Reduce Adverse Impacts of Fishing

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NOAA Fisheries Service
SEFSC, Miami, Florida

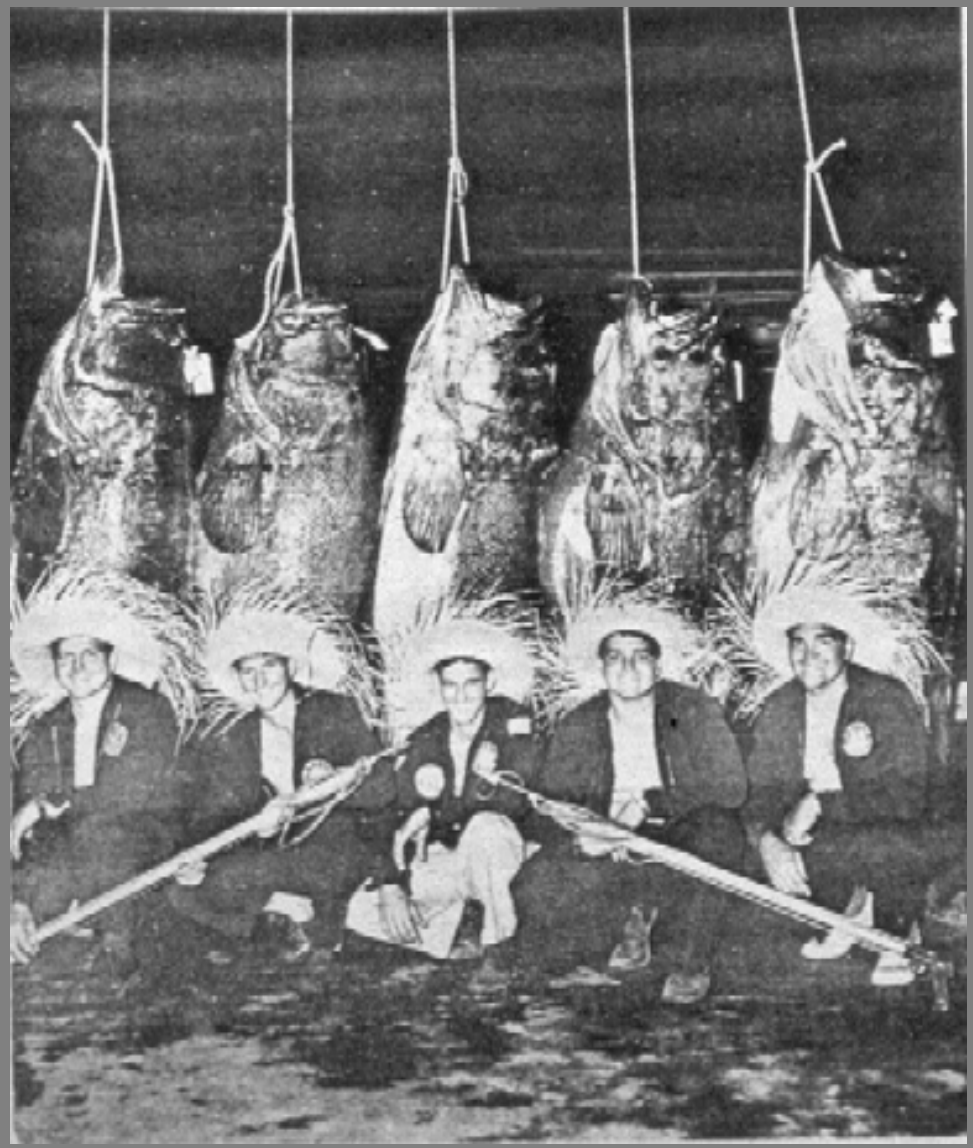
Gerry Davis
NOAA Fisheries Service
PIRO, Honolulu, Hawaii


Deplete Target Species


Cause Habitat Damage
25 1:17PM


Bycatch Mortality of target and non-target species

OVERFISHING



Problem: A species not overfished in a single-species context, may be overfished in an ecosystem context (i.e ecosystem overfishing).

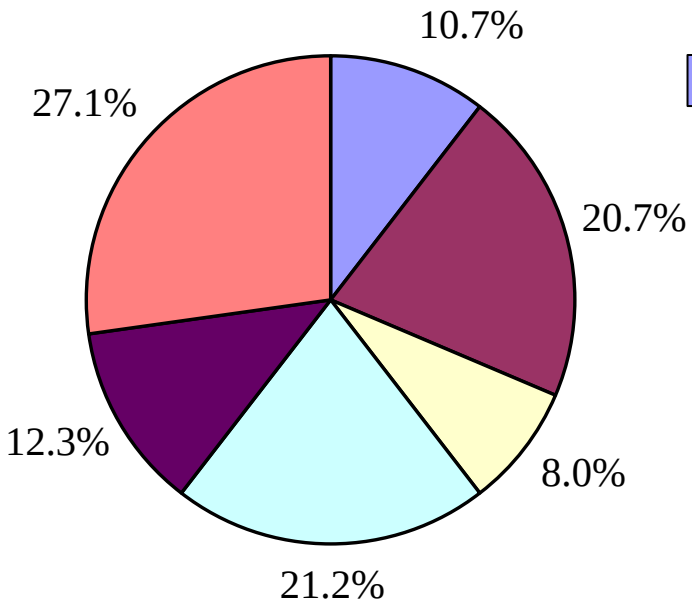
Fishing

Navassa Island

$14.3 Million
238 Projects
5 Years 2002-06

Reduce Adverse Impacts of Fishing: Investment by Subcategory

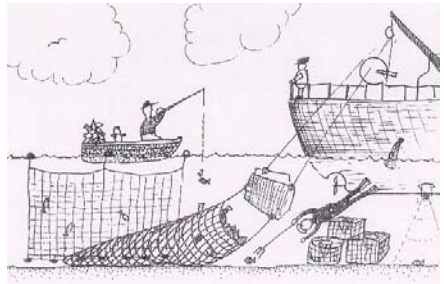
11% CRCP Funds
18% Total Projects
5 Years 2002-06



- Identify and Protect Spawning Aggregations
- Fishing Impacts on Reefs: Impacts of Overfishing and Gear on Reefs
- Fishing Impacts on Reefs: Socioeconomic Studies
- Fishing Impacts on Reefs: Management Implementation
- Fishing Impacts on Reefs: Fisheries Enforcement and Outreach
- Understand Connectivity, Habitat Utilization and Essential Fish Habitats

Marine Ecosystem Model

Human Dimension

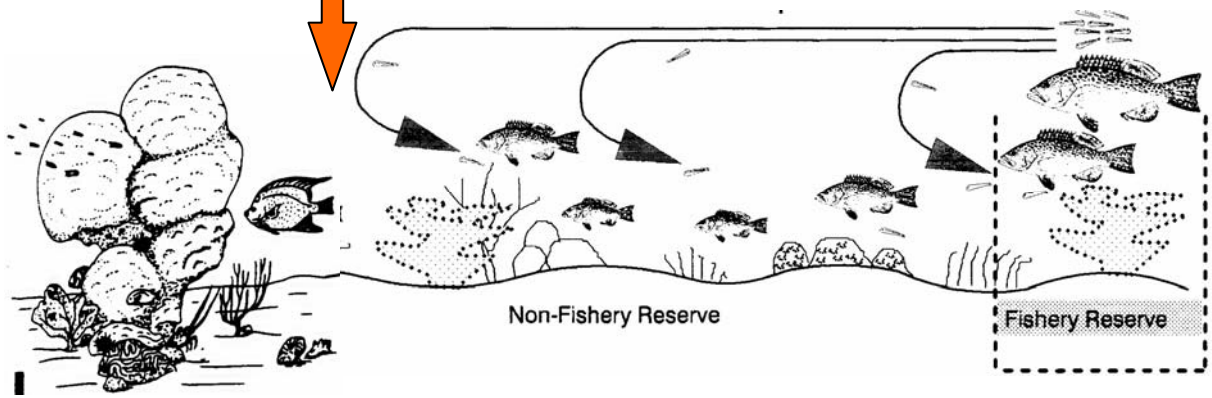


Goods & Services

Detrimental & Impacts

Beneficial

Ecosystem Structure & Function

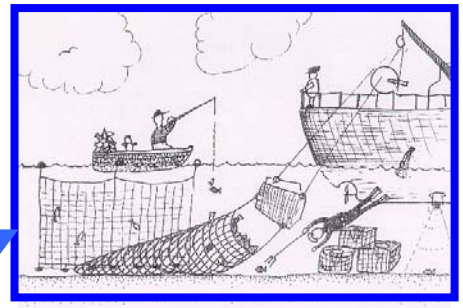


Biotic Dimension

Physical Dimension

(Geology, Oceanography, Climate)

FISHING / OVERFISHING



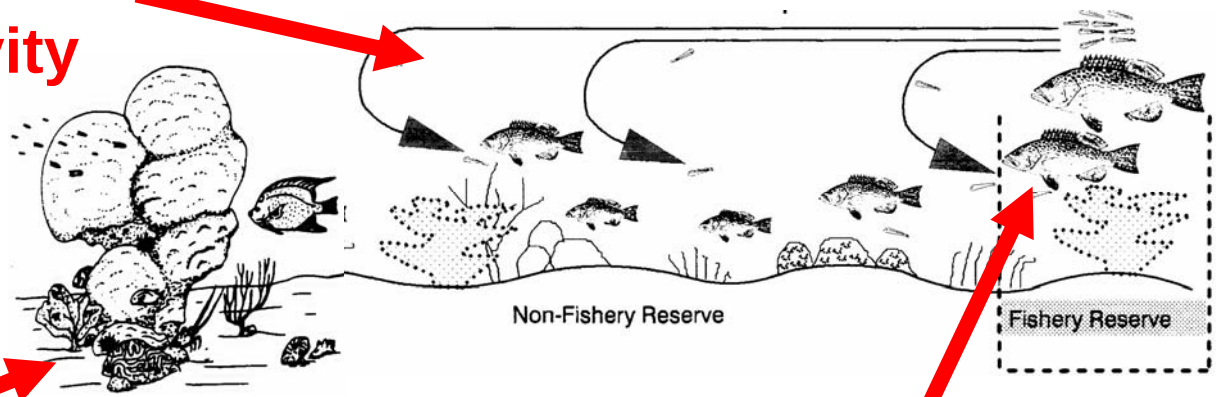
Human Dimension

1. Conduct Socio-economic Studies

Goods & Services

Structure & Function

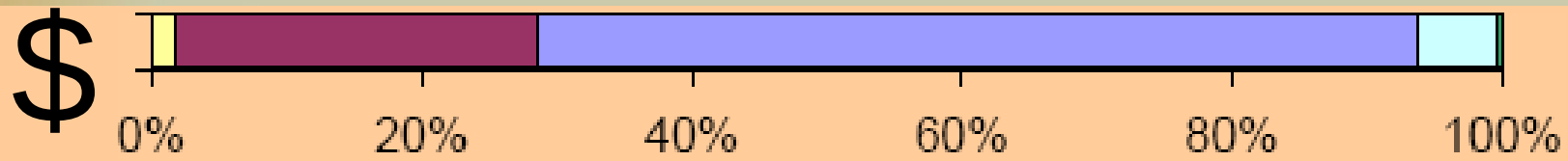
2. Understand Connectivity & Habitat Utilization (EFH)



