

DOH Protocols and Tools for Determining Stream Condition in Hawaii

Linda Koch, Bioassessment Coordinator
Environmental Planning Office
Hawaii State Department of Health

Hawaii Water Quality Standards

■ HAR 11-54

- ◆ Describes Waterbody Types
- ◆ Classification of Water Uses
- ◆ Contains Narrative Criteria
 - ◆ Free From's
- ◆ Specific WQS for each Type

5/21/2008



303(d) List of Impaired Waters

- Analysis of water or assessments by DOH or others (with QC requirements)
- Listing decisions are based on a weight of evidence approach
 - ◆ No data = No decision
- TMDL development process



Monitoring Approaches

- Water Sampling
 - ◆ Conventional Samples
 - ◆ Bacteria Samples
- Fish Tissue, Sediment
- Biological Assessments

Monitoring Approaches

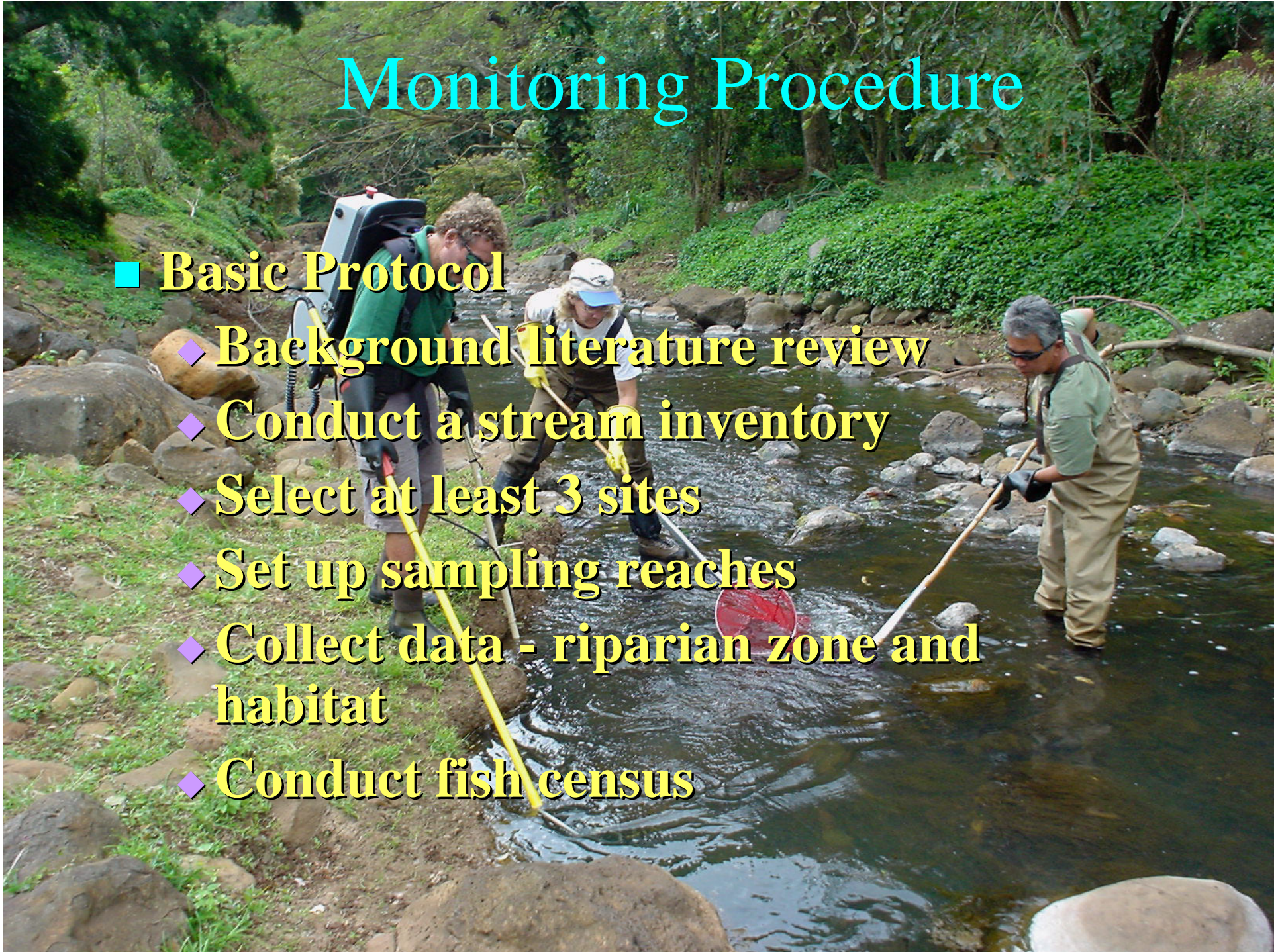
Biological Assessments

- ◆ Hawaii Stream Bioassessment Protocol (HSBP) refined by UH Manoa – 2002
- ◆ Hawaii Stream Visual Protocol (HSVP) developed by NRCS – 2001

Monitoring Procedure

■ Basic Protocol

- ◆ Background literature review
- ◆ Conduct a stream inventory
- ◆ Select at least 3 sites
- ◆ Set up sampling reaches
- ◆ Collect data - riparian zone and habitat
- ◆ Conduct fish census



Waimalu, O'ahu Watershed

■ History

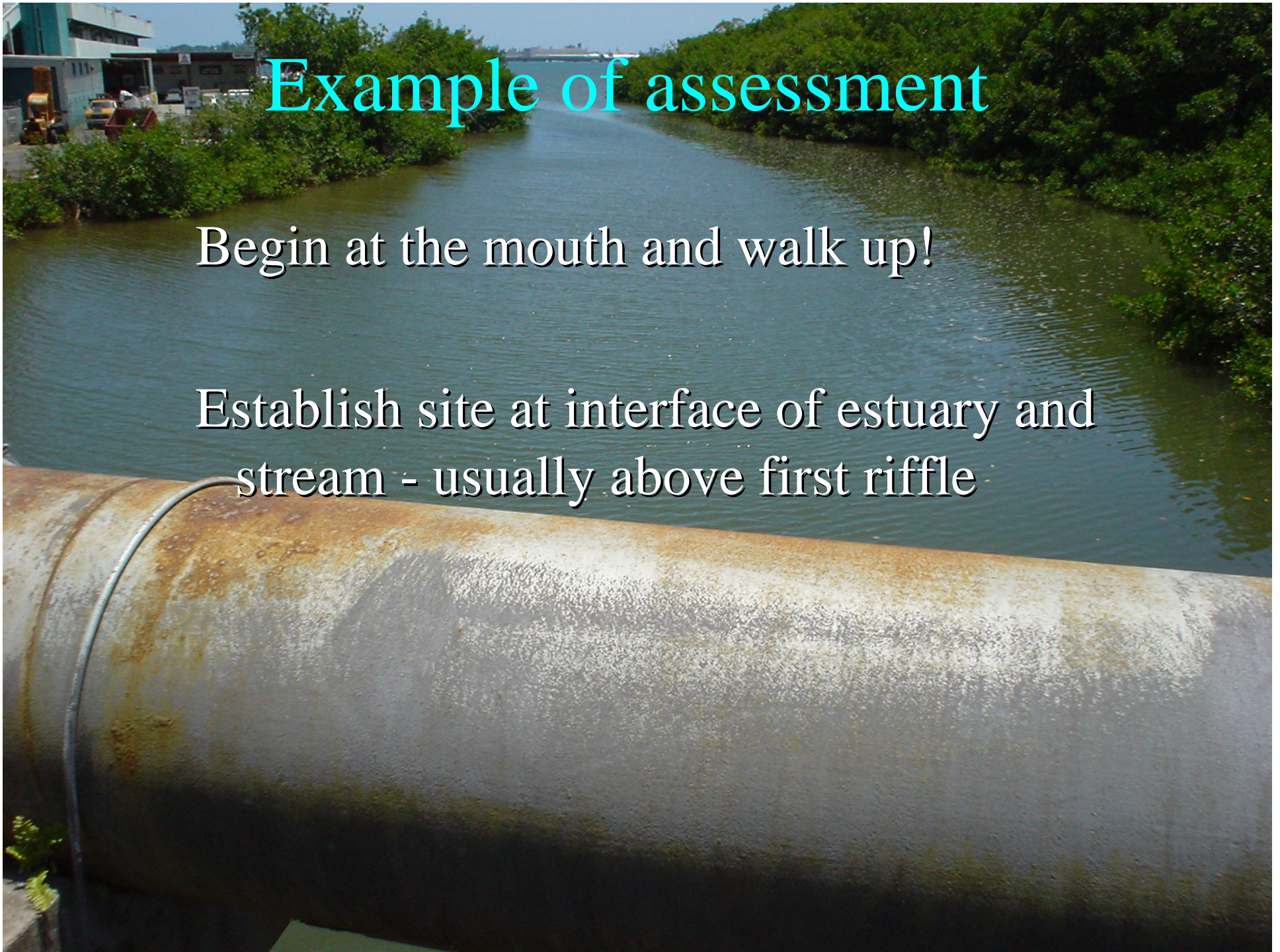
- ◆ Waimalu was listed as impaired in 2001
- ◆ Combined with other watersheds in the Pearl Harbor area to be included in one large TMDL
- ◆ Plantation past – irrigation ditches
- ◆ Now commercial/residential in the lower reach and forested above



