}{2}$ m Quadrats



NOTE: Animation is not to scale

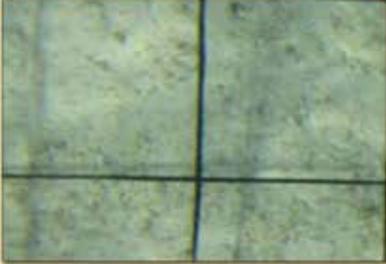


06/07/2012 10:38

NOAA

Benthic Cover - Substrate, Cyanobacteria, Seagrass, Green Algae

Substrate



Sand



Rubble



Turf Algae



Bare Rock

Cyanobacteria



Sea Grasses



Enhalus acoroides



Halodule uninervis



Halophila minor

Golden Algae

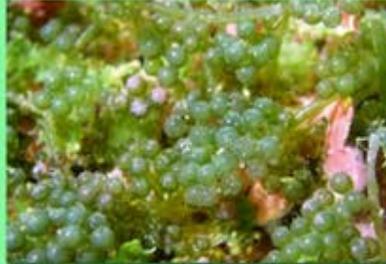


Chrysocystis fragilis

Green Algae



Halimeda



Caulerpa



Caulerpa



Boodlea



Red Algae



Acanthophora



Asparagopsis



Galaxaura



Gracilaria

Crustose Coralline



Branching Coralline



Amphiroa



Amphiroa



Liagora



Turbinaria

Brown Algae



Dictyota



Hydroclathrus

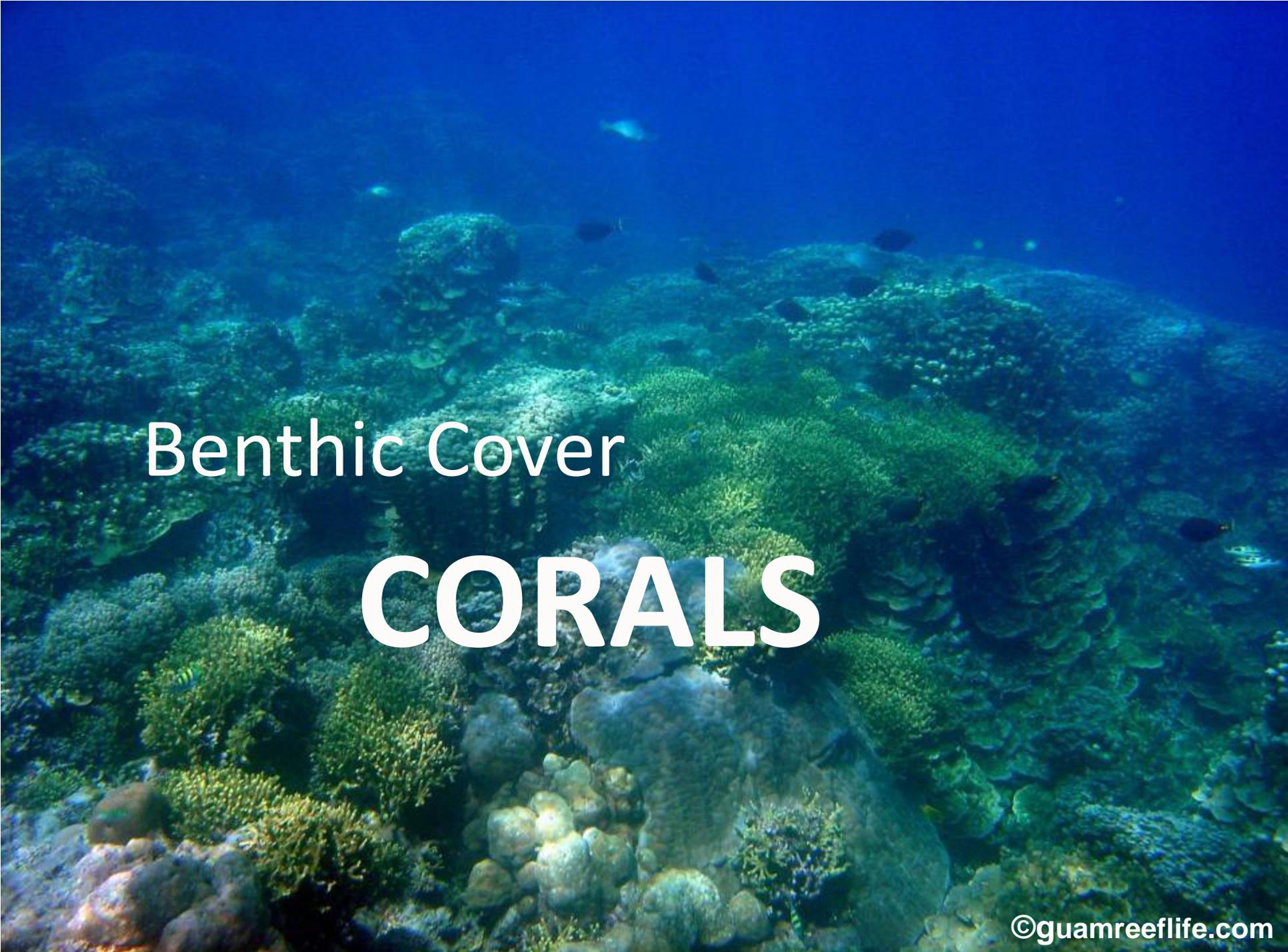


Padina



Sargassum

Benthic Cover - Red Algae, Coralline Algae, Brown Algae

An underwater photograph of a coral reef. The scene is dominated by various types of coral, including large, rounded brain corals in the foreground and more complex, branching structures in the mid-ground. The water is a deep, clear blue, and several small fish are visible swimming in the background. The overall lighting is bright, highlighting the textures and colors of the coral.