Biotic Dimension

3. Identify & Protect Spawning Aggregations (SPAGS)

FAS Pacific Atlantic International

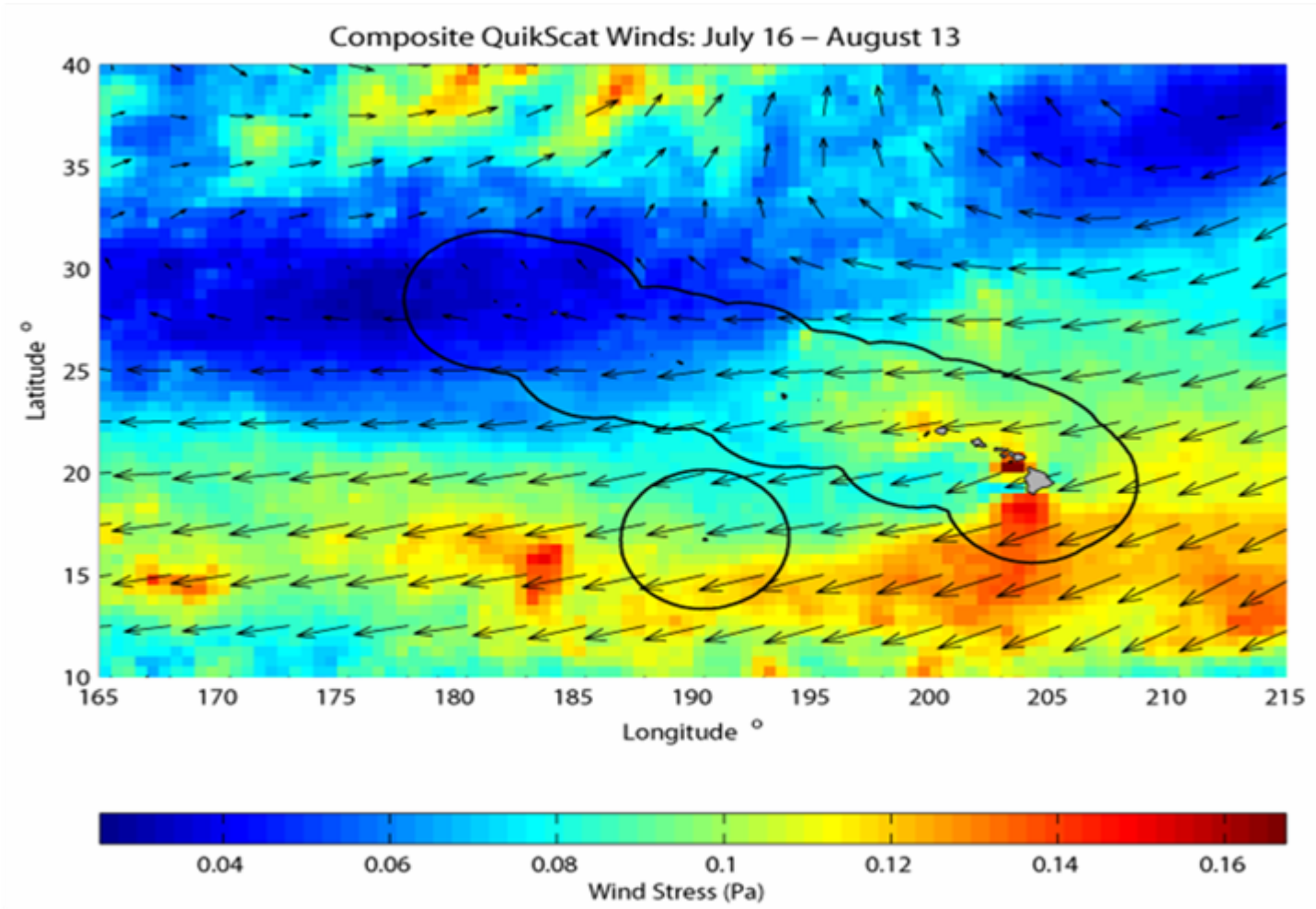


Understand Connectivity & Habitat Use

5 Years 2002-06

$3.9 Million	3% CRCP Funds
56 Projects	4% Total Projects

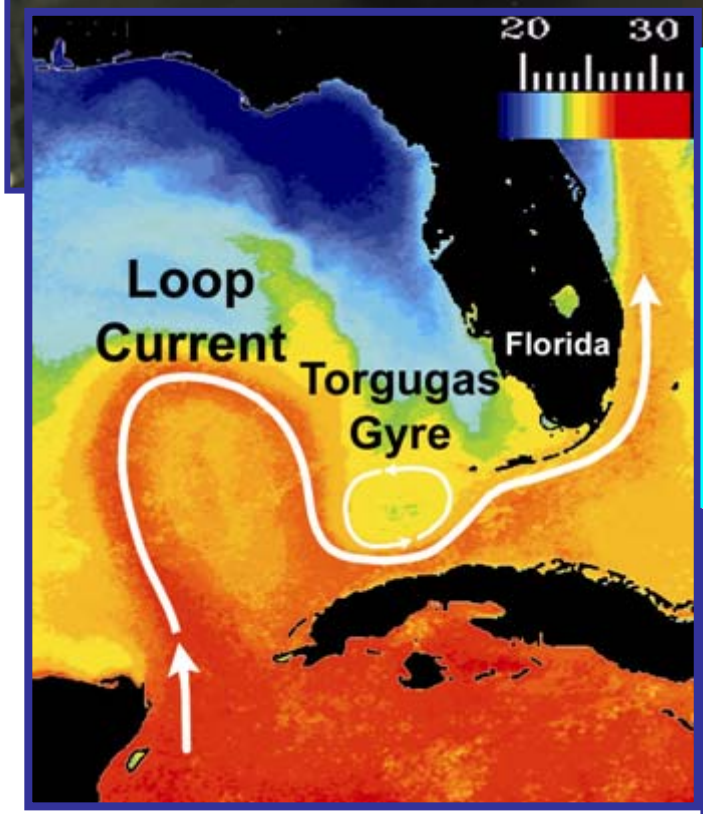
Reef Species Connectivity - Pacific



EARLY LIFE HISTORY RESEARCH

Larval fish and physical oceanography of the Mesoamerican Reef System (Xcalak)

ECOSUR RSMAS NOAA CONANP SAM

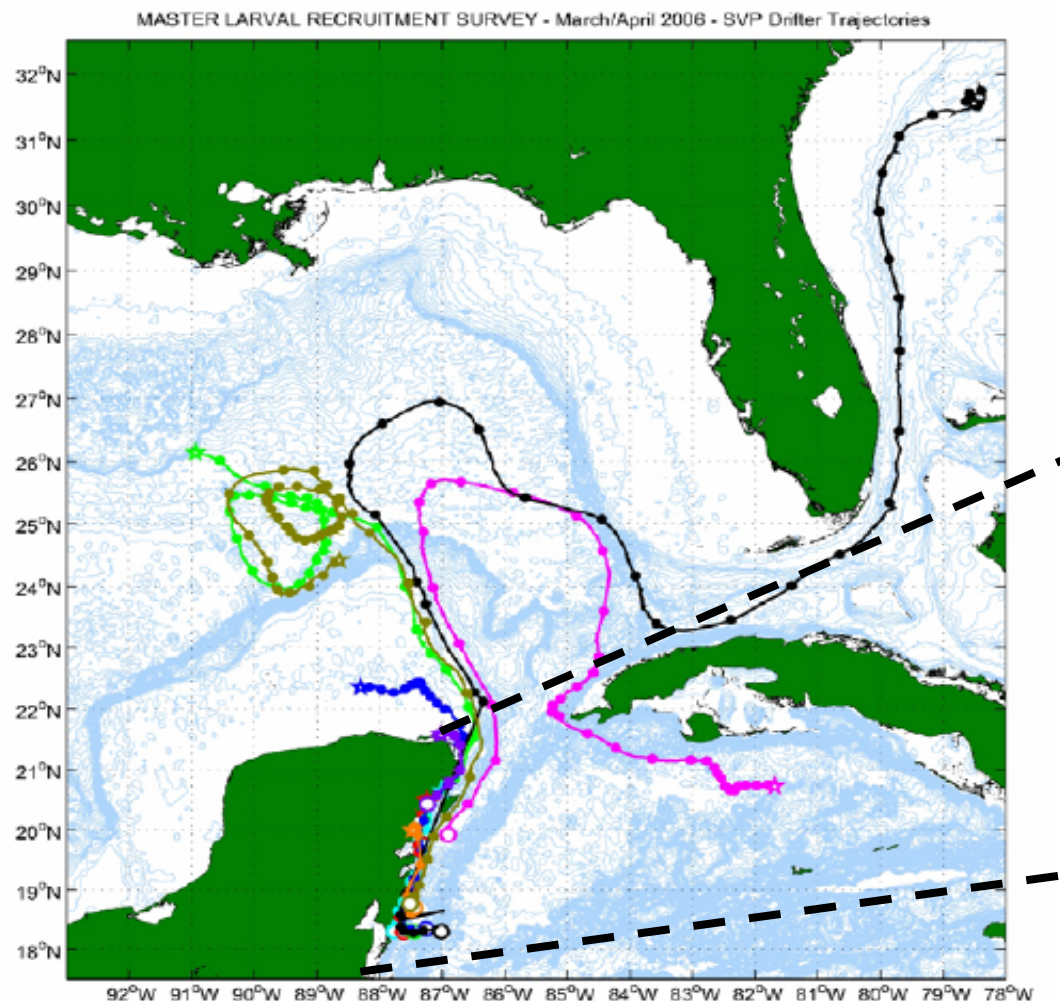


Larval transport research -- linking Meso-american & Florida Keys' coral reef ecosystems.

Meso-American System Transport & Ecology Research Cruise

Cruise 0601: NOAA Ship GORDON GUNTER

March 14 - April 4, 2006



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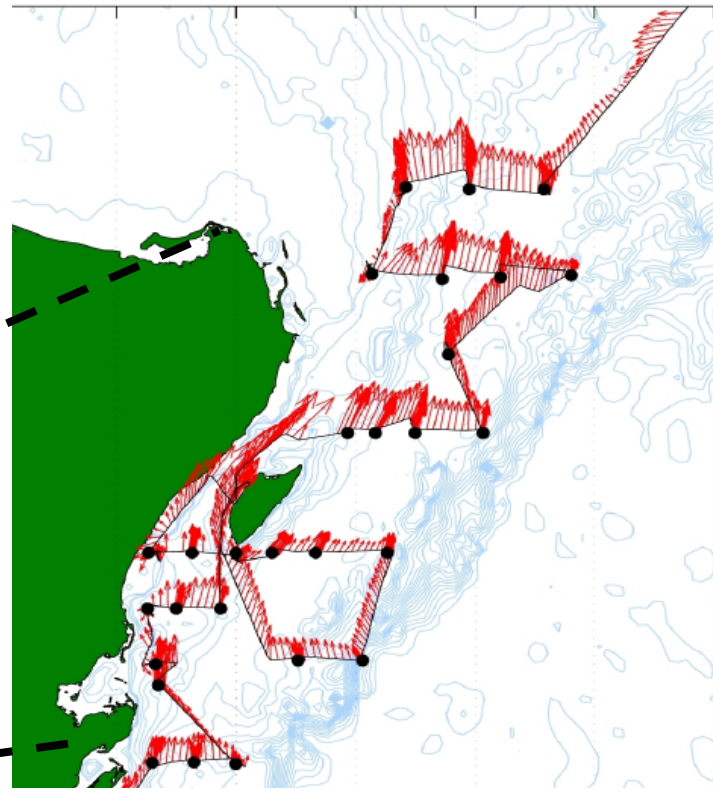
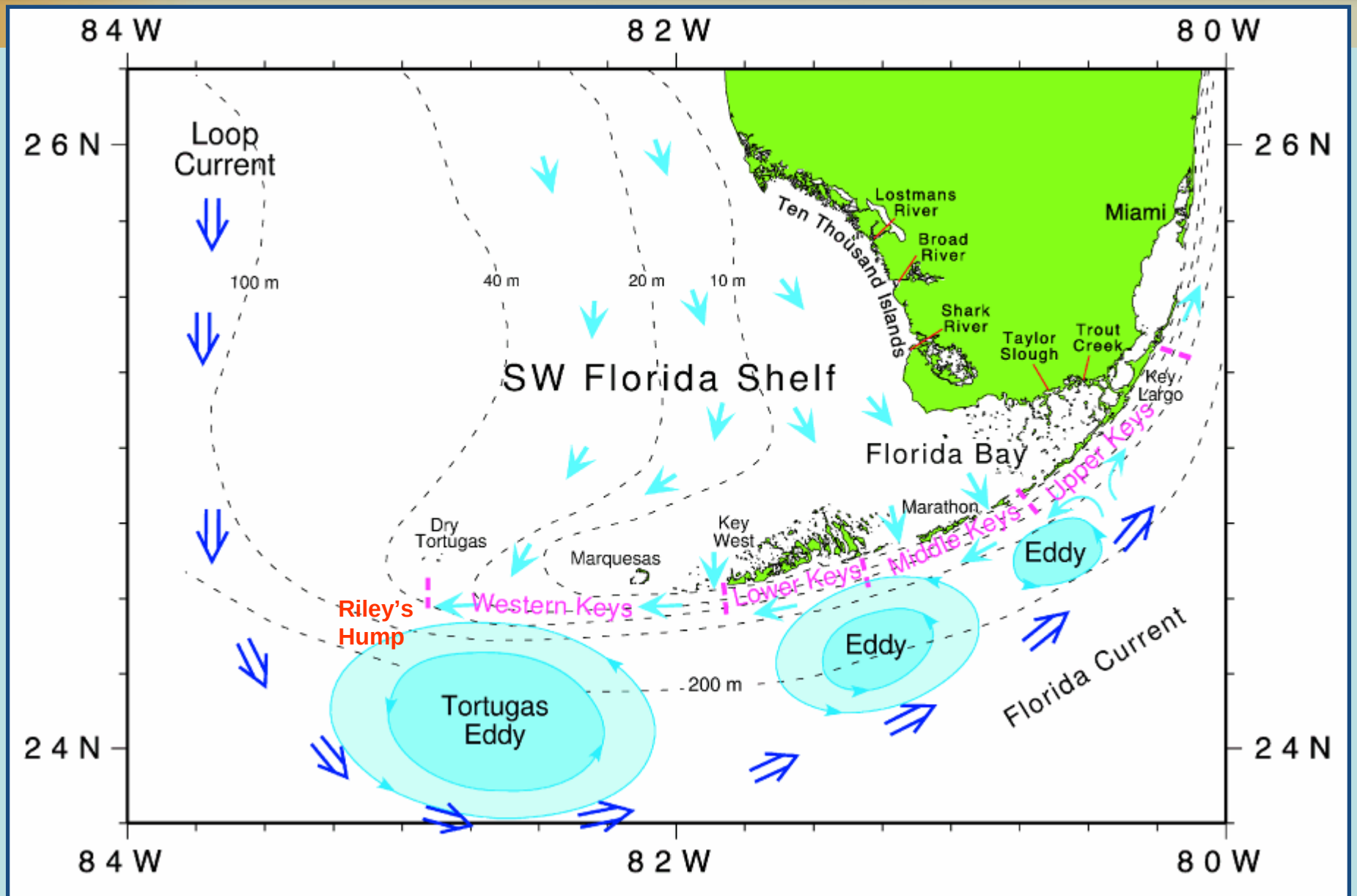
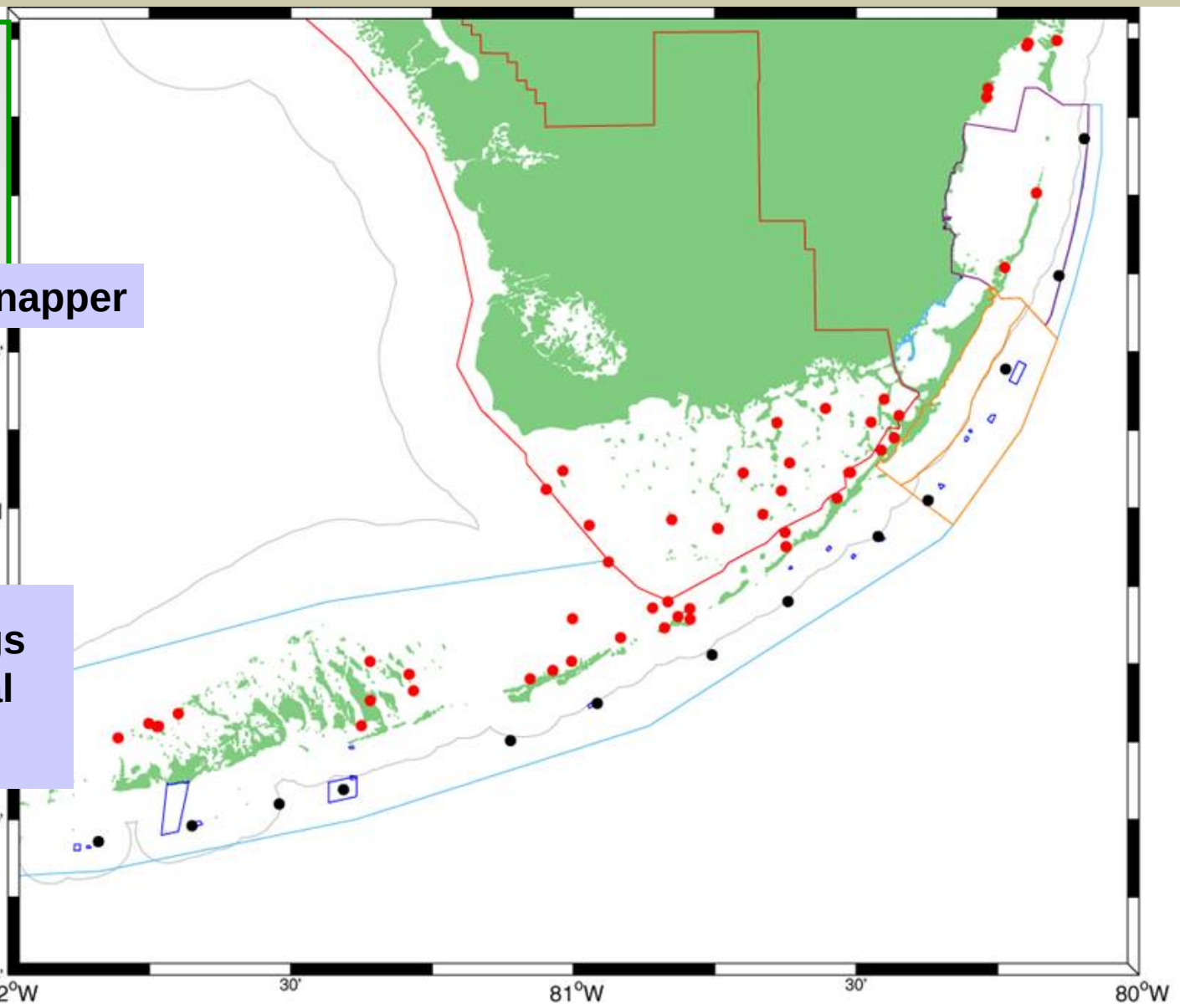


