

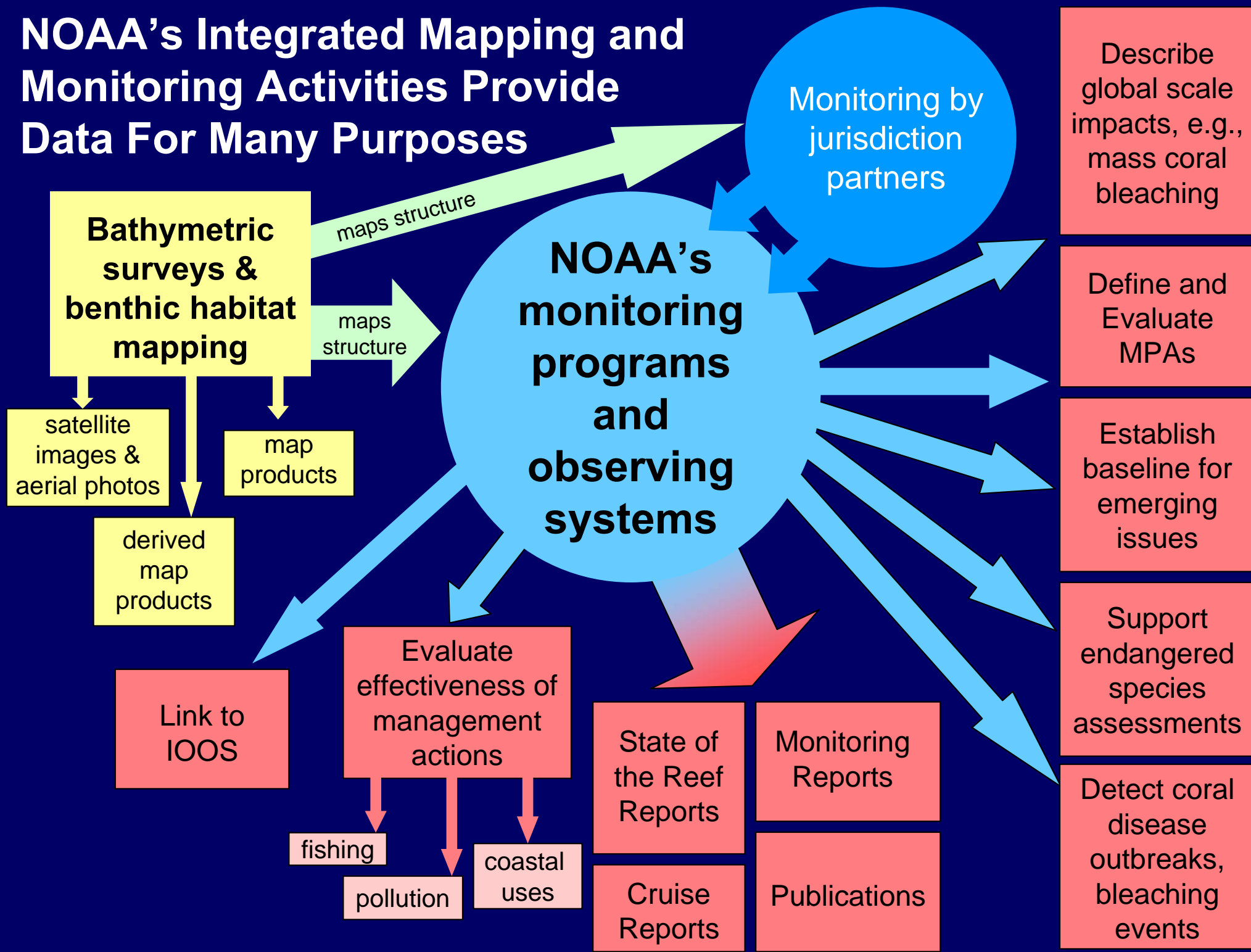
Biological Monitoring

Pacific CREIOS Workshop

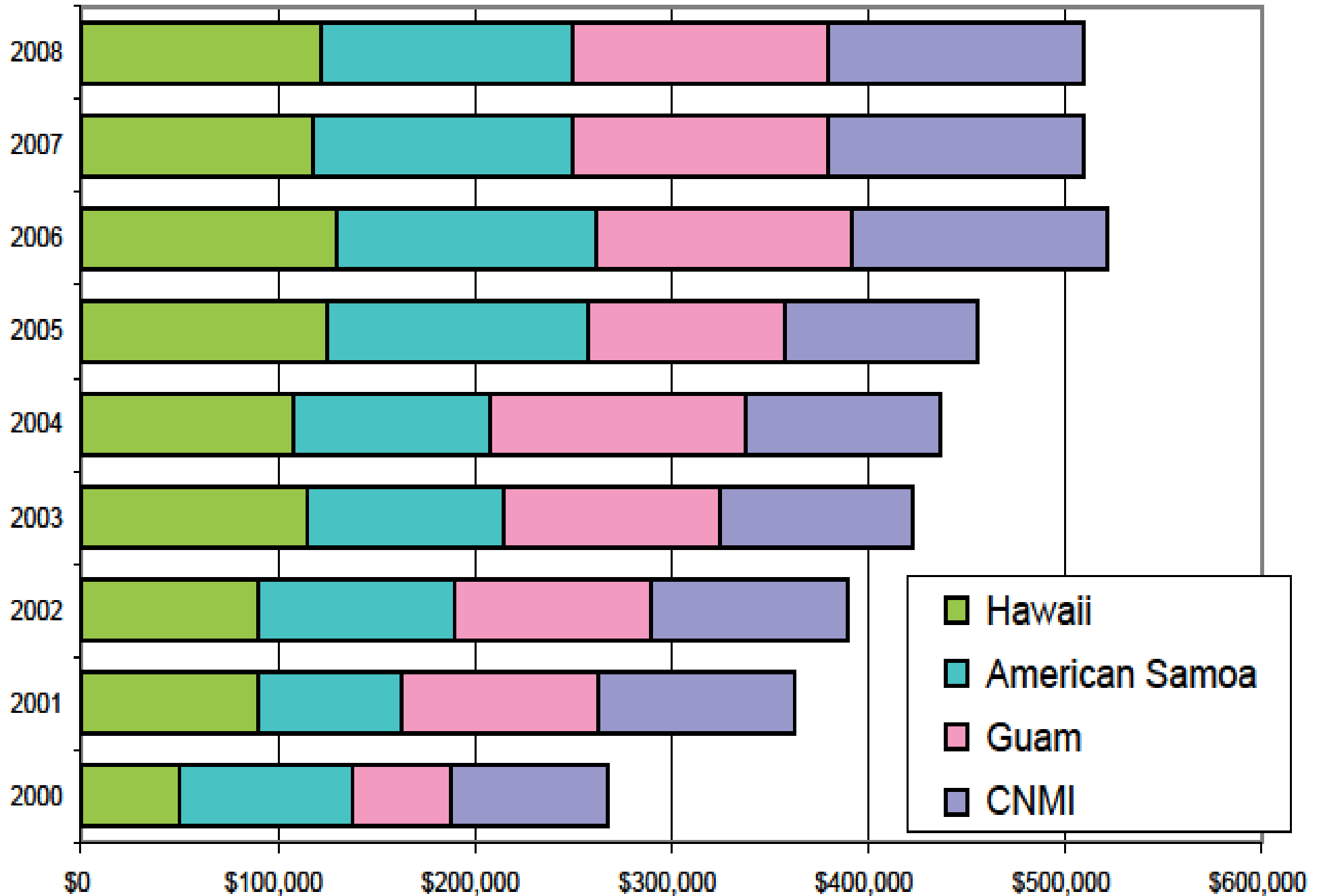
November 18-20, 2008



NOAA's Integrated Mapping and Monitoring