Example of assessment

Begin at the mouth and walk up!

Establish site at interface of estuary and stream - usually above first riffle



Continue assessment

- Establish site here above USGS gage
- Measure width to determine length of study reach
- Set up reach and gather information



Continue lower site setup



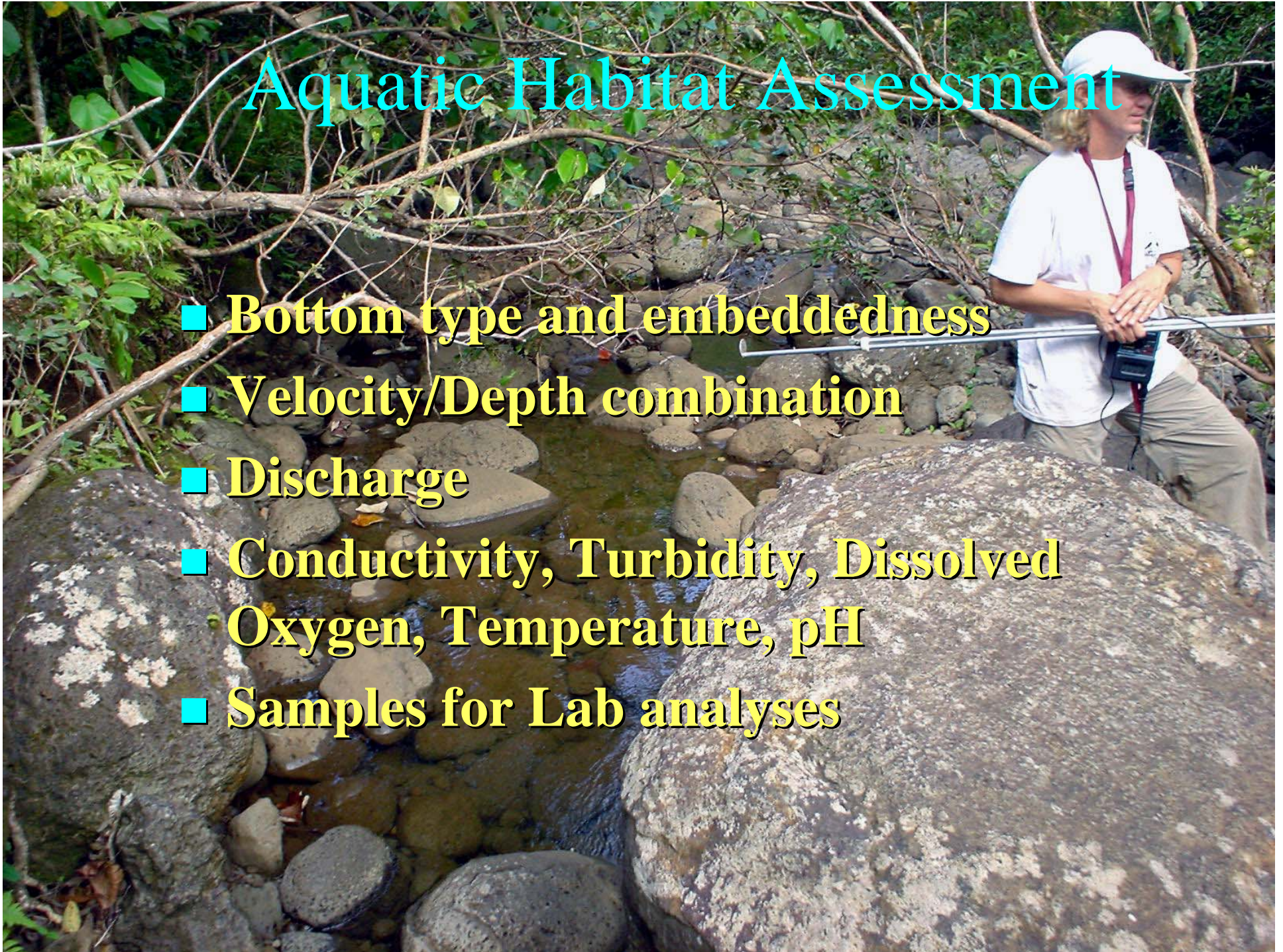
Continue assessment

- Make note in comments
 - ◆ Manmade objects
 - ◆ Natural components
 - ◆ Flora and Fauna