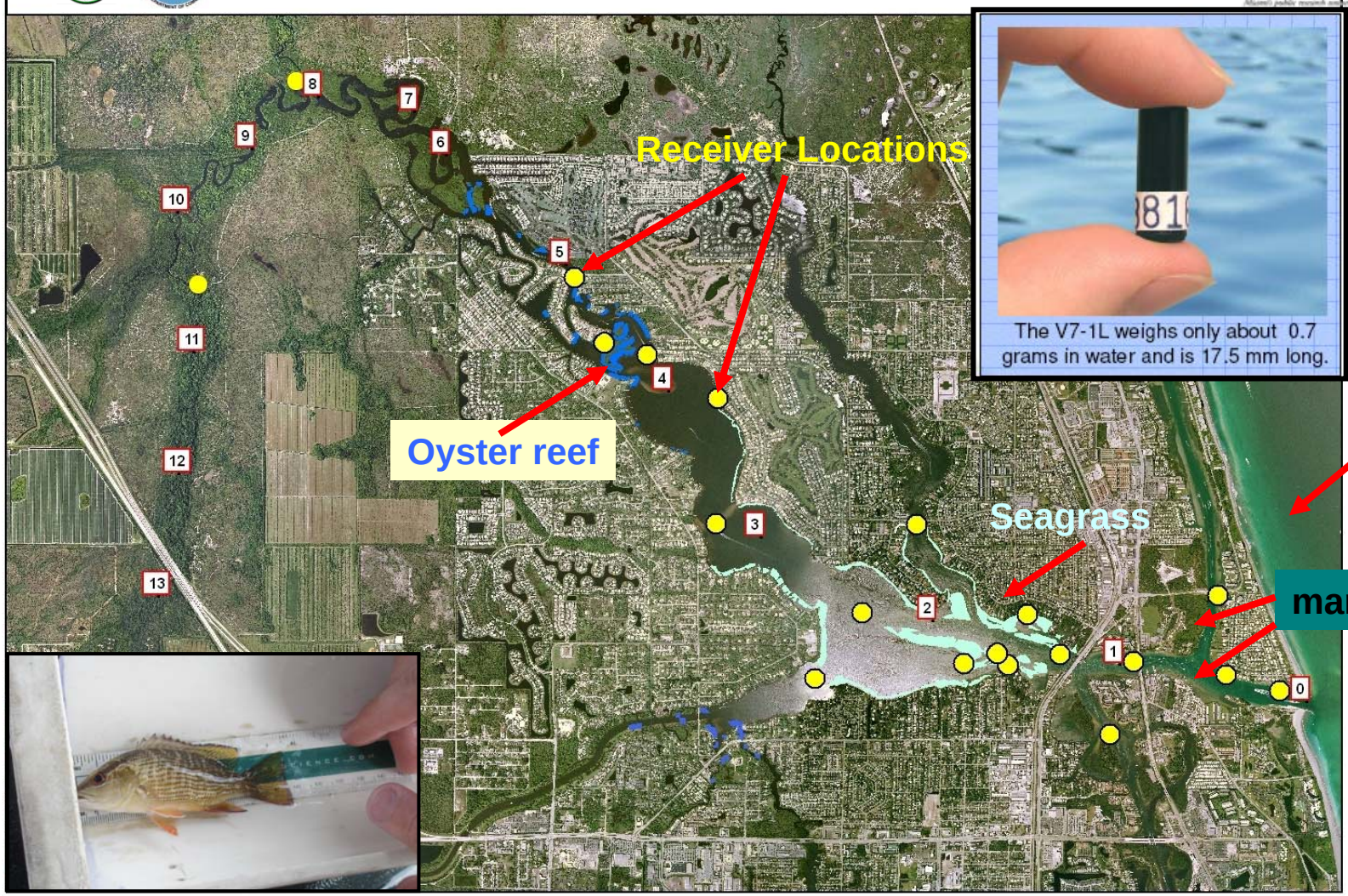

84 W
82 W
80 W
26 N
24 N
Loop Current
100 m
40 m
20 m
10 m
SW Florida Shelf
Ten Thousand Islands
Lostmans River
Broad River
Shark River
Taylor Slough
Trout Creek
Key Largo
Miami
Florida Bay
Upper Keys
Middle Keys
Lower Keys
Western Keys
Marathon
Key West
Dry Tortugas
Marquesas
Riley's Hump
Tortugas Eddy
Eddy
Eddy
200 m
Florida Current

juvenile mangrove snapper

otoliths = natural tags with unique chemical fingerprint



JSMAT Receiver Locations – Loxahatchee Estuary



Tracking acoustically tagged juvenile gray snapper habitat use from an estuarine-marine gradient to Florida's northernmost coral reefs.

First International Symposium on Mangroves as Fish Habitat

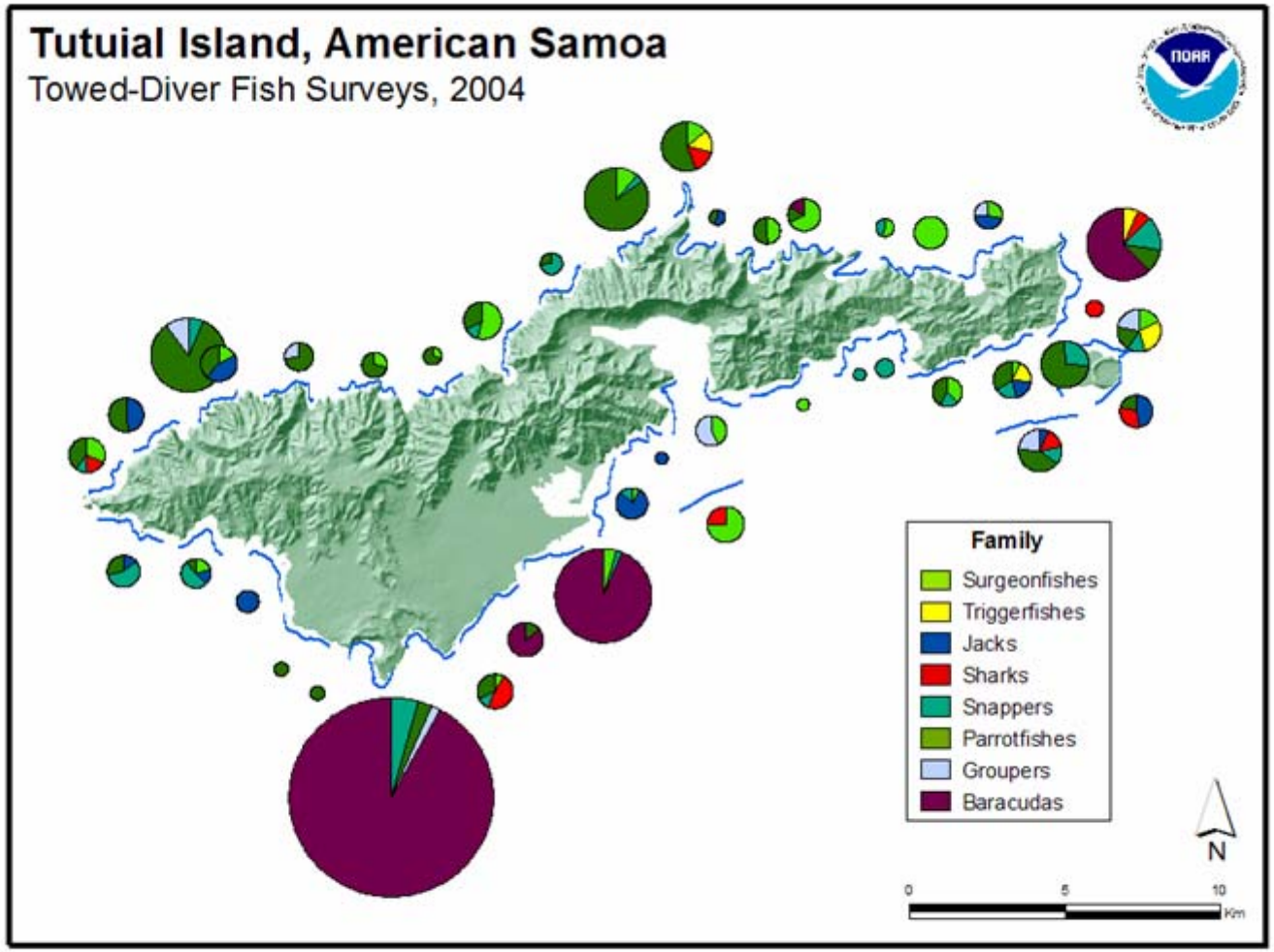
Rosenstiel School of Marine and Atmospheric Science
University of Miami
Miami, Florida
19–21 April 2006

Attendees	**207**
Registrants	**165**
Nations Represented	**25**
Abstracts	**82**
Manuscripts Submitted	**40**