Activities Provide Data For Many Purposes



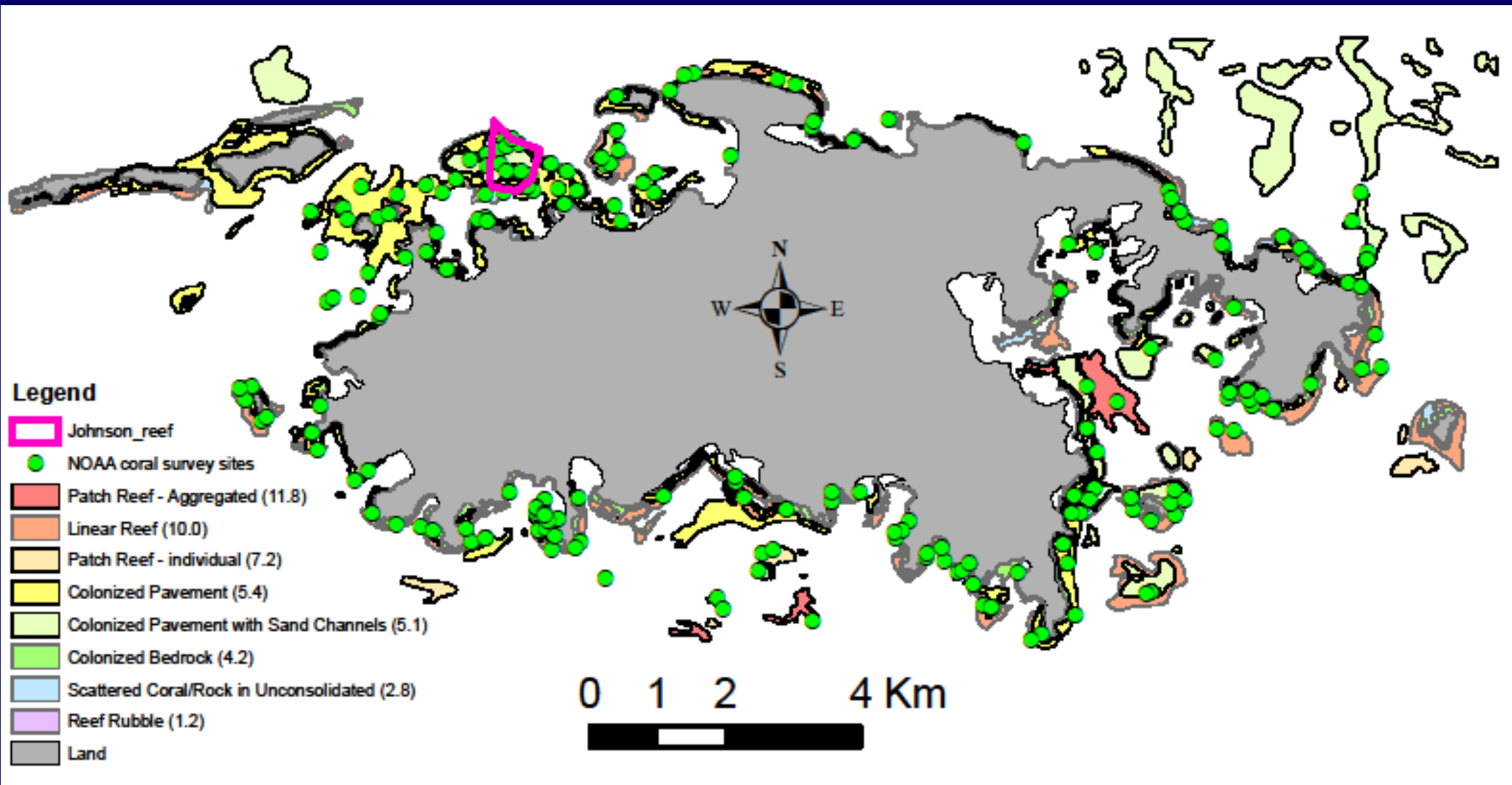
**CRCP National Coral Reef Ecosystem Monitoring Program Grants
U.S. Pacific Jurisdictions, Fiscal Years 2000-2008**