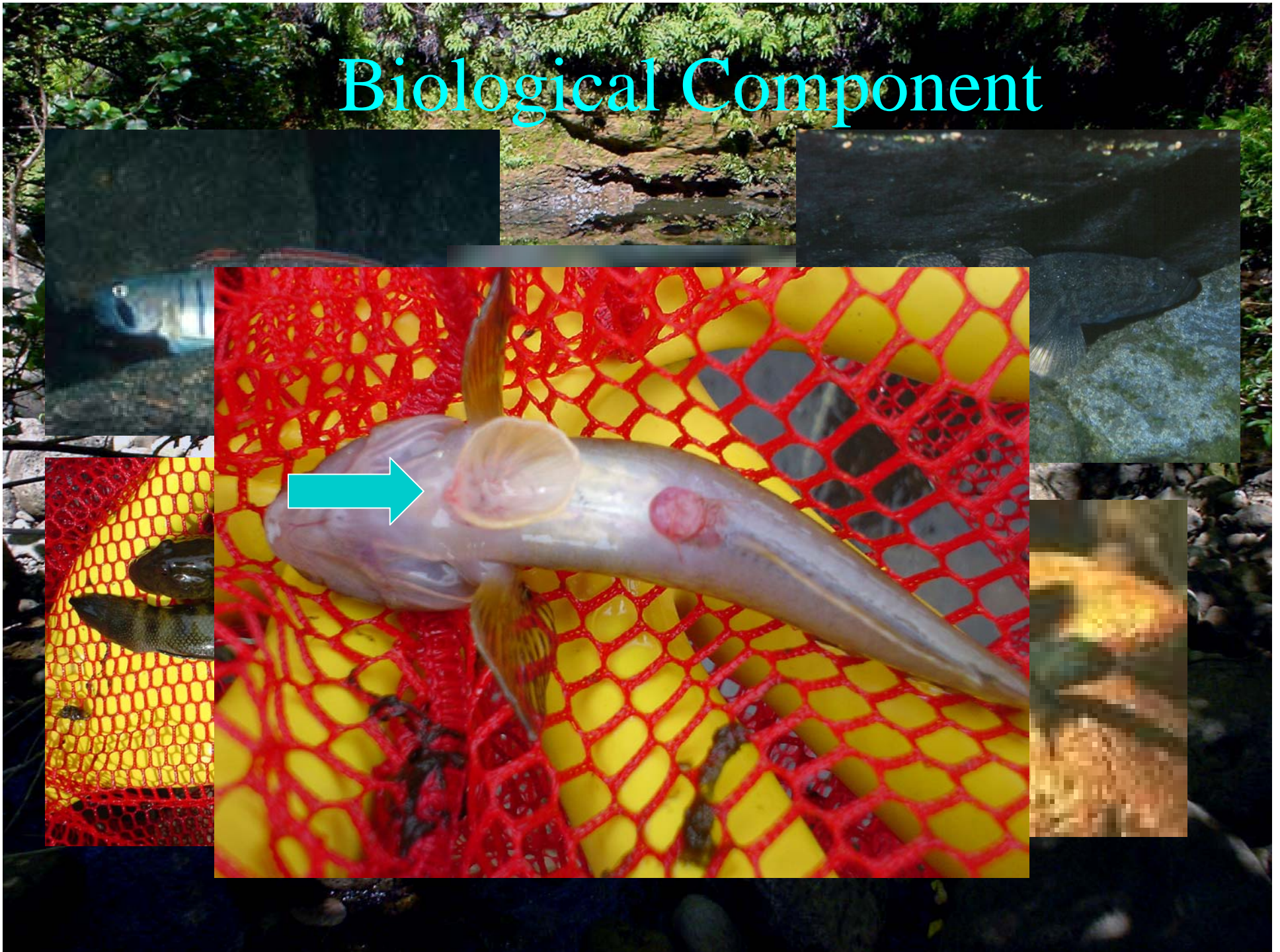


Aquatic Habitat Assessment

- Bottom type and embeddedness
- Velocity/Depth combination
- Discharge
- Conductivity, Turbidity, Dissolved Oxygen, Temperature, pH
- Samples for Lab analyses



Biological Component



Biological Component



Biological Invasives

- Bass – large and small mouth
- Catfishes – Chinese and Channel
- Tilapia – several species
- Aquarium fish, prawns and shrimp



Biological Invasives

- Extensive array of invasive plant species
- Wild Pigs, Cattle, Sheep, Deer and Goats

HSBP Habitat Metrics

Hawaii Department of Health Stream Database

File Edit View Insert Format Records Tools Window Help

HSBP Analyses

Station Info Habitat Types Score Habitat Types Vel-Depth Combos Bank & Riparian Cobble/Boulder vs Soil Channel Status **Habitat Metrics** Comments

Habitat metrics for the HSBP	Max Score	Site Score	Reference Score
Metric			
1. Habitat Availability	20	20	20
2. Substrate Embeddedness	20	20	20
3. FPOM/CPOM Characterization	20	20	20
4. Velocity-Depth Combinations	20	20	20
5. Channel Status	20	14	20
6. Channel Alteration	20	20	20
7. Bank Stability	20	4	20
8. Riparian Vegetation Zone Width	20	20	20
9. Percent Riparian Understory Coverage	20	20	20
10. Boulder / Cobble vs. Soil Presence	20	20	20
Total	200	178	200

Include: ☒ ☒ ☒ ☒ ☒ ☒ ☒ ☒ ☒ ☒ **10 Metrics**

Refresh

Preview Report

Percent of Reference

88.88%

Save/Update Score

Help

Close

Low Slope (<4%) Cascades <0.25m in height

High/Moderate Slope Mid Reach

Waimalu_Upper_1020_Habitat_09082004

Form View

FLTR NUM

Start Bioassessm... Main Menu Selection M... Choose Site HSBP Anal...