Habitat Mapping

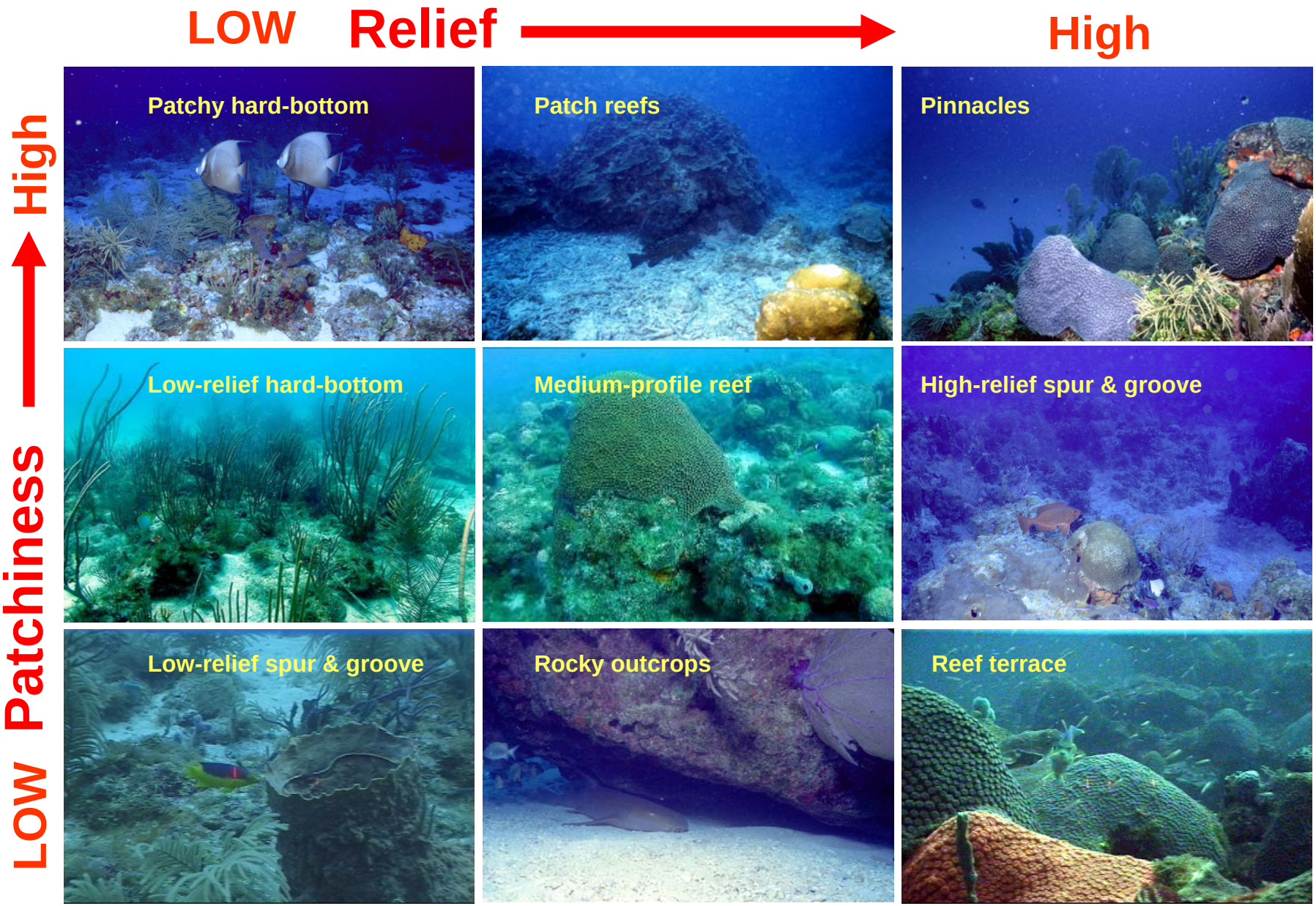
Tutuila Island
American Samoa

Large Fish Surveys



Numerical density of the eight most abundant fish families observed along towed diver surveys at Tutuila Island in February 2004. Pie charts indicate family composition. Relative sizes are scaled to total fish density.

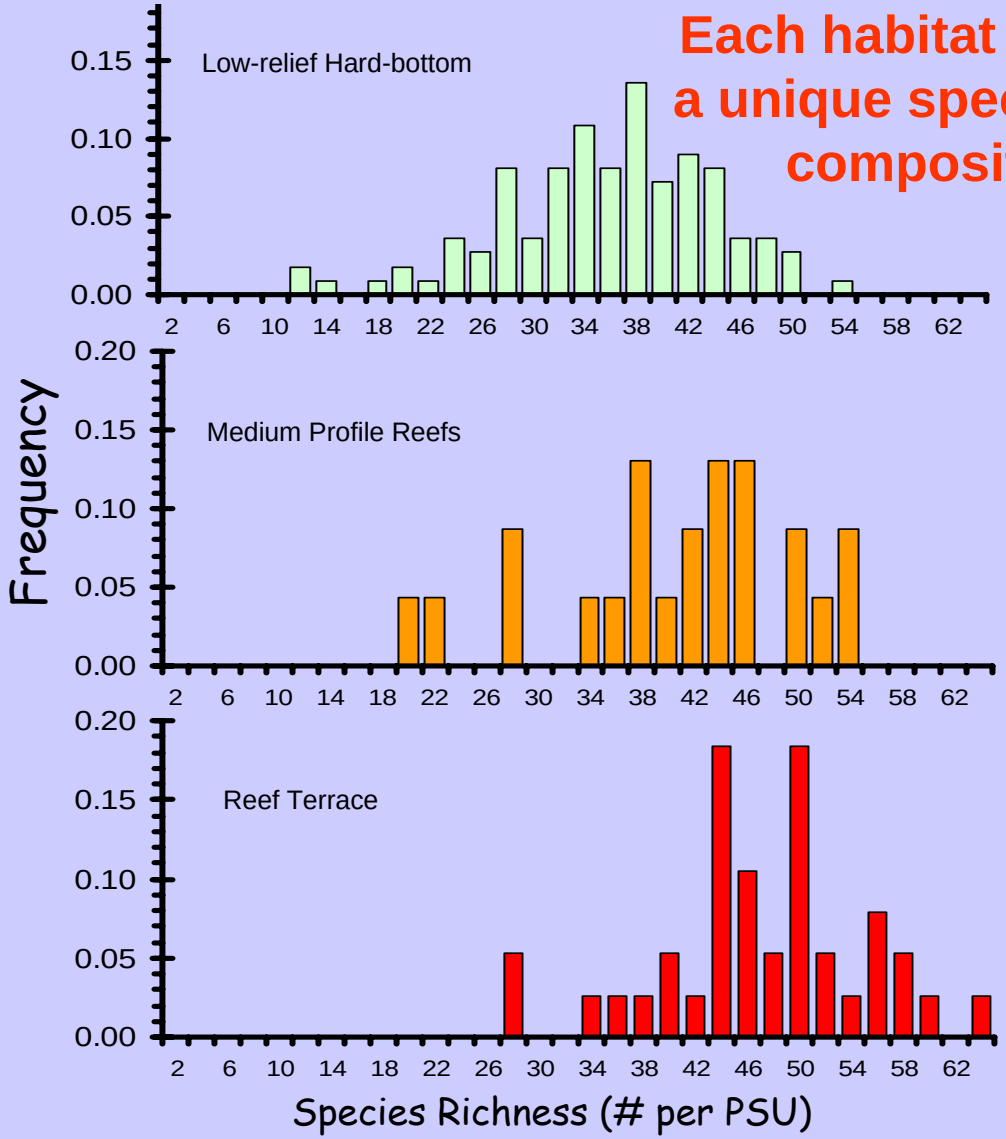

Fishery-independent, non-destructive,
ecosystem-based, habitat monitoring
31 8:10 AM



Accomplishment: Habitat Classification for Stratified Random Sampling

CRCP Accomplishment: All species surveyed

Each habitat has a unique species composition



Gray Snapper shift habitat with age

CRCP fishery independent data

Lc

Fishery dependent data

Bay

Inshore Reefs

Offshore Reefs

Frequency

0.7
0.6
0.5
0.4
0.3
0.2
0.1
0

3 6 9 12 15 18 21 24 27 30 33 36 39 42 45 60

YOY

Juveniles

Adults

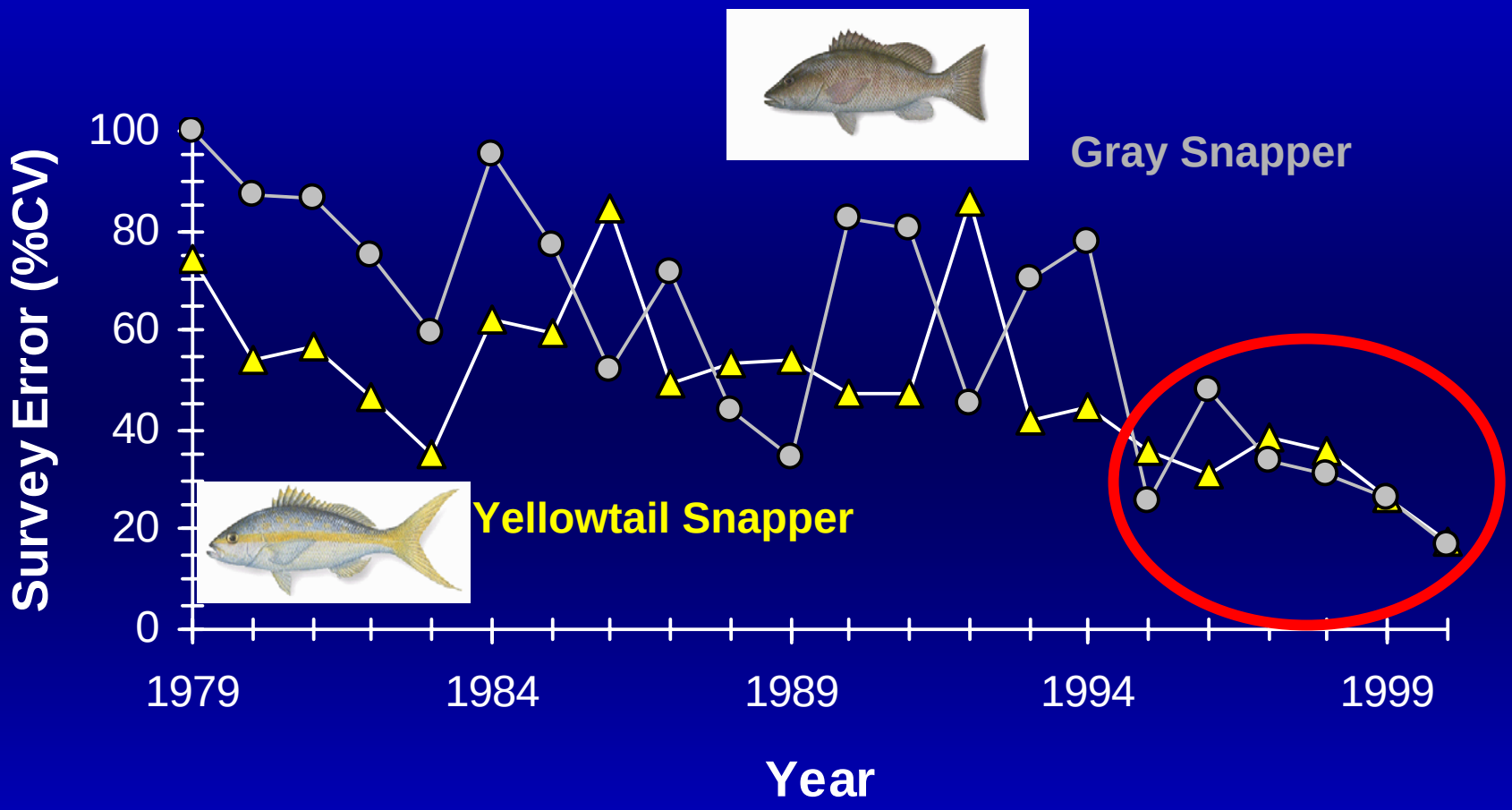
1 yo

L_m

L_c Minimum legal size

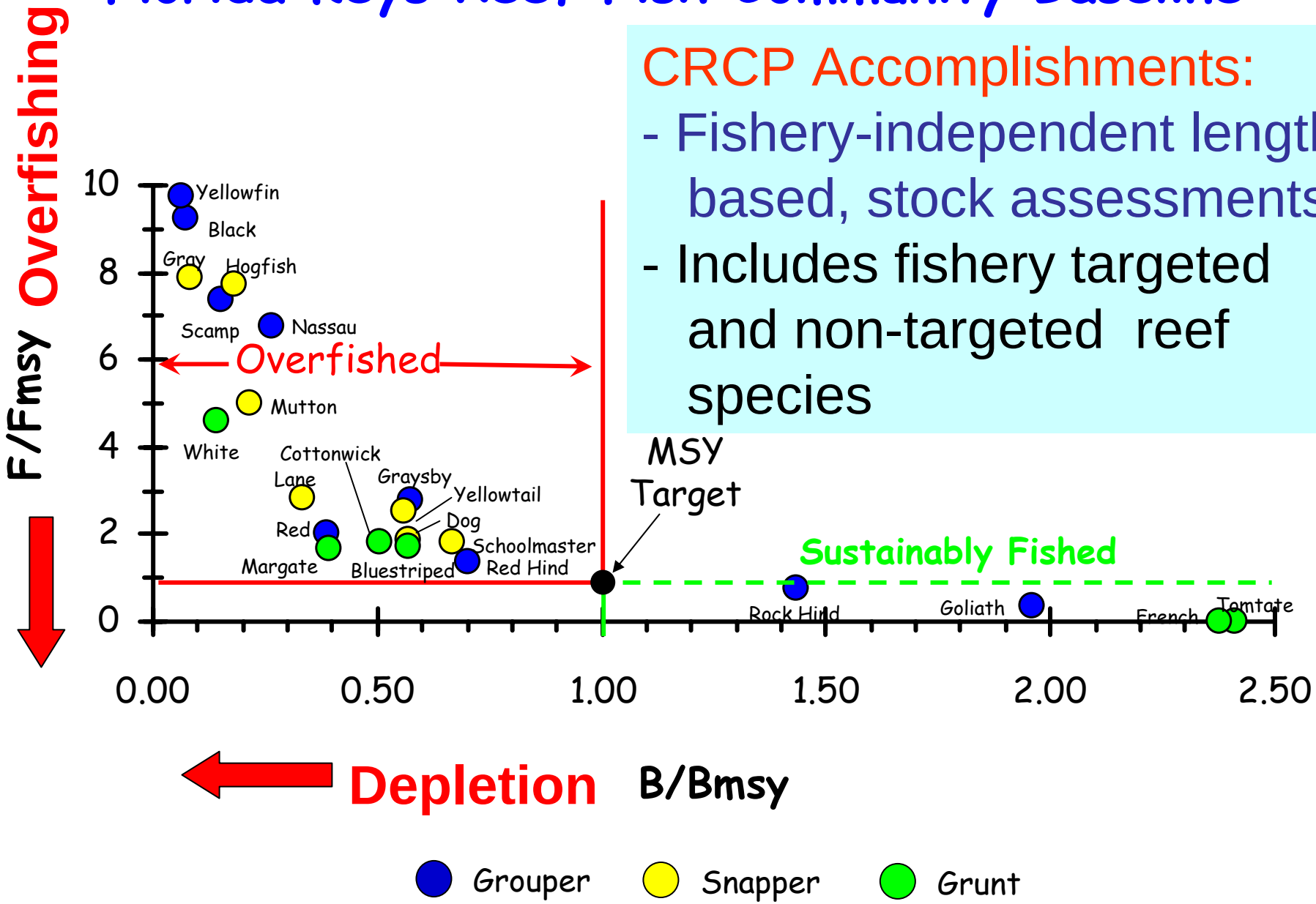
Length (cm)