Atlantic/Caribbean Biological Monitoring

APPROACH

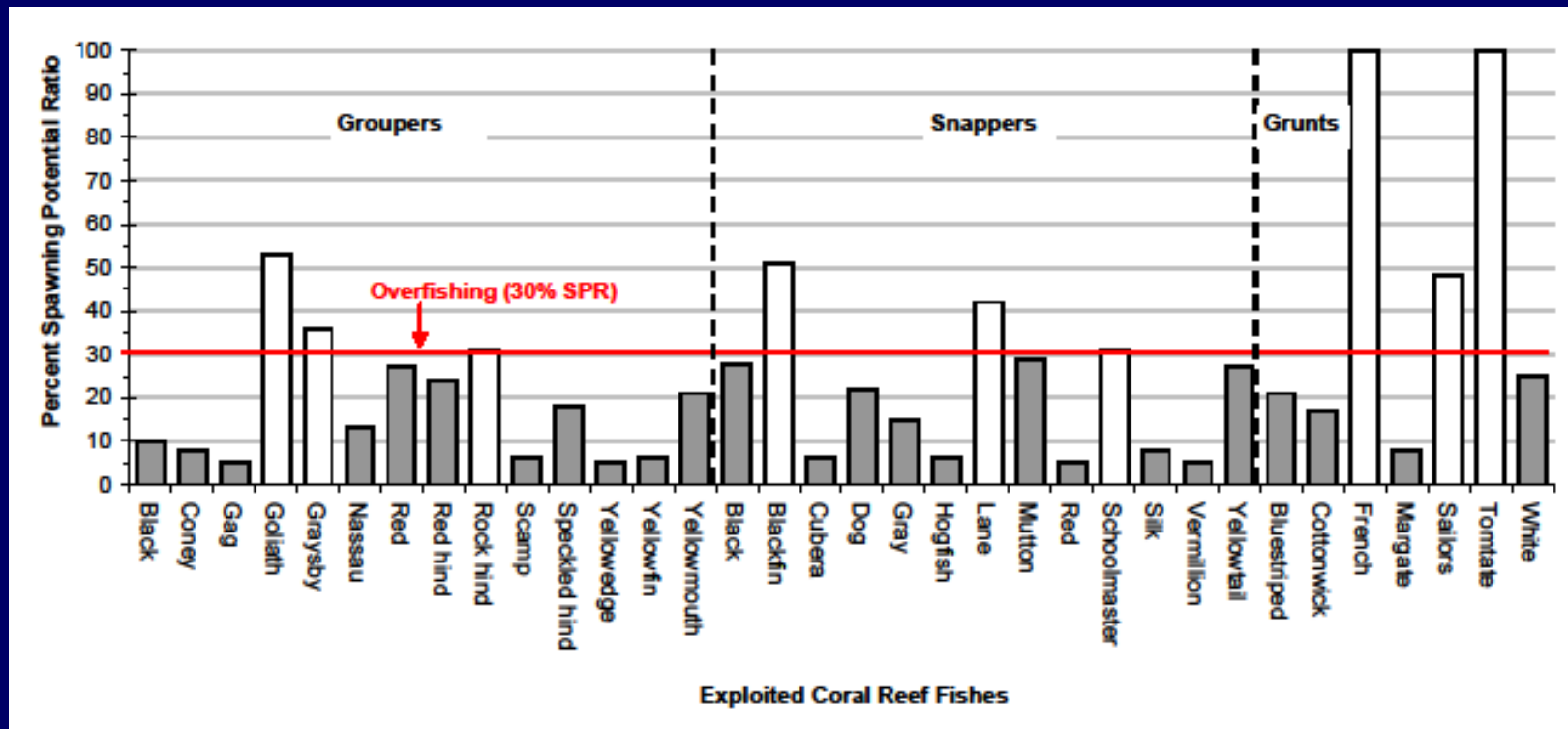
- Decentralized coordinated multi-agency approach
- Stratified random sampling design