Benthic Cover

CORALS

Benthic Cover - Hard Corals - Acropora - Leptoria

Acropora



Acropora muricata



Acropora digitifera

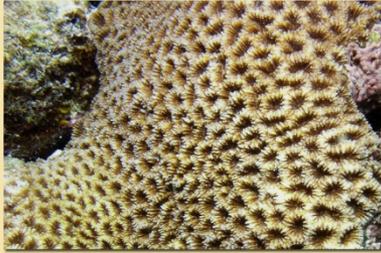


Acropora cerealis



Acropora accuminata

Favia



Favia pallida



Favia fava

Fungia



Fungia fungites



Fungia fungites

Goniastrea



Goniastrea edwardsi



Goniastrea retiformis

Goniopora



Goniopora fruticosa



Goniopora fruticosa

Leptastrea



Leptastrea purpurea



Leptastrea purpurea

Leptoria



Leptoria phyrgia



Leptoria phyrgia



Montipora



Montipora foveolata



Montipora venosa



Montipora floweri



Montipora verrucosa

Pavona



Pavona decussata



Pavona cactus



Pavona divaricata



Pavona decussata

Pocillopora



Pocillopora damicornis



Pocillopora damicornis



Pocillopora elegans



Pocillopora eydouxi

Porites



Porites lutea



Porites cylindrica



Porites rus



Porites australiensis

Benthic Cover - Corals - Psammocora - Soft Corals - Fire Corals - Blue Coral

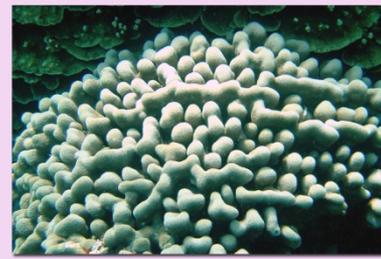
Psammocora



Psammocora contigua



Psammocora stellata



Psammocora digitata



Psammocora digitata

Soft Corals



Sinularia sp.



Sinularia sp.



Sarcophyton sp.



