

GUAM'S COASTAL & WADEABLE STREAM ASSESSMENTS

Monitoring Program
EMAS Division
Guam EPA



26th Pacific Islands Environment Conference

June 22-25, 2009
Saipan, CNMI



Key Environmental Issues



- Habitat Destruction and Alteration
- Sedimentation related Issues
- Toxic Contamination
- Eutrophication on Reefs



Key Questions

- What size (in percent or miles) of all waters in Guam meet their designated uses?
- For assessed waters that are not meeting their designated uses, what size is affected by stressors?

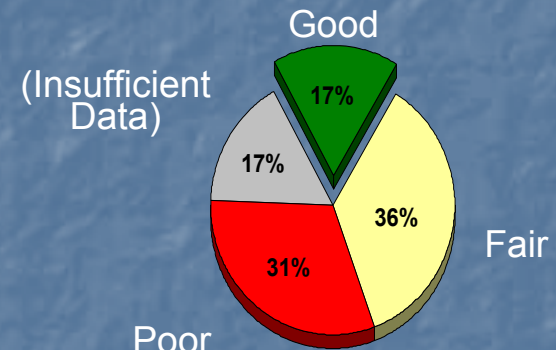


Why EMAP?

- Probability Design Advantage
 - Sites are statistically representative of the entire resource population
 - Results can be extrapolated to entire population
 - Allows Guam to be included in the national assessment
 - Expandability to a regional scale

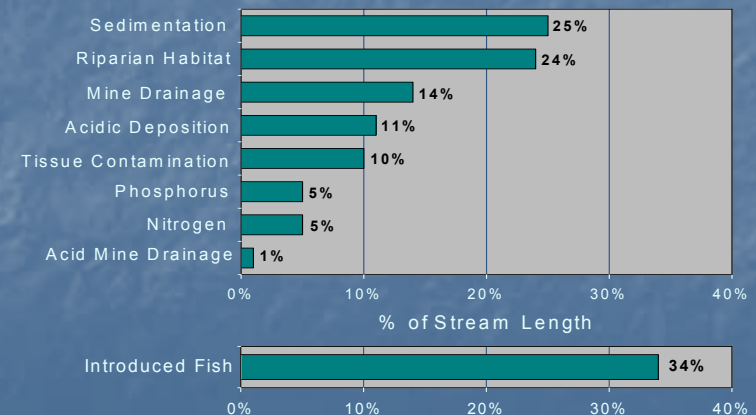


Fish IBI Results



Proportion of Stream Length

Ranking of Potential Stressors



(Example from EMAP in Mid-Atlantic)

Guam Coastal Assessment
(GCA)

50 Stations
Islandwide

0 TO -60ft
Depth

Estuaries and Near
Shore
w/

Special Sample Area:
APRA HARBOR





Phaethon lepturus
(WHITE-TAILED TROPIC BIRD)

R/V UTAK



GCA Parameters

Water Column Profile



3 Depths Collection:

- Bacteria (enterococci)
- Chlorophyll a
- Ammonia-nitrogen
- Nitrite nitrogen
- Nitrate+nitrite Nitrogen
- Orthophosphorus
- Total Suspended Solids

3 Depths *in situ*:

- Depth
- Temperature
- Transparency/Clarity
- pH
- Salinity
- Conductivity
- Dissolved Oxygen
- Turbidity (NTU)



Data Sonde & PAR combo



Horizontal Water Sampler

GCA Parameters

Biological Resources



Benthic Community & Habitat Description - SCUBA

- Sediment collection:
 - Infaunal Composition & Abundance
 - Granulometry (UH Infaunal Lab)
 - Total Organic Carbon
 - Habitat Substrate type
- Habitat Aquatic Vegetation & Macroalgal Abundance
- Habitat Invertebrate Composition & Abundance
- Degree of Wave Impact
- Anthropogenic Debris Identification
- Threatened/Endangered Species Identification

Fish Community Visual Assessment - SCUBA

- Composition
 - Abundance
- Used for:
- Biomass Estimate
 - (Standing Stock)