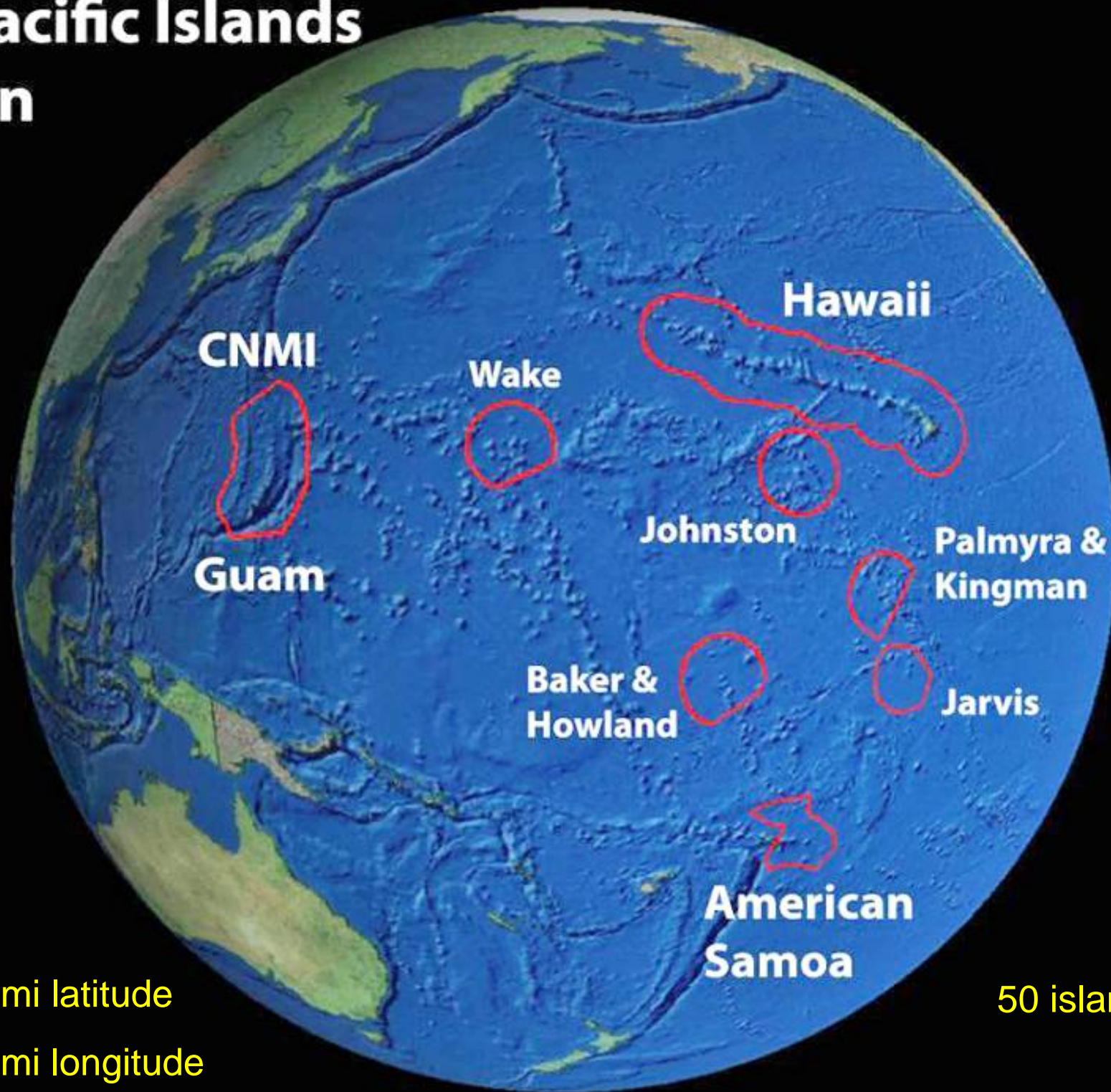
Atlantic/Caribbean Biological Monitoring

MANAGEMENT APPLICATIONS

- **Baseline resource characterization**—anchoring zones, aquaculture facility placement, EFH
- **Response to environmental, anthropogenic disturbance**—ship groundings, bleaching/disease events, oil spills, hurricane impacts
- **Targeted assessment products**—region-wide stock assessments and ecosystem assessments, MPA efficacy, impact of LBSP



The Pacific Islands Region



2,500 nmi latitude

3,600 nmi longitude

50 islands/banks

Biological Monitoring Goals

To measure temporal and spatial variation in:

- Sustainable reef living resources (fish, macroinverts, algae)
- Reef resource habitat composition/ trophic base (corals, macroalgae, oceanography)
- Reef ecosystem condition (indicators, parameters)
- Reef biological diversity (e.g., species richness)
- Reef species of concern (e.g., endangered)

Pacific RAMP

Biological Monitoring Activities

Towed-diver:

- Large fish
- Macroinvertebrates
- Habitat composition
- Survey ~25,000 m²

Site-based REAs (fish, coral/disease, algae, macroinvertebrates):

- Belt-transect
- Point counts
- Survey ~200 -1000 m²
- ARMS (Autonomous Reef Monitoring Structure)
- EARs (Ecological Acoustic Recorders)