Lobophytum sp.

Fire Corals



Millepora sp.



Millepora platyphyllia



Millepora sp.



Millepora platyphyllia

Blue Coral



Heliopora coerulea



Heliopora coerulea



Heliopora coerulea





On to Macroinvertebrates!

What's a macroinvertebrate?

Animal without a backbone that are large enough to see in plain view

Why are they important?

- Help maintain water quality for coral reef ecosystem
- Key indicators for reef health

Macroinvertebrate Monitoring

Macroinvertebrate Surveys



Includes:

- Sea cucumbers
- Sea stars
- Sea urchins
- Giant clams
- Snails

Materials

- Transect tape
- 1m Survey Rod
- Field Guide
- Datasheet & clipboard
- Snorkel gear
- Camera & Housing

Procedure

1. Lay out transect tape (25 meters)
2. Attach weights to both ends of transect tape
3. Start at 0 meters, swim/walk along side holding out 1m survey rod
4. Count macroinvertebrates in transect
 - Within 1m on either side of transect tape
5. Record counts on datasheet
6. Repeat on other side of transect tape

Observers:		Date:	Guam Community Coral Reef Monitoring Program Reef Flat Quantitative Invertebrate Survey	
Site A:		Survey area for each transect is 25m long and 1m on each side		
Site B:		Site A	Site B	
CUCUMBERS (BALATE)	Holothuria atra			
	Small to medium size, black			
	Holothuria edulis			
	Medium, black with red belly			
	Stichopus chloronotus			
	Medium, greenish black, big spikes			
	Stichopus horrens			
	Small, lumpy mottled brown and tan			
Actinopyga mauritiana				
Medium, hard, brown/white, white anal teeth				
Actinopyga echinites				
Medium, hard, brown, with brown anal teeth				
Bonaparteia argus				

Observers:		Date:	Guam Community Coral Reef Monitoring Program Reef Flat Quantitative Invertebrate Survey	
Site A:		Survey area for each transect is 25m long and 1m on each side		
Site B:		Site A	Site B	
CUCUMBERS (BALATE)	Holothuria atra			
	Small to medium size, black			
	Holothuria edulis			
	Medium, black with red belly			
Stichopus chloronotus				

SEA			
	Pillow star		
	Acanthaster planci !!!DANGER!!!		
	Many spined, many armed seastar		
MOLLUSKS			
	Trochus niloticus		
	Topshell, Alleng		
	Tridacna		
	Giant Clam		
	Lambis lambis		
	Five finger shell		
	Octopus cyanea		
	Octopus cyanea		

Sea Cucumbers - Balate'



Actinopyga echinites



Bohadschia argus



Holothuria atra



Holothuria edulis



Holothuria leucospilota



Stichopus chloronotus.