Done with the assistance of the
DAWR Fisheries Section



1m Square Quadrat



25m Transect

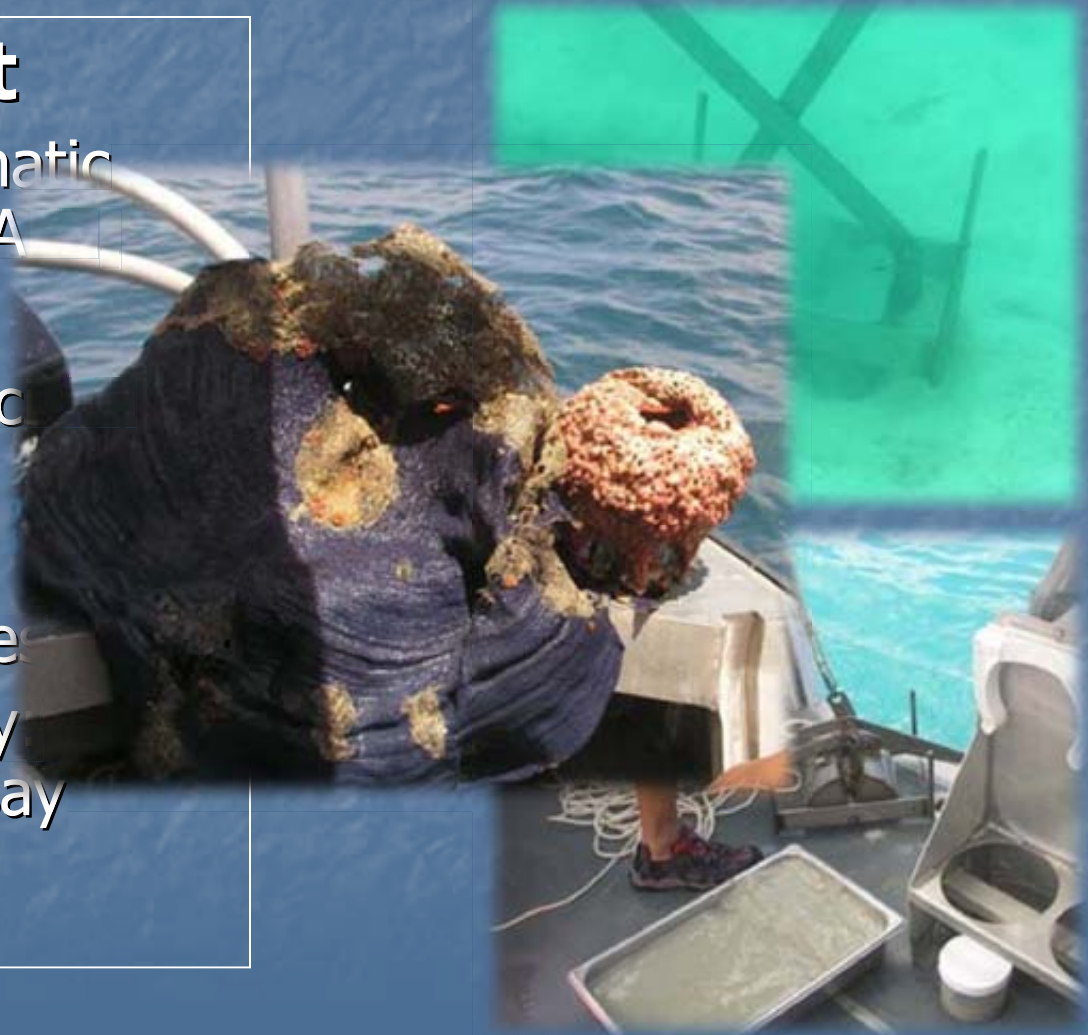
GCA Parameters

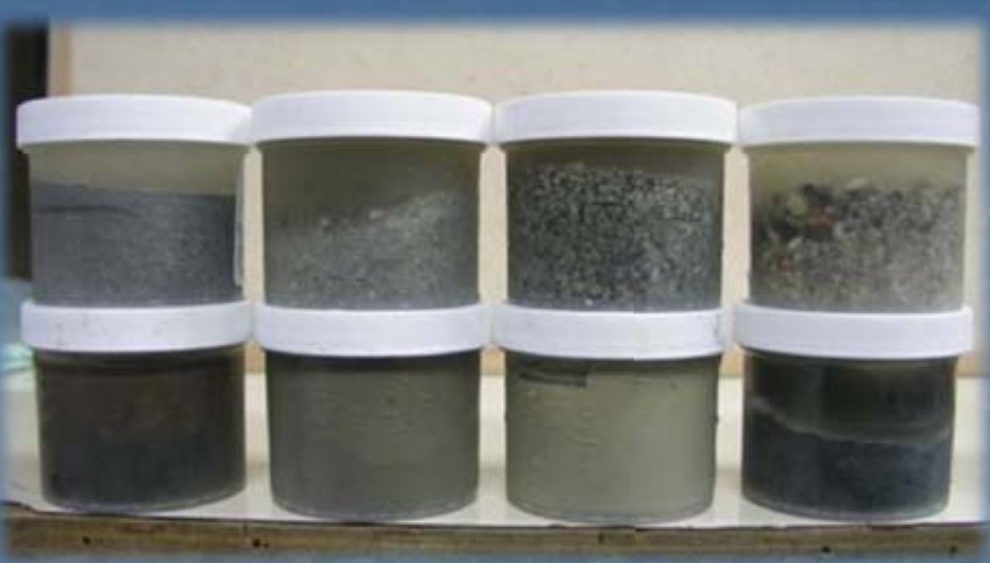
Contaminants: Sediment



Sediment

- Polynuclear Aromatic Hydrocarbons (PAHs)
- PCB congeners
- Chlorinated Pesticides other than DDT
- Inorganics
- DDT & Metabolites
- Sediment Toxicity Amphipod Bioassay





Nematoneis unicornis



Capitella capitata



Sipuncula



Branchiostoma sp



Total Invertebrates	14,051
Invertebrate Taxa	163
Total Polychaetes	8,582
Polychaete Taxa	141

GCA Parameters

Contaminants: Tissue



Actinopyga mauritiana

Holothurian Tissue

- ▣ Polynuclear Aromatic Hydrocarbons (PAHs)
- ▣ PCB congeners
- ▣ Chlorinated Pesticides other than DDT
- ▣ Inorganics
- ▣ DDT & Metabolites
- ▣ Tissue % Lipid Determination