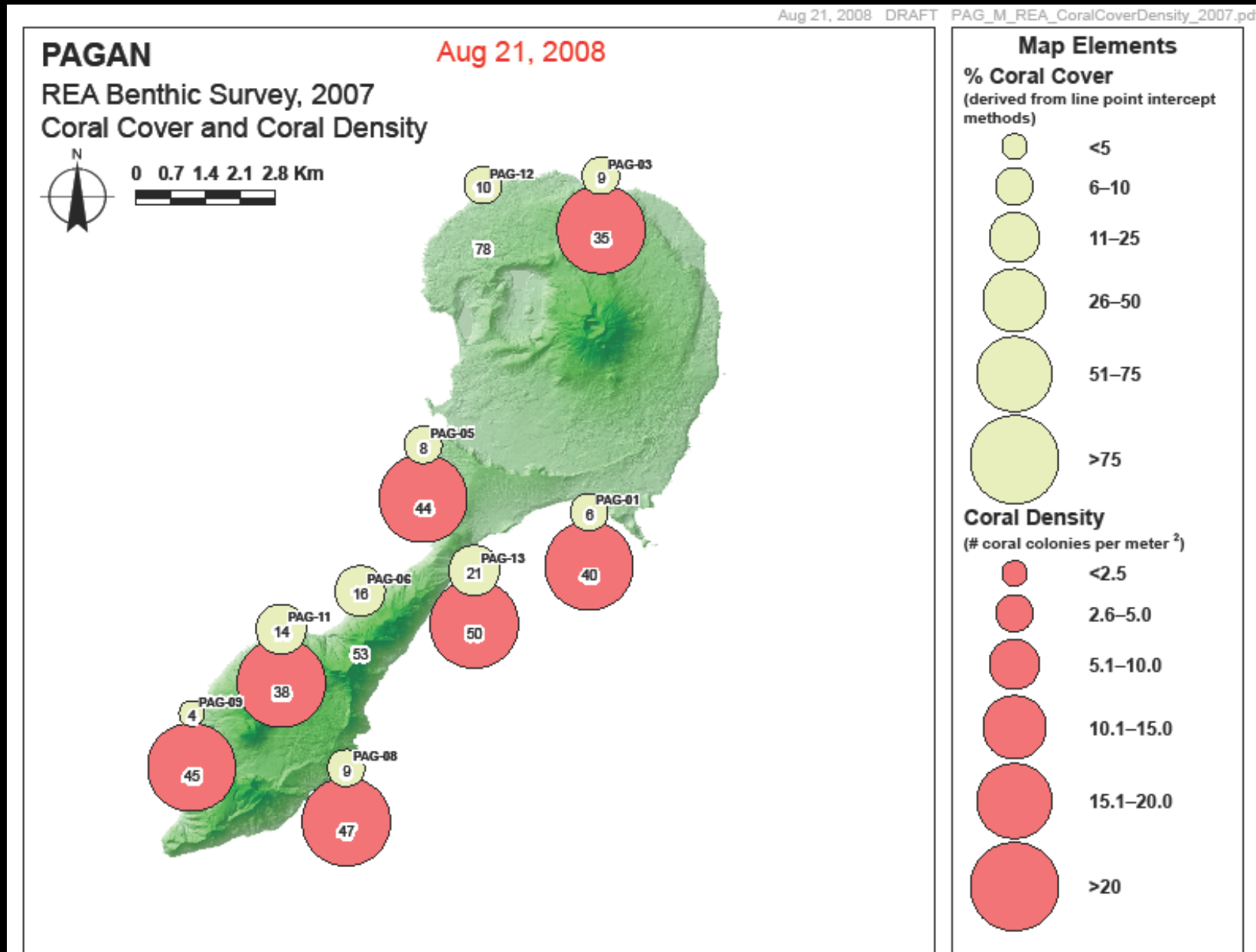


Pacific RAMP

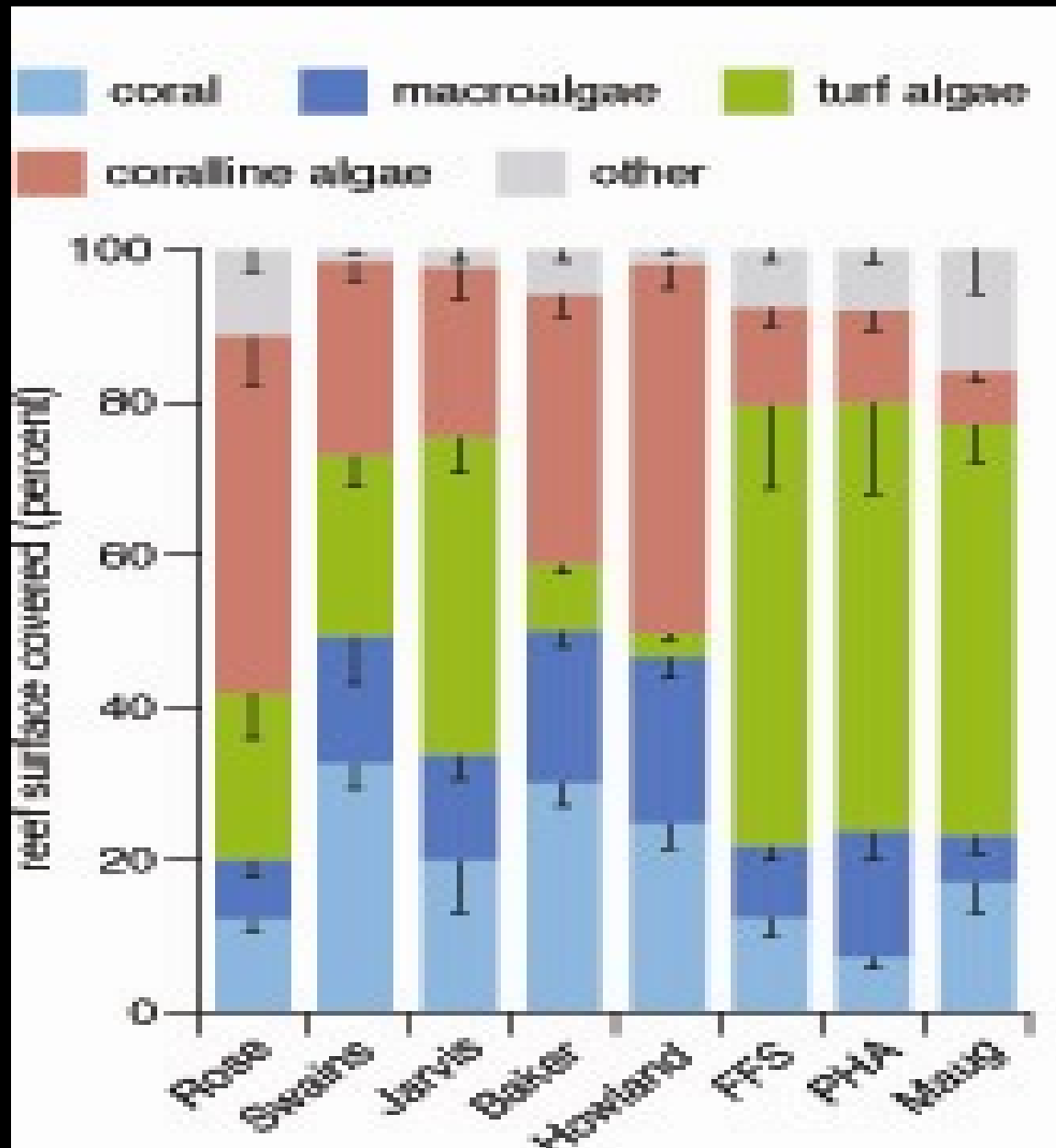
Unique Survey Capabilities

- 1) Small (within island) to broad-scale (Pacific-wide) spatial coverage
 - provides for regional comparison (eg., Tutuila to Saipan to Oahu to Jarvis)
 - Provides for surveys at very remote, uninhabited US islands/atolls
- 2) Produces simultaneously coordinated multidisciplinary ecosystem surveys