Survey Precision for Adult Population Size



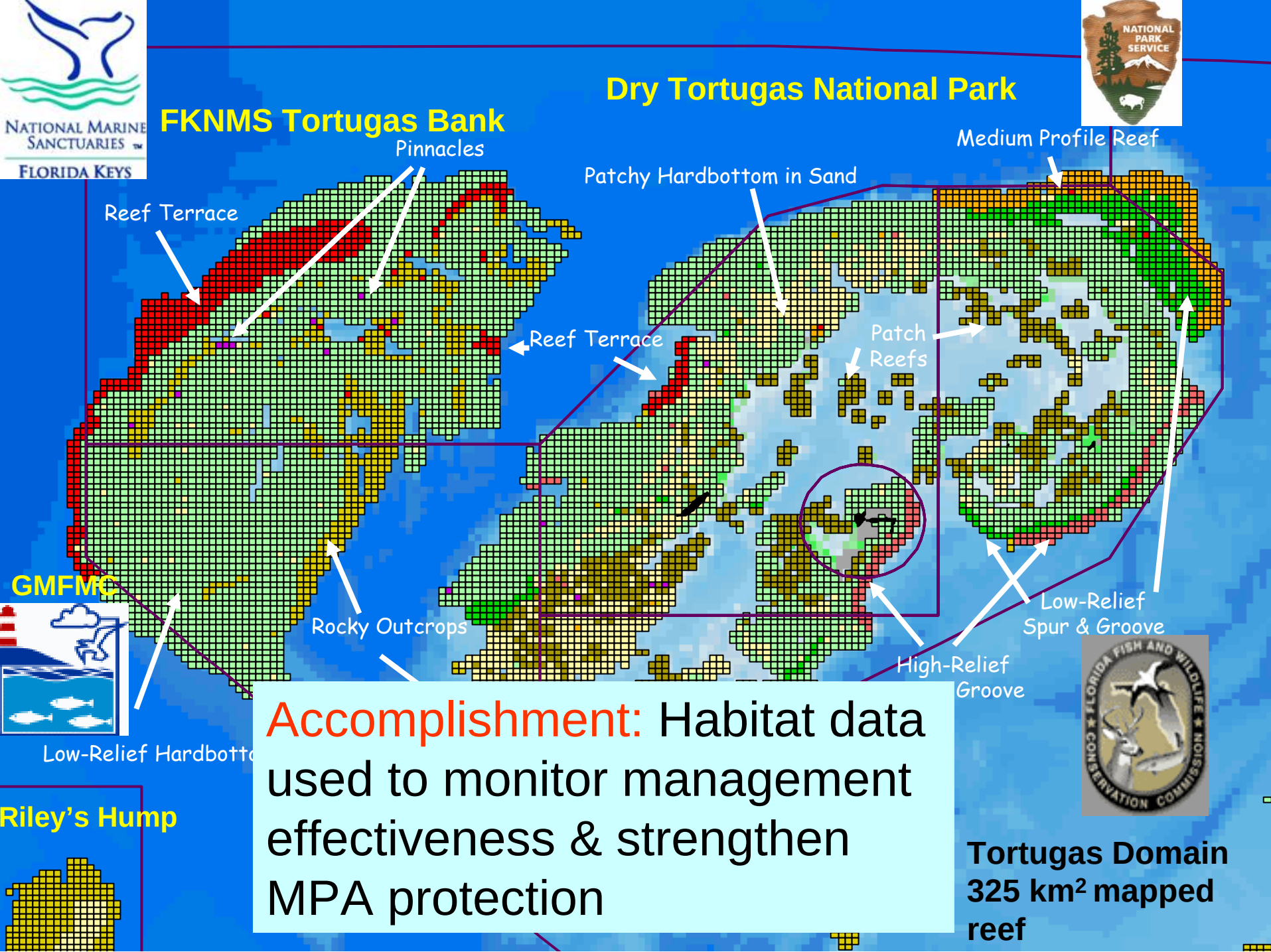
CRCP Accomplishment: Provide precise population estimates due to habitat-stratified random sampling

Florida Keys Reef Fish Community Baseline



CRCP Accomplishments:

- Fishery-independent length-based, stock assessments
- Includes fishery targeted and non-targeted reef species


National Marine Sanctuaries
Florida Keys
FKNMS Tortugas Bank
Pinnacles
Reef Terrace
Dry Tortugas National Park
Medium Profile Reef
Patchy Hardbottom in Sand
Reef Terrace
Patch Reefs
GMFMC
Rocky Outcrops
Low-Relief Spur & Groove
High-Relief Groove
Low-Relief Hardbotto
Riley's Hump
Accomplishment: Habitat data used to monitor management effectiveness & strengthen MPA protection
Tortugas Domain
325 km² mapped reef

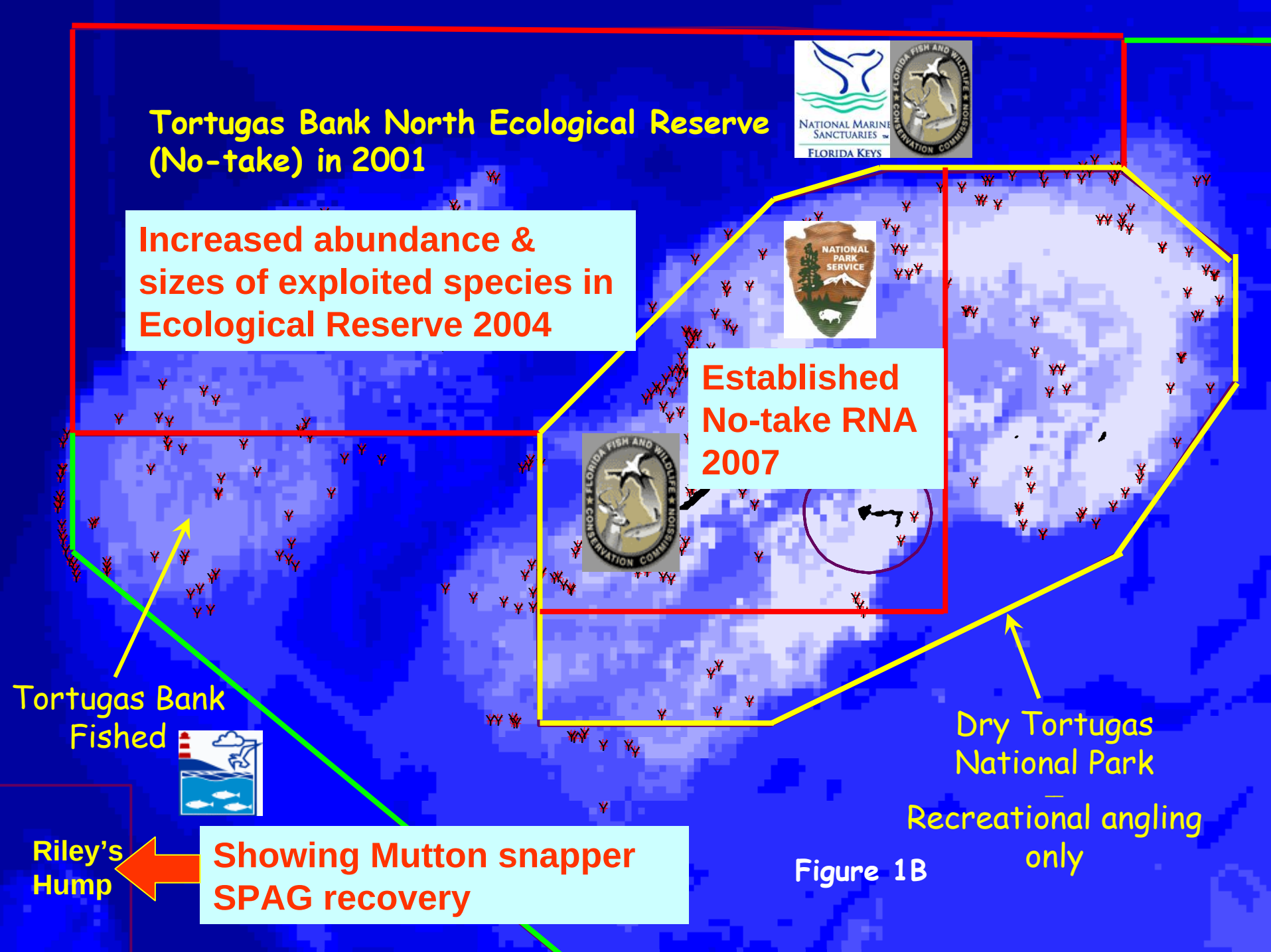
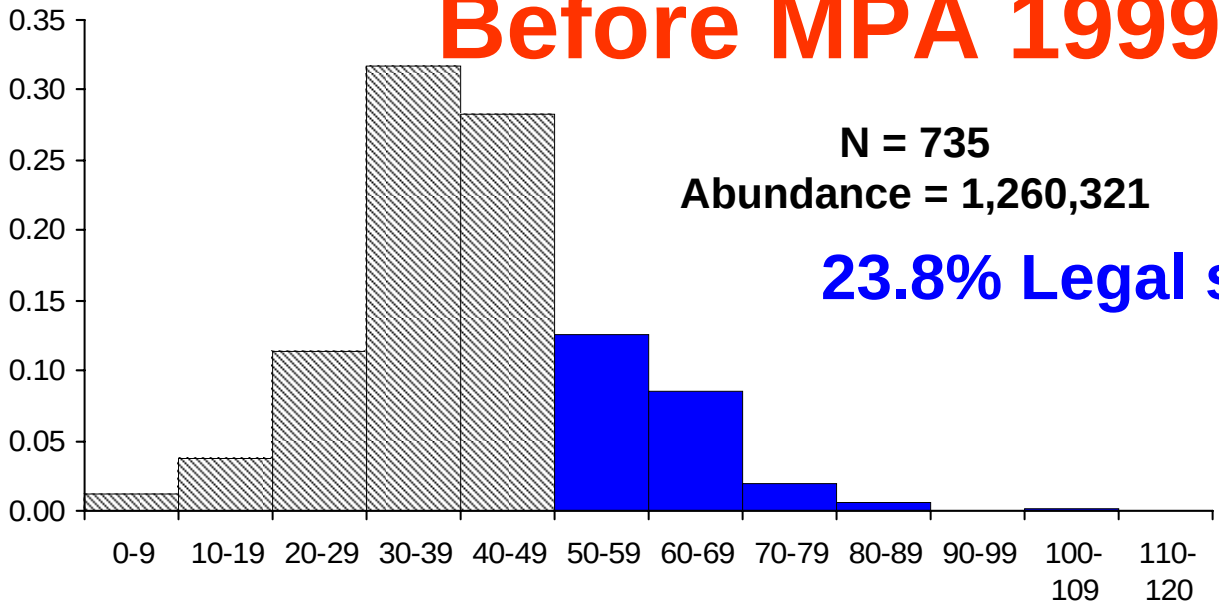

Tortugas Bank North Ecological Reserve (No-take) in 2001
Increased abundance & sizes of exploited species in Ecological Reserve 2004
Established No-take RNA 2007
Tortugas Bank Fished
Dry Tortugas National Park
Recreational angling only
Riley's Hump
Showing Mutton snapper SPAG recovery