Holothuria atra

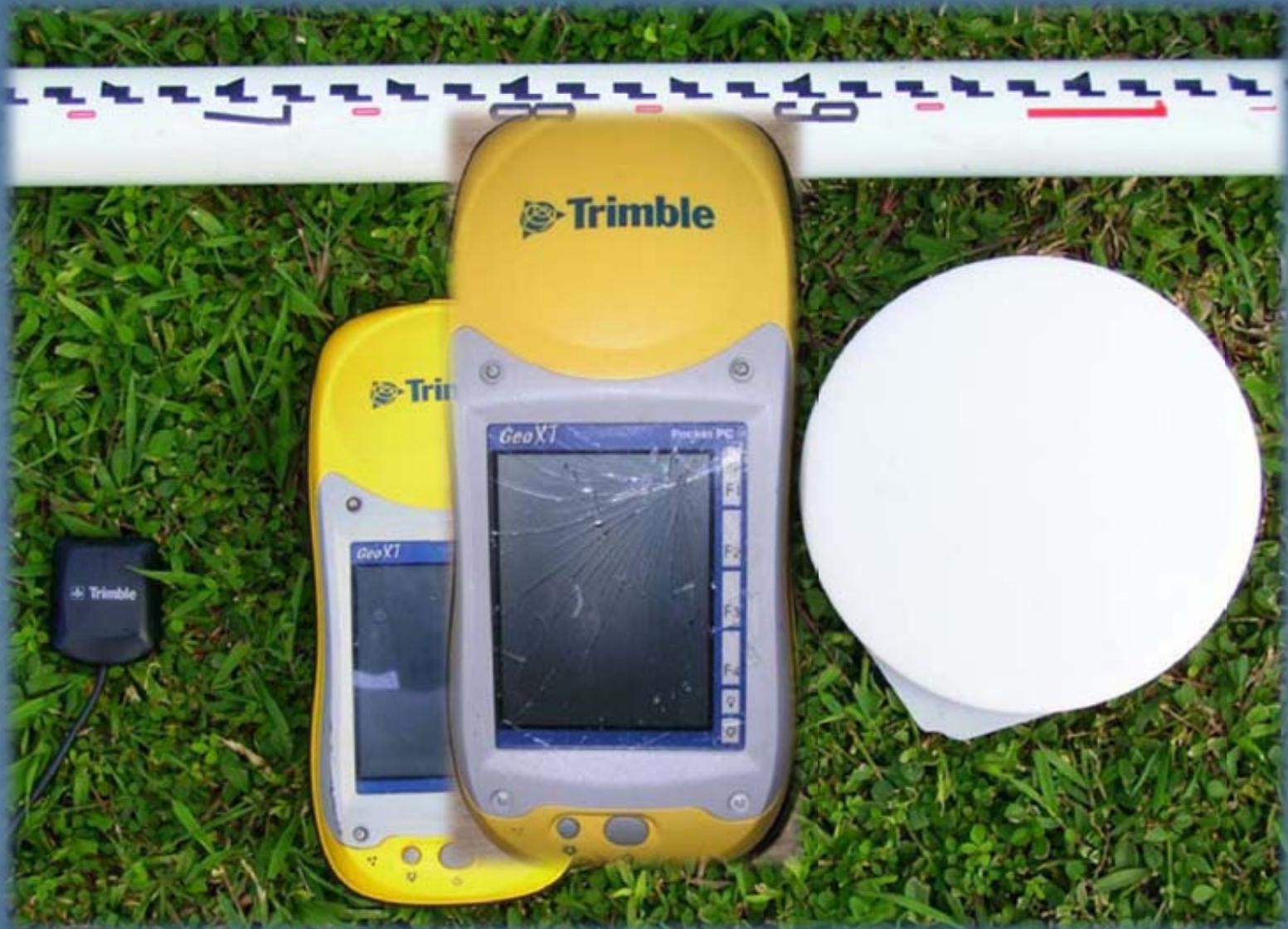
Guam Wadeable Stream Assessment
(GWSA)

38 Stations w/in Southern
Watersheds

119 Rivers & Streams

FRESHWATER ONLY







Site Location &
Verification







Reach 150m
Ten 15m segments



GWSA Parameters

Water



Guam EPA Laboratory

- Temperature
- pH
- Conductivity
- Dissolved Oxygen
- Turbidity (NTU)
- Chlorophyll
- True Color
- Total Suspended Solids
- Total Dissolved Solids
- Bacteria (E. coli)
- Total Dissolved Nitrogen
- Ammonia-nitrogen
- Nitrite nitrogen
- Nitrate+nitrite Nitrogen
- Total Dissolved Phosphorus
- Orthophosphorus

USEPA Region 9 Laboratory

- NH₃, Ammonium
- Silica, dissolved
- Acid Neutralizing Capacity-Alkalinity (ANC)
- Total Inorganic Carbon
- Total Organic Carbon
- Total Aluminum (Dissolved)
- Aluminum (monomeric & organic monomeric)
- Major Anions (Chloride/Nitrate/Sulfate)
- Major Cations (Calcium/Magnesium/Potassium/Sodium)

Biological Stream Assessments



GWSA Parameters

Tissue



- PCB Congeners (EPA 8082)
- Organochloride Pesticides (EPA 8081)
- Inorganics (EPA 7010 for Ar, Pb, Hg, & Se)
- Inorganics (EPA 6010)
 - (Al, Cd, Cr, Cu, Fe, Ni, Sn, Zn)
- Tissue Chemistry (% Lipid Determination)
- Organophosphate Pesticides
- Tributyltin





Periphyton and Benthic Macro Invert Sampling





Physical Habitat Characterization





Stream Bank Angle



Stream Discharge





Canopy Density





Woody Debris ID



Measuring Undercut



Stream Heading/Slope





Forms Forms Forms





Current Status

GCA '04

- Sampling Completed
- Data Validation Ongoing
- Data Evaluation

GWSA '06

- Sampling Ongoing
15 stations remaining
Next Year should start
- Data Validation
- Data Evaluation

GCA '10

- Sampling NearShore Reef Flats Only
- Still Deciding If Regional for CNMI and Guam
- Funding from USEPA