- 3) Uses standardized methods and observers

Connecting Monitoring to Management: CNMI: Live Corals Around Pagan



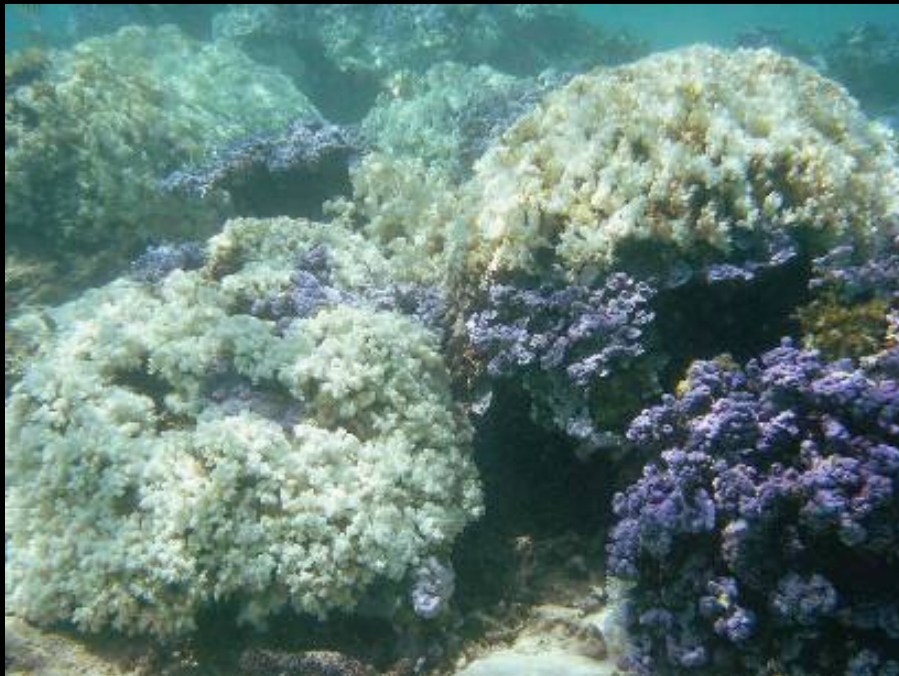
Connecting Monitoring to Management : Remote Islands: Reef Biological Habitat



Connecting Monitoring to Management:

Document unexpected phenomena:

- mass bleaching in NWHI
- COTS outbreak off Oahu
- knowledge led to Hawaii LAS development and changes in PMNM management plan