Figure 1B

Before MPA 1999-2000

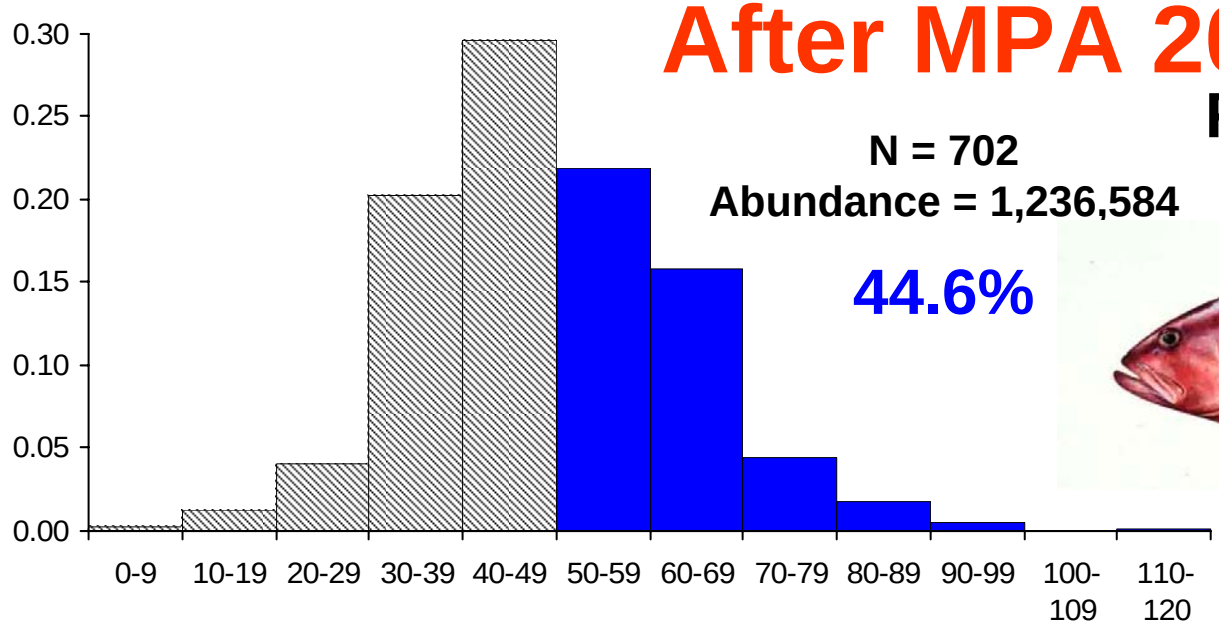


N = 735
Abundance = 1,260,321

23.8% Legal sized

After MPA 2004

Red Grouper



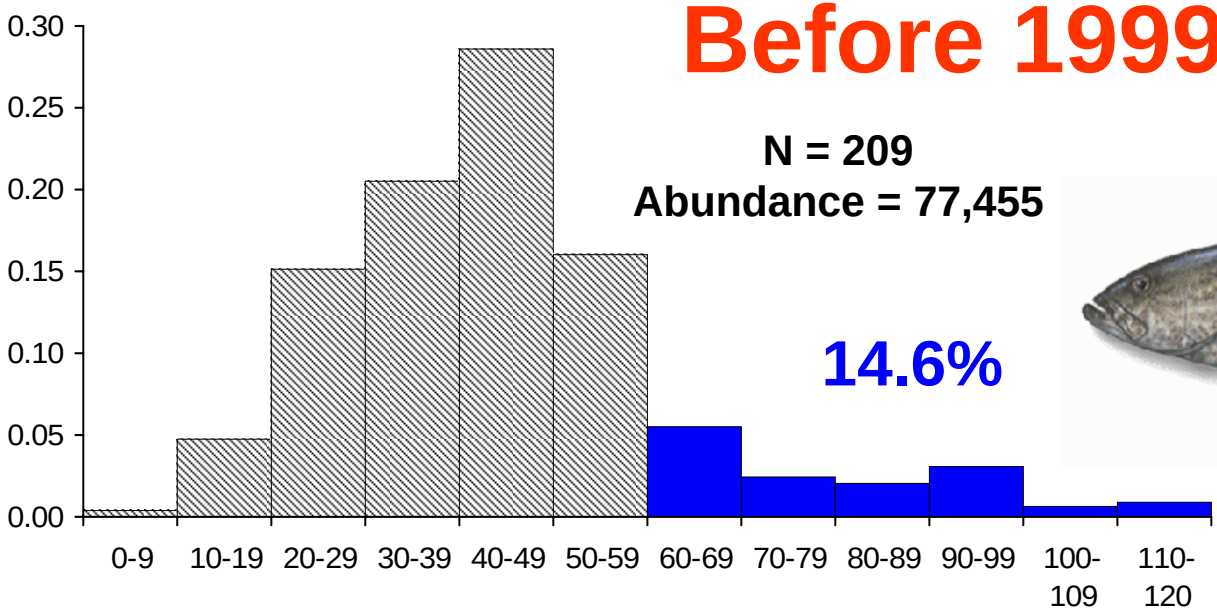
N = 702
Abundance = 1,236,584

44.6%

Frequency

Length (cm)

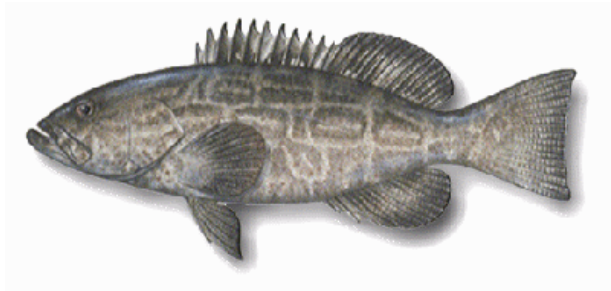
Before 1999-2000



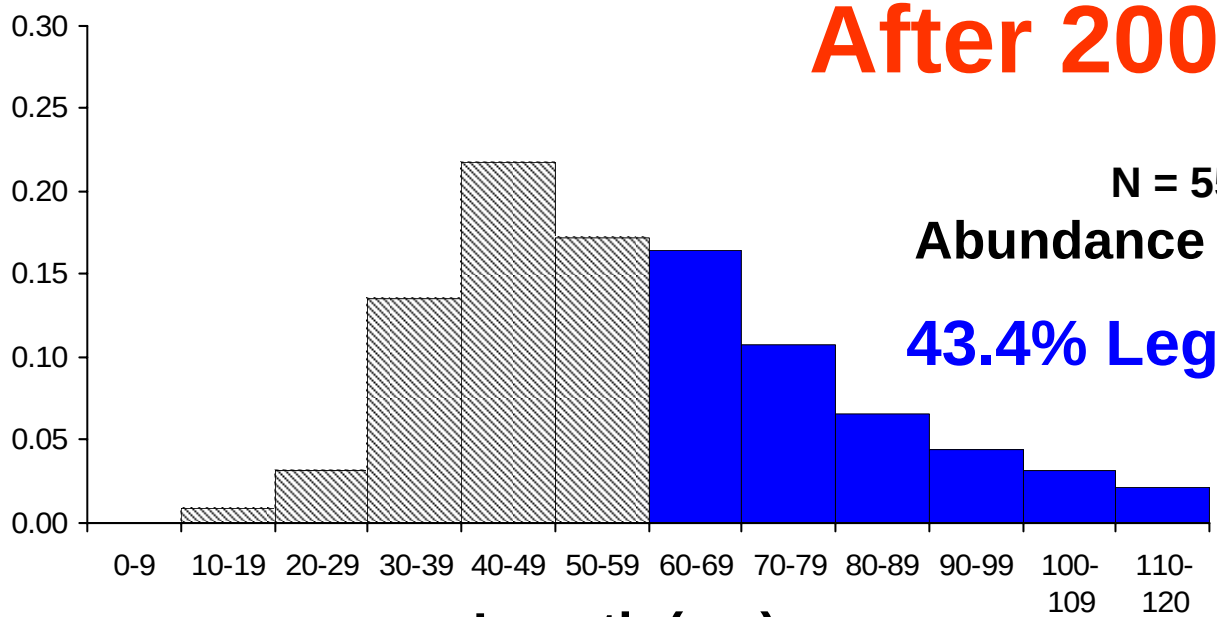
N = 209

Abundance = 77,455

14.6%



After 2004



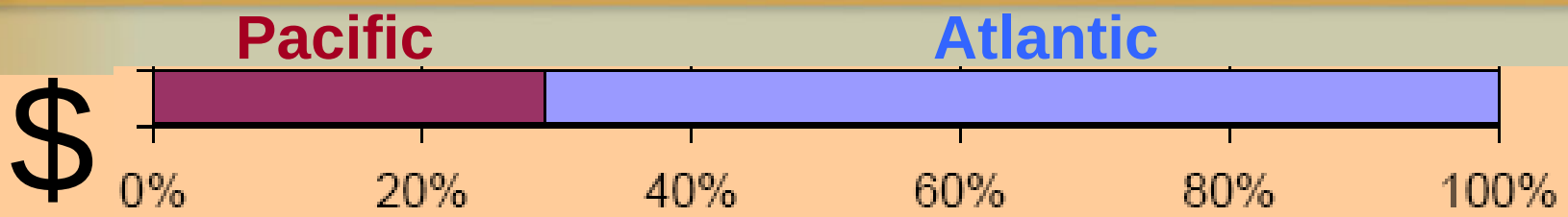
N = 558

Abundance = 621,662

43.4% Legal sized

Frequency

Length (cm)



Conduct Socio-Economic Studies

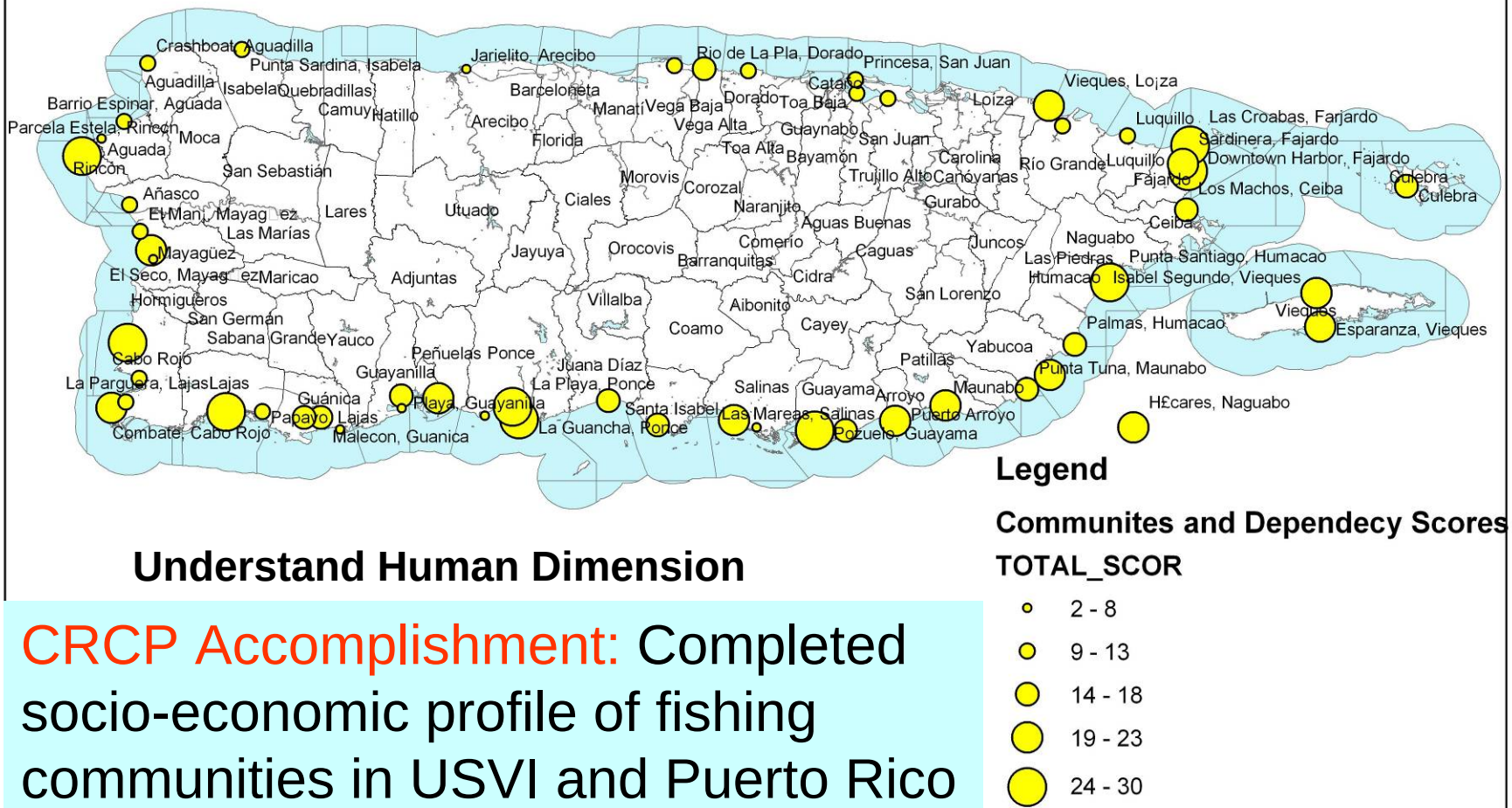
5 Years 2002-06

$3.0 Million	2% CRCP Funds
41 Projects	3% Total Projects

Conduct Social and Economic Studies to Understand the Human Dimension

Puerto Rico and USVI

Puerto Rico
Fishing Communities and Dependency Scores



Understand Human Dimension

CRCP Accomplishment: Completed socio-economic profile of fishing communities in USVI and Puerto Rico

Commercial Fishers' Perceptions of Condition of Coral Reefs (n=226)*

Time	Dead / Absent	Nearly dead	More or less healthy	Pretty healthy	Healthy	Don't Know
10 years ago	1.8	1.8	9.3	19.8	**63.9**	3.5
5 years ago	2.2	11.1	29.2	**31.4**	21.7	4.4
Today	19.3	**30.5**	20.6	16.6	9.0	4.0
5 years from now	**44.1**	14.7	12.3	8.5	10.0	10.4

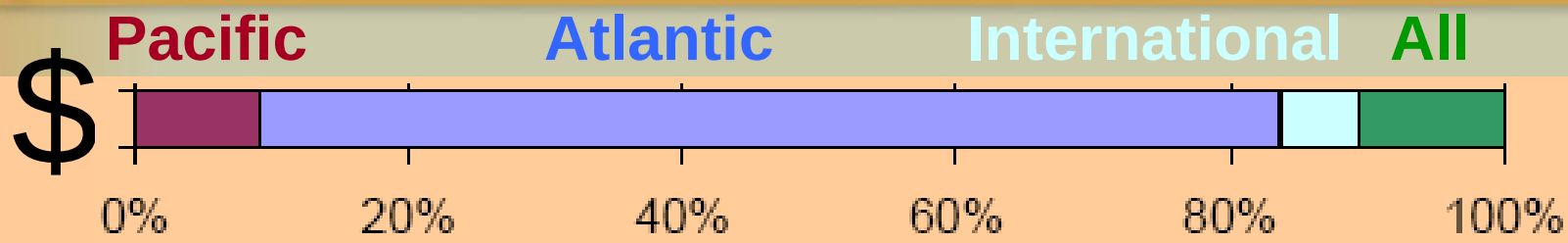
*Figures are percentages

Fishers believe that coral reef health has declined due to contamination, recreational boat anchoring, and recreational divers standing on reefs.