Desktop 11:43 AM

HSBP Biological Metric Scoring

Hawaii Department of Health Stream Database

File Edit View Insert Format Records Tools Window Help



Aquatic Faunal Survey Analyses

Station Information Natives Aliens Native Fish Density Metrics HS-IBI CWA Comments Scoring

METRIC	SCORING CRITERIA		
POINTS:	5	3	1
Metric 1. Number of native amphidromous macrofauna:			
(SNAM) - High/Moderate Slope Mid Reach	4 - 3	2 - 1	0
(SNAM) - Low Slope Terminal Reach	6 - 5	4 - 2	1 - 0
Metric 2. Percent Contribution Native Taxa (PNT):	100% - 75%	74% - 50%	≤ 49%
Metric 3. Percent Sensitive Native Fish (SNF):	≥ 50%	49% - 20%	≤ 19%
Metric 4. Sensitive Native Fish Density (fish per sqm):	≥ 0.46	0.45 - 0.20	≤ 0.19
Metric 5. Sensitive Native Fish Size (%≥ 6.0 cm):	≥ 50%	49% - 25%	≤ 24%
Metric 6. Awaous guamensis Size (%≥ 8.0 cm):	≥ 50%	49% - 25%	≤ 24%
Metric 7. Total Native Fish Density (fish per sqm):	≥ 0.75	0.74 - 0.36	≤ 0.35
Metric 8. Community Weighted Average (CWA):	1.0 - 4.0	4.1 - 9.0	9.1 - 10
Metric 9. Number of Alien Taxa (NAT):	0 - 1	2 - 3	> 3
Metric 10. Percent Tolerant Alien Fish:	0%	1 - 4%	≥ 5%
Metric 11. Percent Diseased / Parasitized Fish:	≥ 1%	2% - 10%	≥ 11%