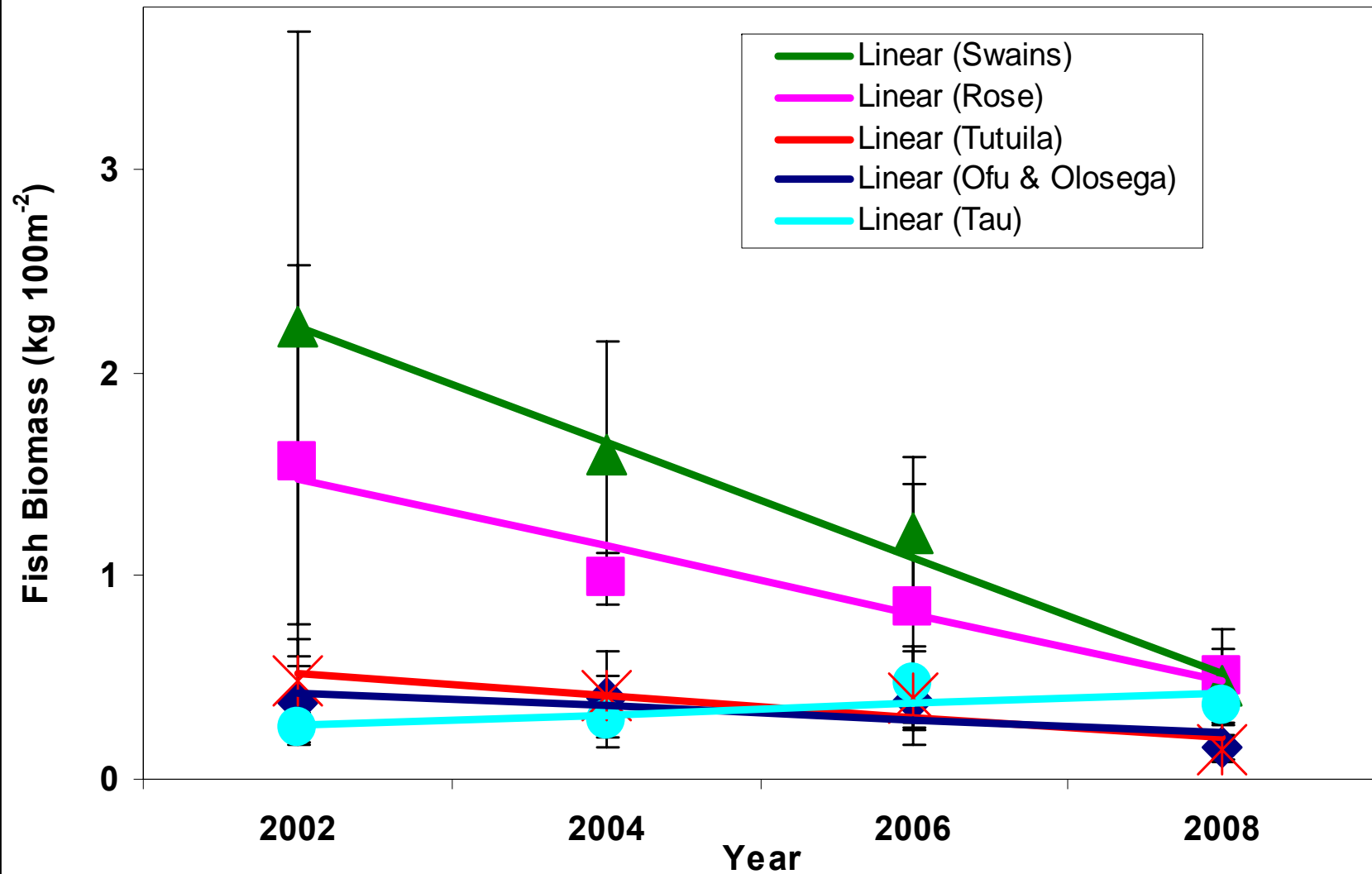
Coral Bleaching, NWHI



Crown of Thorns, MHI

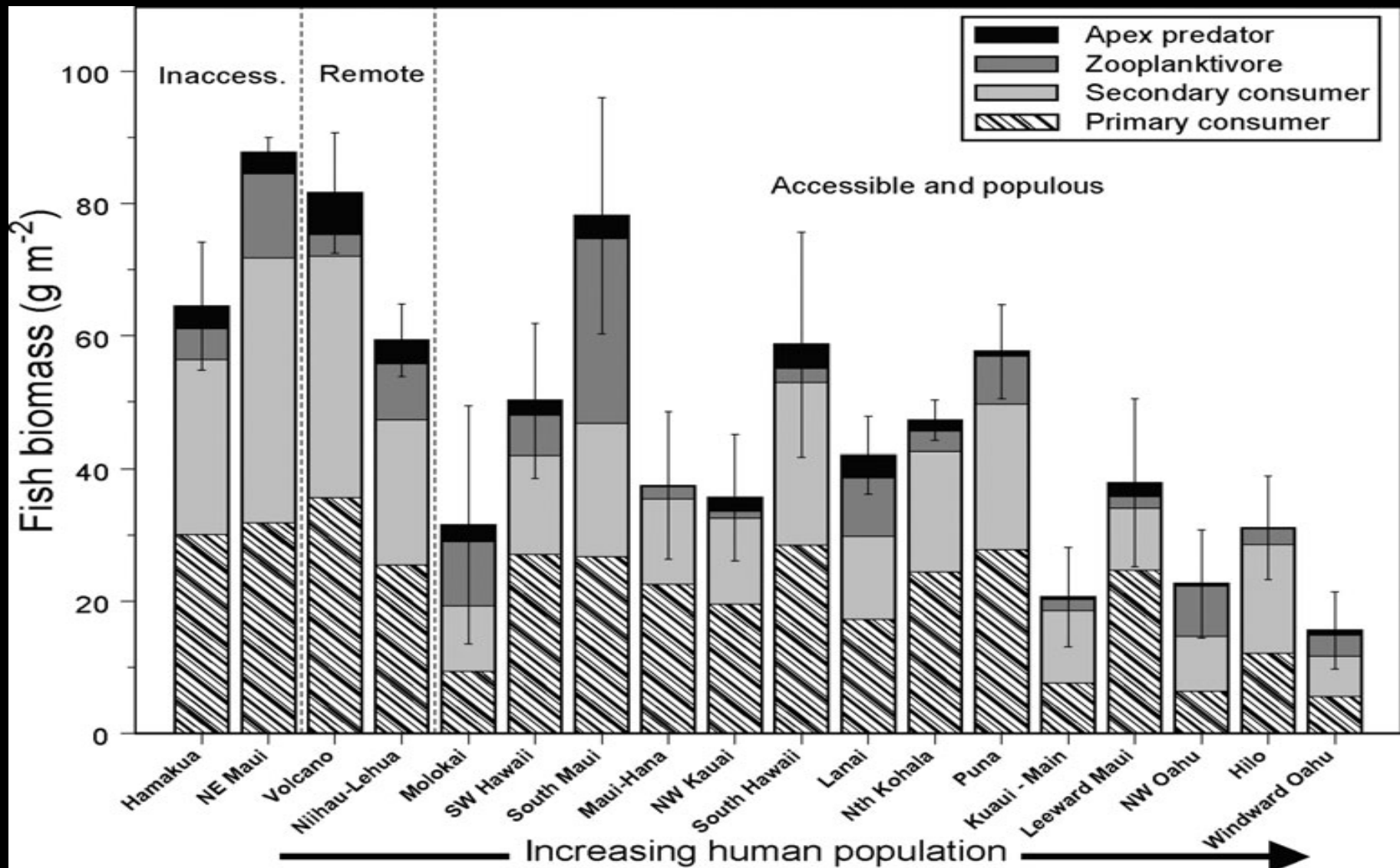
Connecting Monitoring to Management: Samoaan Island Trends in Large Fish Biomass

(Fish >50cm TL, 2002-2008)



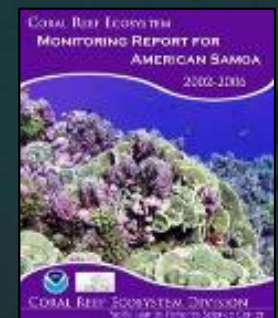
Connecting Monitoring to Management: Fishing Impacts on MHI Reefs

Pacific-RAMP results (in Williams, et al. 2008, *Envir.Cons.*)



Connecting Monitoring to Management

- **American Samoa:**
 - **Monitoring Report**
 - **Basis for establishing MPA network**
- **CNMI/GU - DOD build-up/activities**
- **NWHI – Marine National Monument**
- **PRIA – Pres. Bush Marine Monument proposals**



Connecting Monitoring to Management

- REA assessment/monitoring sites chosen in partnership with local managers to target locations difficult to access or of special management interest
- Cruise report (summaries) and raw survey data are available to local jurisdictions (after review and approval by PIFSC)
- Monitoring Reports provide scientific basis for reef management

Pacific Reef Biological Monitoring

Management Priority: (data needs)	Identified by:					
	AS	CNMI	GU	HI	Cross-cutting	Pacific RAMP data
* overfishing (esp. large fish/ target species)	■	■	■	■		■
* achieve sustainable harvest	■	■		■		
* larval dispersal patterns	■	■	■	■		