Reef Fish Landings

68%	Recreational
5%	Headboat
27%	Commercial
100%	Total

Boaters in Biscayne National Park

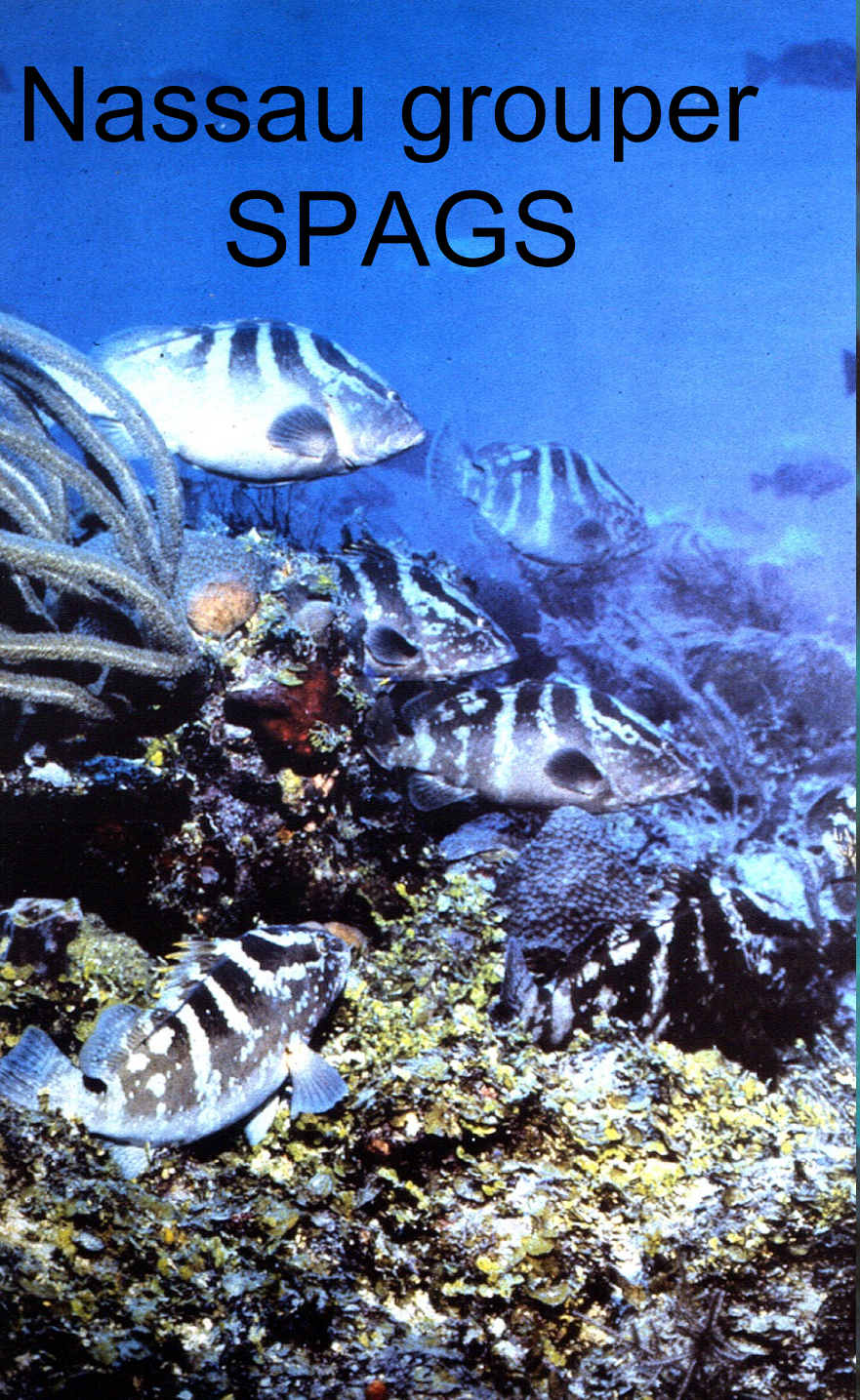


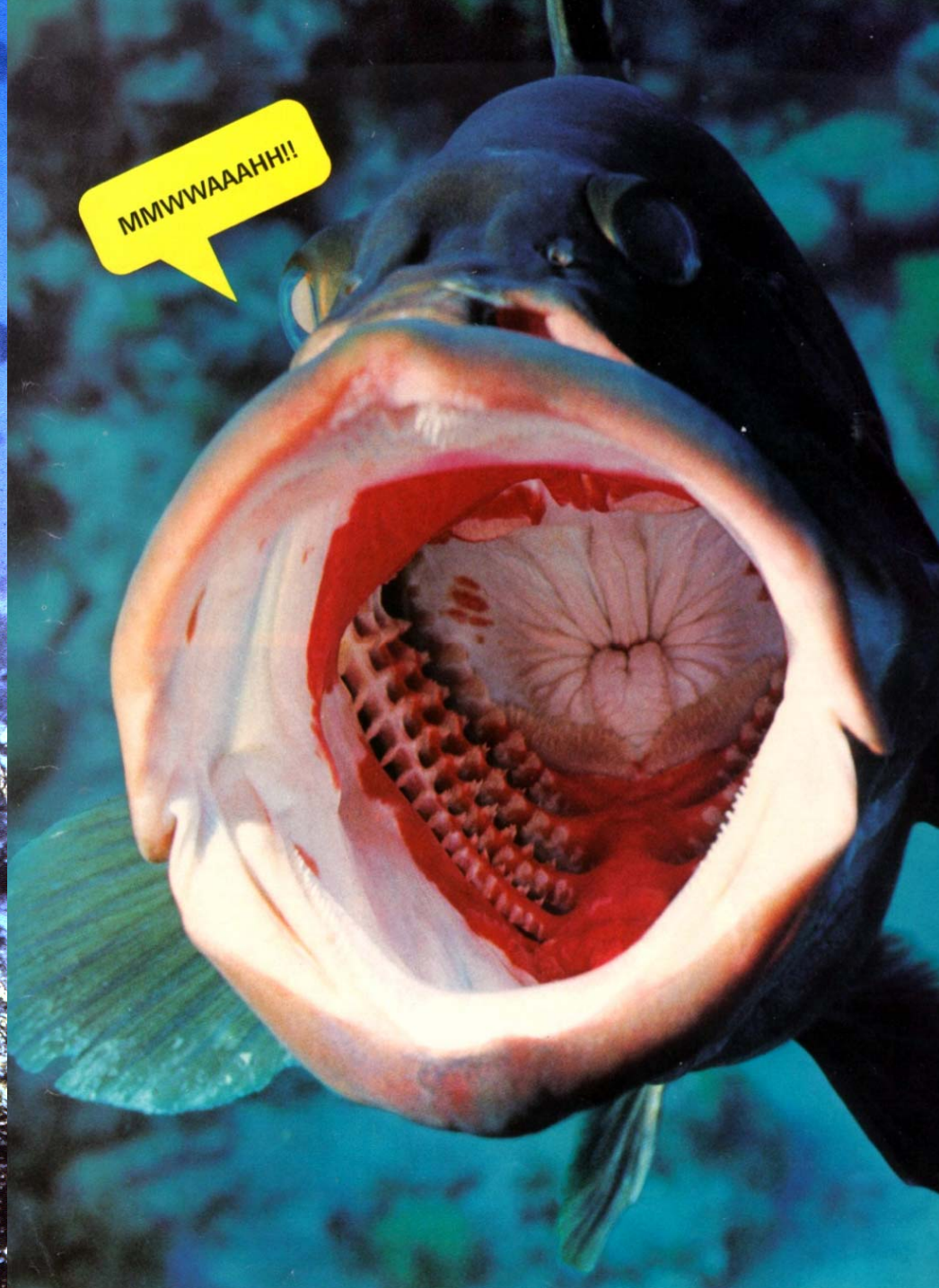
Identify & Protect Spawning Aggregations

5 Years 2002-06

$1.5 Million	1% CRCP Funds
25 Projects	2% Total Projects

Nassau grouper SPAGS



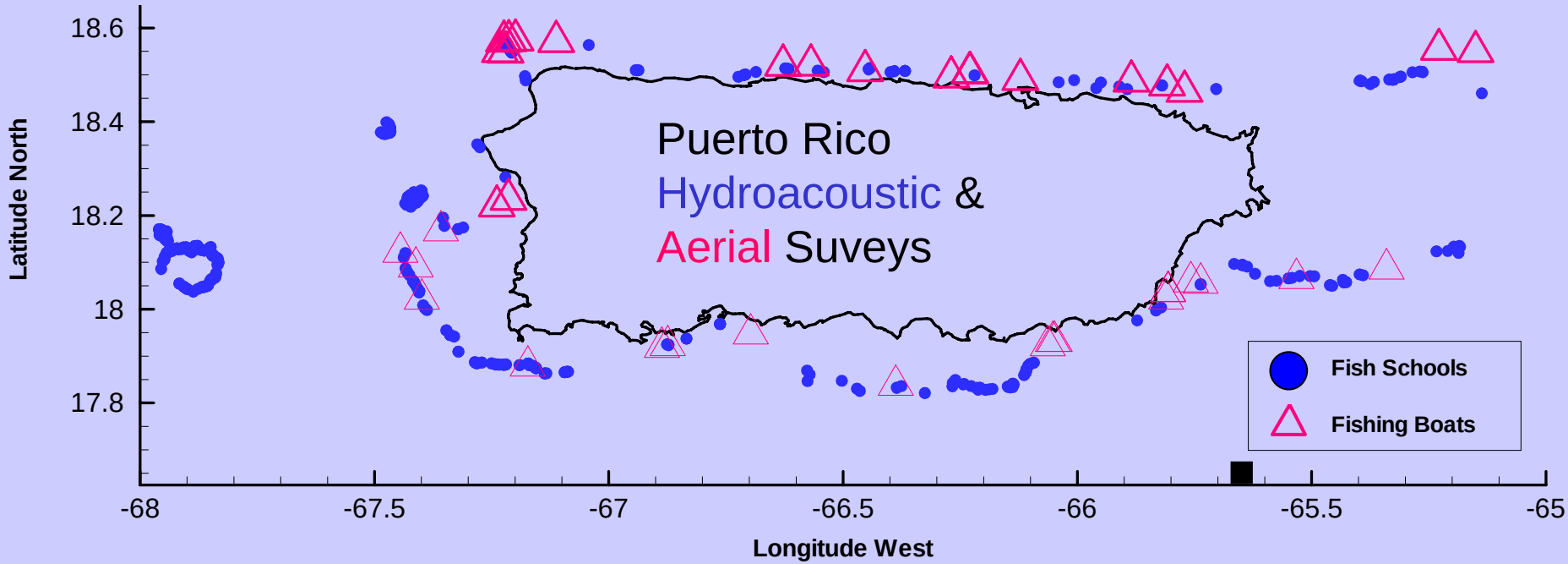


Spawning Aggregations (SPAGS) easily exploited

Some only occur outside U.S.

Photo Credit: Doug Perine

Results: Caribbean FMC closed federal MPAs in Puerto Rico and USVI & Puerto Rico closed fishing during spawning season



CRCP data used in reef fishery assessments:

goliath grouper, mutton snapper, yellowtail snapper, queen conch

Challenges:

- One Caribbean Ecosystem
- Most SPAGS outside U.S.
- Limited international travel and research funding

NOAA Caribbean Marine Res. Ctr

Bahamas, Nassau grouper

MEXICO Meso-America & U.S. Connectivity

Puerto Rico & USVI

BVI, Nassau grouper

Mexico Outreach

Cayman Is. Nassau SPAGS

Windward Is Acropora

Providencia, CO Black grouper SPAGS

Belize
Guatemala
Honduras
El Salvador
Nicaragua
Costa Rica
Panama
Venezuela
Guy

Science Challenges:

- Move from single-species to multi-species, ecosystem-based management
- Incorporate MPAs and spatial structure into stock assessments
- Include new science in management and policy decisions

Develop and apply new acoustic and stereo video sampling technology

Program Challenges

CORAL REEF CONSERVATION PROGRAM

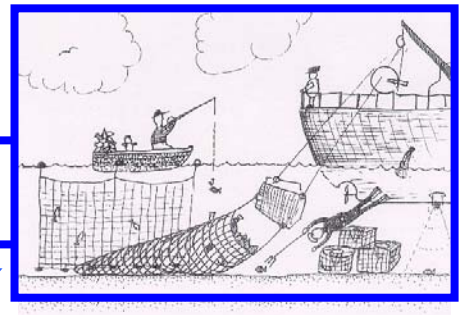
- Flat funding under inflation
- New restrictive and expensive diving and boating regulations
- Annual funding: long-term planning difficult & no new FTEs
- Funds unavailable in critical seasons
- Limited international program
- Loss of CMRC & NURC funding

Program Strengths

CORAL REEF CONSERVATION PROGRAM

- Provides ecosystem-based approach to science and management
- Highly integrated by geography, research theme, and threat
- Highly leveraged with >100 partners and programs
- Strong research-publication record