High/Moderate Slope Mid Reach
Waimalu_Middle_Electrofishing_08182004



Help Close

Form View

FLTR

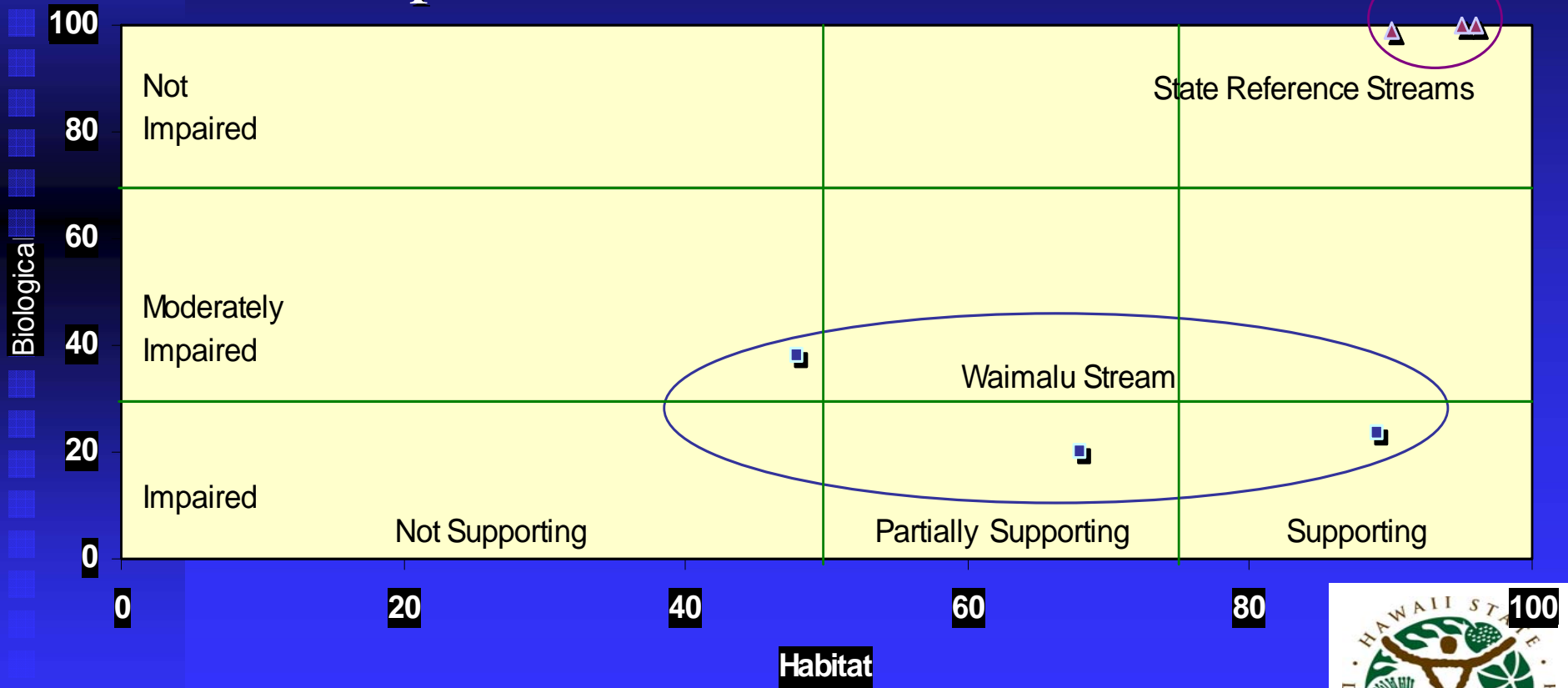
NUM

File Edit View Insert Format Records Tools Window Help

Form View

Compile information into report

- Compare data to reference streams
- Compare each site in watershed



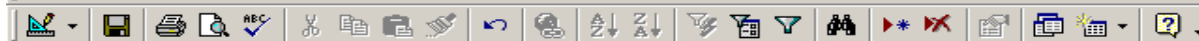
5/21/2008



NRCS Visual Protocol Metrics

Hawaii Department of Health Stream Database

File Edit View Insert Format Records Tools Window Help



NRCS

Station Info Stream Type / Substrate Bank Veg Embeddedness Flow Width & Temp Element Score Comments

Score Each Element - Use "Scoring Sheet for the Elements" Guidance

Help

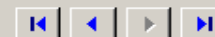
	Segment #1	Segment #2	Segment #3	Segment #4
1. Turbidity	2	2	2	2
2. Plant Growth	1.8	1.8	1.8	1.8
3. Channel Condition	2	2	2	2
4. Channel Flow Alteration	2	2	2	2
5. Bank Stability	1.4	1	0.5	0.9
6. Canopy	0	0	1.9	0
7. Riparian Condition	2	2	2	2
8. Habitat Available	1.9	1.7	1.2	1.8
9. Litter/Trash	2	2	2	2
10. Embeddedness	1.5	1.5	1.4	1.3
Total Score	16.6	16	16.8	15.8
Total Score## of Elements	1.7	1.6	1.7	1.6

Mean
Element
Score

1.6

10

NRCS-Waimalu-Upper-5/11/2004



Close

Ready

Start

Bioassessment i...

Main Menu

Selection Menu

NRCS

FLTR

NUM

Desktop

1:49 PM

Compile report

- Synthesize other pertinent information
- Conclude condition of watershed and significant changes that have occurred or could occur in the future.

5/21/2008



Uses of data and reports

- Determine status of aquatic life use attainment for CWA purposes by adding a line of evidence
- Help with TMDL development
- Help with the Implementation Plan
- Fulfills grant conditions for effectiveness monitoring for various projects
- Validates restoration efforts



Other factors

- Who can do the protocols?
- Is it time and labor efficient?
 - ◆ Critical to adhere to protocols
- Great way to validate efforts

5/21/2008



Next Steps

- New revision of HSBP to combine new features
- Add macroinvertebrate metrics
- Work toward incorporating Probabilistic Monitoring techniques to maximize resources



Acknowledgements

- EPA – Region IX for the funding!
- R. Wolff – awesome database
- Momi Wheeler – great pictures



Contact information

Linda Koch

Bioassessment Coordinator

Environmental Planning Office

919 Ala Moana Blvd., Rm. 312

Honolulu, Hawaii 96814

Phone: (808) 586-4349

Email: linda.koch@doh.hawaii.gov

Website:

<http://hawaii.gov/health/environmental/env-planning/wqm/wqm.html>

5/21/2008