* resource spatial variation (for MPA selection)	■	■		■		■
* reef ecosystem 'health' (bleaching, disease, turf algae, sedimentation)	■			■		■
* effectiveness of fishery management regulations (closures, restrictions, MPAs)	■	■	■	■	■	■
* reef fishery stock assessments / reef fish standing stock biomass (e.g., MS-Act)		■		■		
* impact of fishing on reef ecosystem functions and community structure		■	■			■
* monitor resource impacts of coastal/nearshore development (e.g., DOD activity)		■	■			■
* refine EFH maps (Habitat Area of Particular Concern, HACP)			■			
* island-wide resource assessmt. Including typically remote/inaccessible areas)			■	■		■
* reef fish fishery-independent monitoring (e.g., predator biomass)	■	■		■		■
* status and trends for invasive algae- predict new occurrences?				■		
* biological indicators for alien species				■		■
* use management questions (threats) to guide monitoring				■	■	
* monitor to understand functional mechanisms of reef ecosystem		■		■	■	■
* large-scale monitoring to understand local threats/ impacts	■	■		■	■	■

Long-term Management Value of Pacific-wide Biological Monitoring

- Multidisciplinary research and monitoring is essential to:
 - understanding reef resource condition and temporal variation
 - providing the scientific basis to inform management options that address priority threats