FISHING / OVERFISHING



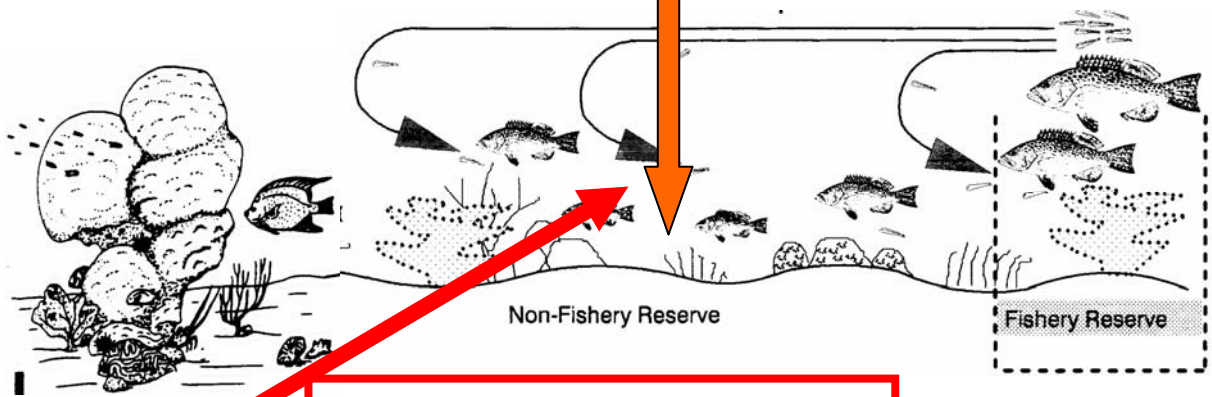
Human Dimension

5. Enhance Fisheries Management Implementation

6. Address Fisheries Enforcement and Outreach

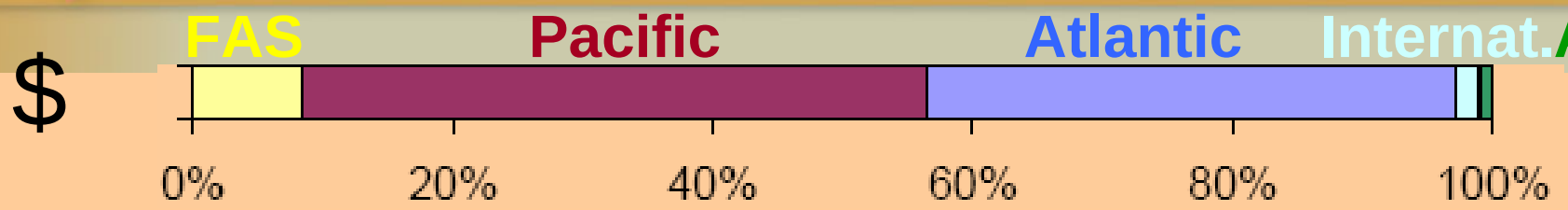
Goods & Services

Structure & Function



Biotic Dimension

4. Address Impacts of Overfishing and Gear on Reefs



Address Impacts of Overfishing and Gear on Reefs

5 Years 2002-06

$3.0 Million
41 Projects

2% CRCP Funds
3% Total Projects

Address Impacts of Overfishing and Gear on Reefs

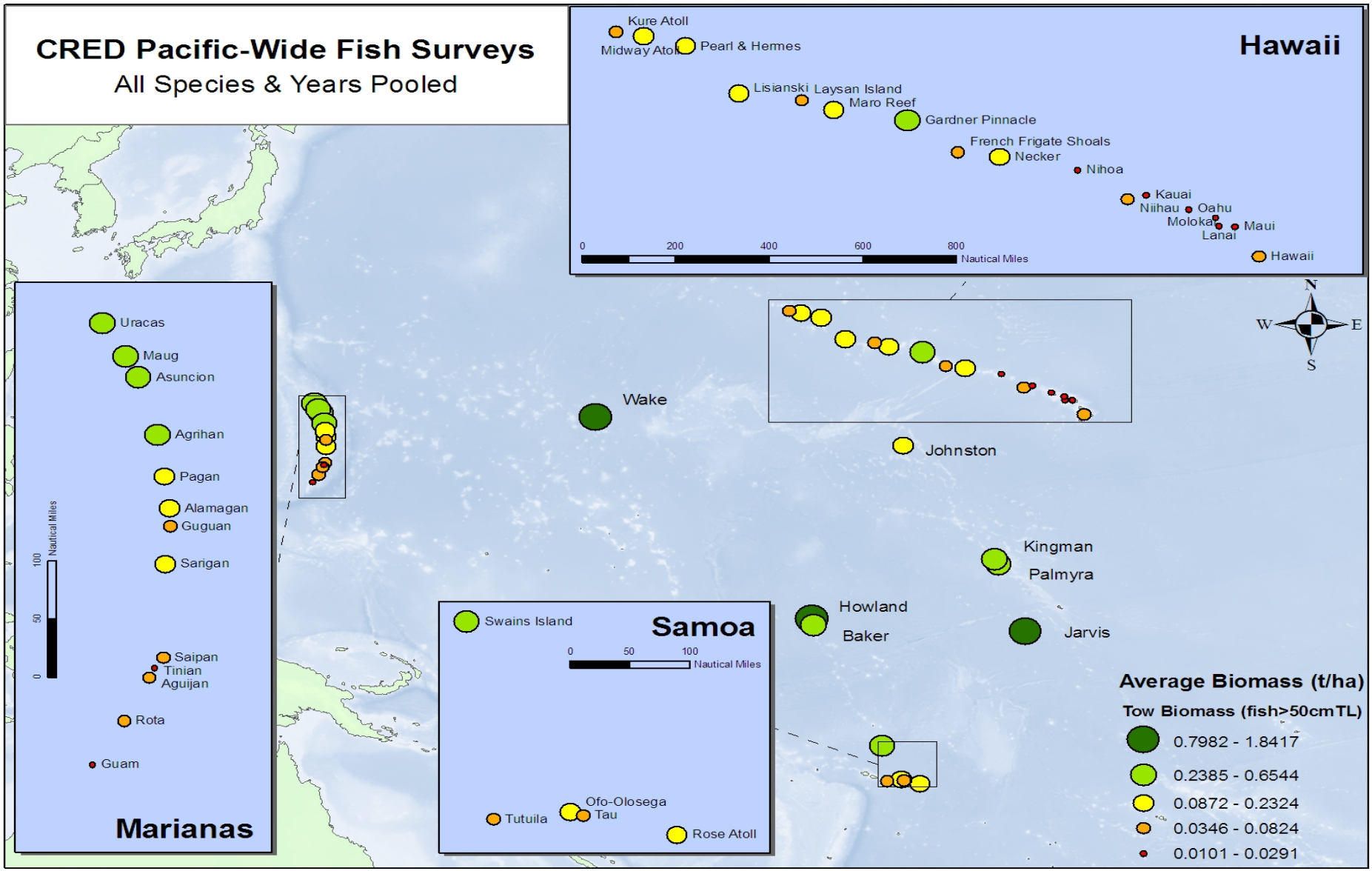
- Development of new technologies
- Regional assessments of possible overfishing and impacts to reefs
- Assessing the interaction of specific gear types – assessment and technical support

Development of new technologies

BotCam

Bait Station

Regional assessments of possible overfishing and impacts to reefs



Trap Fishing Effects on Coral Reefs and Associated Habitats - Florida Keys, Puerto Rico and US Virgin Islands

SEFSC-Galveston
Partners: Florida FWCC FWRI
USVI Div. of Fish and Wildlife
UPR-Mayagüez Marine Sciences Dept.

Overfishing and Gear Effects

Benefits

1. Increased capacity and focus on key fisheries management needs.
2. Implementation of Coral Reef Fisheries Management
3. Development of new fisheries tools to serve management needs
4. Technical Assistance in fisheries research and management
5. Tools to implement fisheries education across stakeholders.

Accomplishments

1. Assessment of fish trap and lobster traps on fisheries (Caribbean)
2. Overfishing impacts in the Pacific
3. Technical assistance toward phase out of Trammel nets (USVI).
4. Technical Assistance in research and management (gathering life history data, baseline assessments, etc.)

Overfishing and Gear Effects

Challenges

1. Limited local capacity
2. Data sets are large across many areas and complex to analyze
3. Large geographic scale, small sample time, low sample frequency
4. Weather
5. Adapting sampling to cultural and fisheries differences

Enhance Fisheries Management Implementation

5 Years 2002-06

$3.0 Million	2% CRCP Funds
46 Projects	4% Total Projects

Management Implementation

CNMI Creel Survey

Examples

Stewardship program in American Samoa, Participatory Learning and Action

Fisheries LAS coordination

Management Implementation

Benefits

1. Status of stocks
2. Science driven management
3. Fisheries Councils FMP support
4. Facilitated Community Management

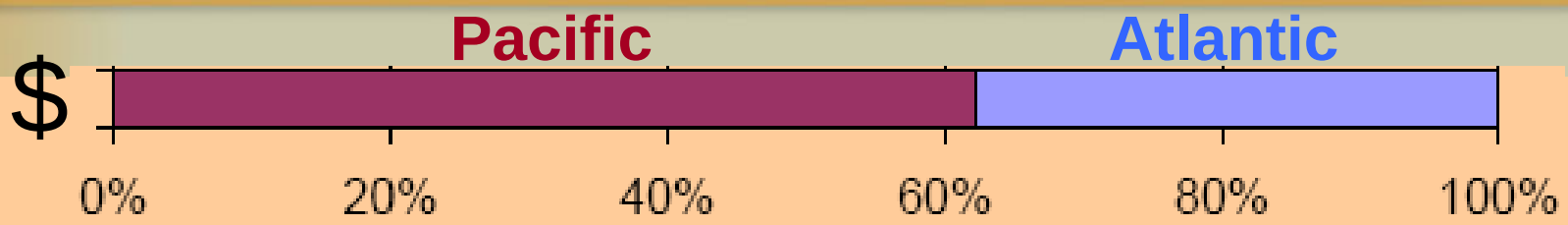
Accomplishments

1. CNMI Inshore Creel Survey
2. Significant support to Fishery Councils (Ecosystem approach)
3. Stewardship Program in American Samoa
4. Revised Fisheries LAS

Management Implementation

Challenges

1. Local capacity
2. Variability in resource status and use between jurisdictions
3. Effective dissemination of information to stakeholders
4. Measuring management of overfishing progress toward Success
5. Target management baseline



Address Fisheries Enforcement and Outreach

5 Years 2002-06

$1.8 Million	1% CRCP Funds
44 Projects	3% Total Projects

Enforcement & Outreach

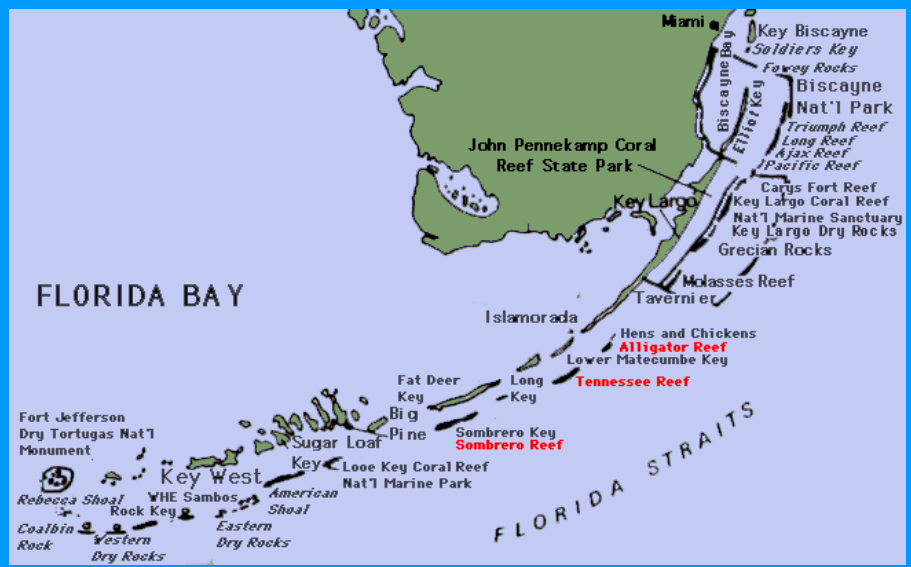
Fisheries LAS Coordinators
American Samoa, Guam,
CNMI, Hawaii

Fisheries Management
Workshops

Fisheries Enforcement and Outreach

Fisheries Extension Agent in Hawaii

Radar coverage network - much of Florida Keys National Marine Sanctuaries



Conservation Officer Reserve Program in Guam

Enforcement & Outreach

Benefits

1. Strengthen Community Partnerships
2. Improved information delivery to stakeholders
3. Improved regulatory framework
4. Localized Outreach Approaches

Example Accomplishments

1. Fisheries Extension In Hawaii
2. Fisheries LAS Coordinators
3. Radar Installation in Florida Key NMS
4. Conservation Officer Reserve Program in Guam

Enforcement & Outreach

Challenges

1. Continuous enforcement funding (staff & equipment)
2. Every place needs a different enforcement and outreach approach.
3. Having to provide significant up-front training to staff enforcement positions.
4. Inadequate local resource laws
5. Carrying out broad educational programs with limited resources and staff.
6. Difficult to get coral reef education into primary and secondary school curriculums

Hawaii Coral Reef Ecosystem Division

Total staff: ~55 (7 FTEs)
11 PhD
14 MS
2 post-Docs
10 students (3 PhD & 7 MS)

These staff and our partners spend 4000-5000 man-days/year at sea!

Tortugas Cruises

Partnerships

NATIONAL MARINE SANCTUARIES
FLORIDA KEYS

NATIONAL PARK SERVICE

FLORIDA FISH AND WILDLIFE CONSERVATION COMMISSION

ROSENSTIEL SCHOOL OF MARINE AND ATMOSPHERIC SCIENCE
RSMAS
UNIVERSITY OF MIAMI

NATIONAL OCEANIC AND ATMOSPHERIC ADMINISTRATION
NOAA
U.S. DEPARTMENT OF COMMERCE

Reduce Adverse Impacts of Fishing:
Investment by Subcategory

- Identify and Protect Spawning Aggregations
- Fishing Impacts on Reefs: Impacts of Overfishing and Gear on Reefs
- Fishing Impacts on Reefs: Socioeconomic Studies
- Fishing Impacts on Reefs: Management Implementation
- Fishing Impacts on Reefs: Fisheries Enforcement and Outreach
- Understand Connectivity, Habitat Utilization and Essential Fish Habitats

1. **Significant benefits and accomplishments in all areas.**
2. **All areas limited by local and federal capacity**
3. **Need to continue to expand and improve local and federal partnerships**
4. **Successes have been and need to continue to be management driven**
5. **Next steps need to focus on implementation.**


Discussion