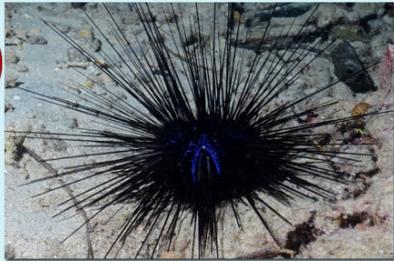
Synapta maculata



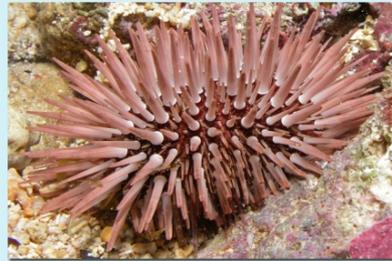
Thelanota ananas



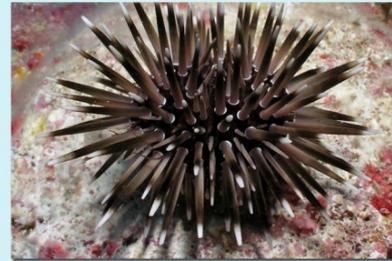
Sea Urchins



Diadema savignyi



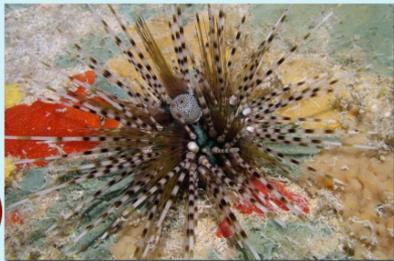
Echinometra mathaei



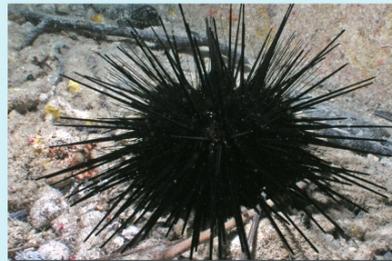
Echinometra sp..



Echinostrephus aciculatus



Echinothrix calamaris



Echinothrix diadema



Toxopneustes pileolus



Tripneustes gratilla

Macroinvertebrates - Echinoderms: Sea Cucumbers & Sea Urchins

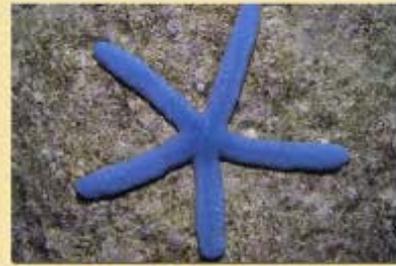
Sea Stars



Acanthaster planci



Culcita novaguineae



Linckia laevigata



Linckia multiflora

Snails & Clams



Charonia tritonis



Conus striatus.



Conus tulipa



Cypraea tigris



Lambis chiragra



Lambis truncata



Tectus niloticus.



Tridacna maxima

Other



Octopus cyanea



Carpilius maculatus



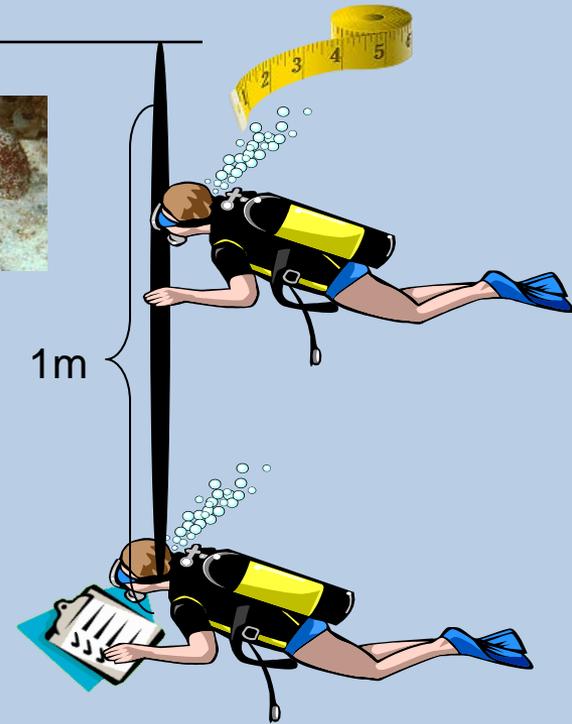
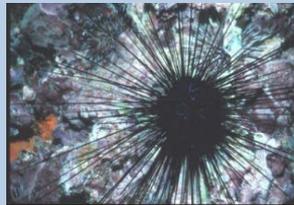
Parribacus antarcticus



Stomatopod

Macroinvertebrate Belt Transects

25m ←



NOTE: Animation is not to scale





In-Water Training

Saturday, August 16th

10am-12pm

Pago Bay, Yona

Monitoring Surveys

1:00 – 3:00pm

Piti

Wear tabbies and swimwear.

**Don't forget liability release form &
water bottle!**

Si Yu'os Ma'ase!

This program is supported through National Oceanic and Atmospheric Administration's Coral Reef Conservation Program

