

**Tom Karier**  
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Washington

**Frank L. Cassidy Jr.**  
"Larry"  
Washington

**Jim Kempton**  
Idaho

**W. Bill Booth**  
Idaho



**Joan M. Dukes**  
Vice-Chair  
Oregon

**Melinda S. Eden**  
Oregon

**Bruce A. Measure**  
Montana

**Rhonda Whiting**  
Montana

May 3, 2007

MEMORANDUM

TO: Council Members

FROM: Karl Weist

RE: Discussion of Willamette Wildlife Crediting and the Combined Habitat Assessment Procedure (CHAP)

Tom O'Neill of the Northwest Habitat Institute, Michael Pope of the Oregon Department of Fish and Wildlife, Paul Ashley and others, will brief the Council on the potential use of CHAP, a new wildlife crediting methodology with specific application to the Willamette subbasin and possible broader use.

The Willamette system, with 96% of its land in private ownership, had one of the first loss assessments performed on its eight federal dams. However, the Willamette is somewhat unique being the only subbasin west of the Cascades to have quantified wildlife losses. The Willamette has a different species mix than the species used to calculate losses in the original Habitat Evaluation Procedure (HEP).

The panel will explore the history of Willamette wildlife mitigation and the advantages of the CHAP method for assessing properties to mitigate for those losses, to calculate the number of habitat units to credit for those properties, and how CHAP serves to develop better management plans for properties purchased.

The ISRP reviewed four projects in the Fiscal Year 2007-09 project solicitation that featured elements of CHAP in their proposals. The Panel supported the CHAP elements in two proposals: the Habitat and Biodiversity Information System (200307200) and the Albeni Falls Operational Loss Assessment (200731200). The Panel deemed the CHAP elements in two projects not fundable: Habitat Evaluation Procedure (200600600) and Willamette Wildlife Mitigation (199206800).

In the HEP proposal evaluation the ISRP stated: "The reviewers found the CHAP portion of the proposal Not Fundable. The proposal did not provide convincing evidence that the approach of NWI would be a significant improvement over the HEP-derived habitat unit metric

now in place. In particular, the methods used to determine habitat value (HV) were not clearly presented. It would have been useful for the proposal to include a more clear explanation of the calculation and use of habitat value, with an example from a subbasin of how to use the metric, habitat value, as a measure of progress towards mitigation. It seems likely that direct biological M&E will almost always be more convincing, more interpretable, and thus more useful for evaluation and application to management decision-making than would be a less direct, HEP-type measure. The proposal did not convince the ISRP that the NWI efforts to improve HEP would be as good as direct biological M&E.”

However, the Panel concluded in the Albeni Falls proposal: “Although the ISRP was not supportive of the CHAP objective in the HEP proposal, in the context of these research proposals the "Index to Ecological Integrity" is better justified. This proposal provides a creative, multi-disciplinary approach to restore the ecology of the floodplain.”

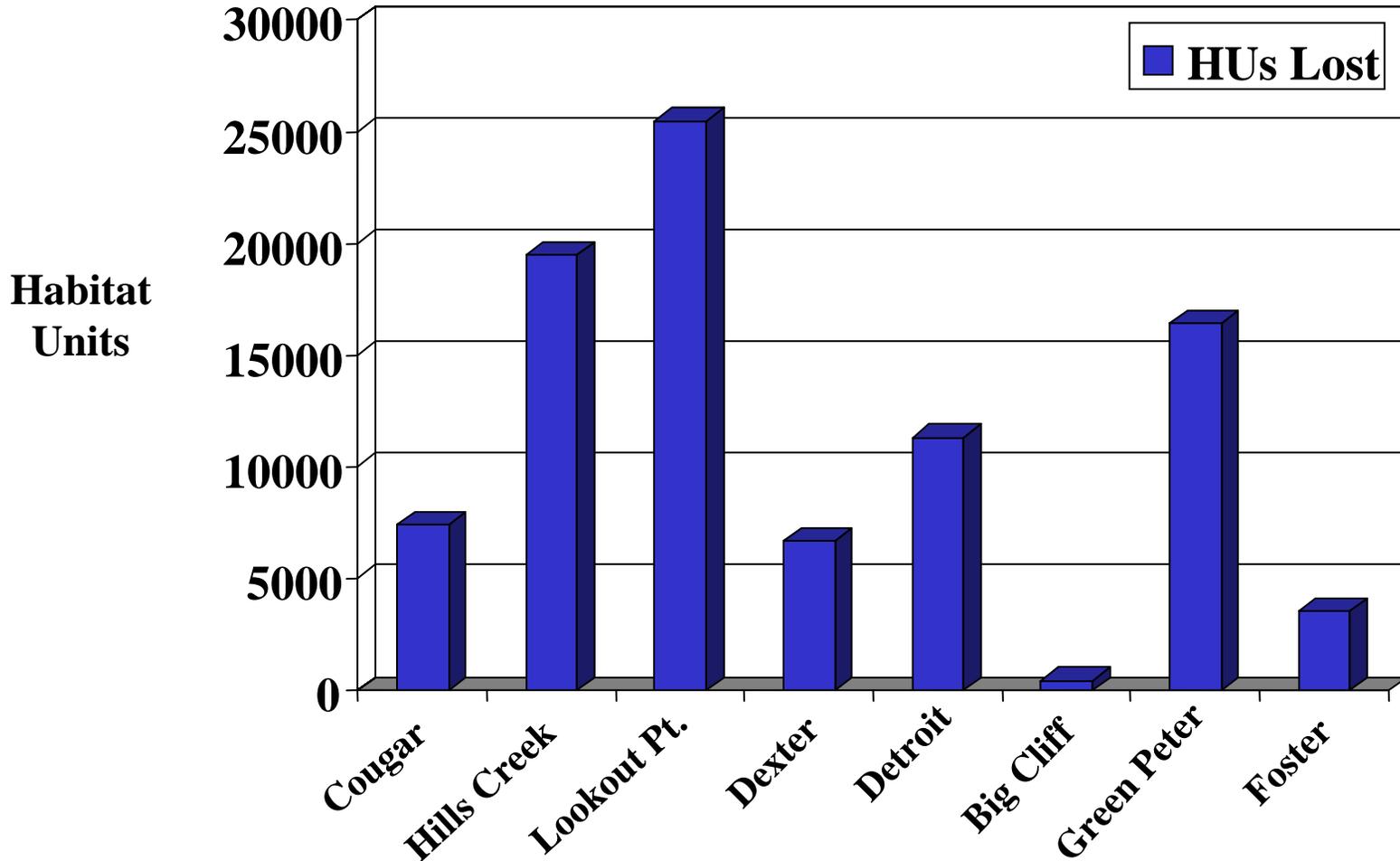
# Combined Habitat Assessment Protocols

## HEP & Habitat Value



# Impact Assessment Results

## Willamette River Dams-94,306 HU

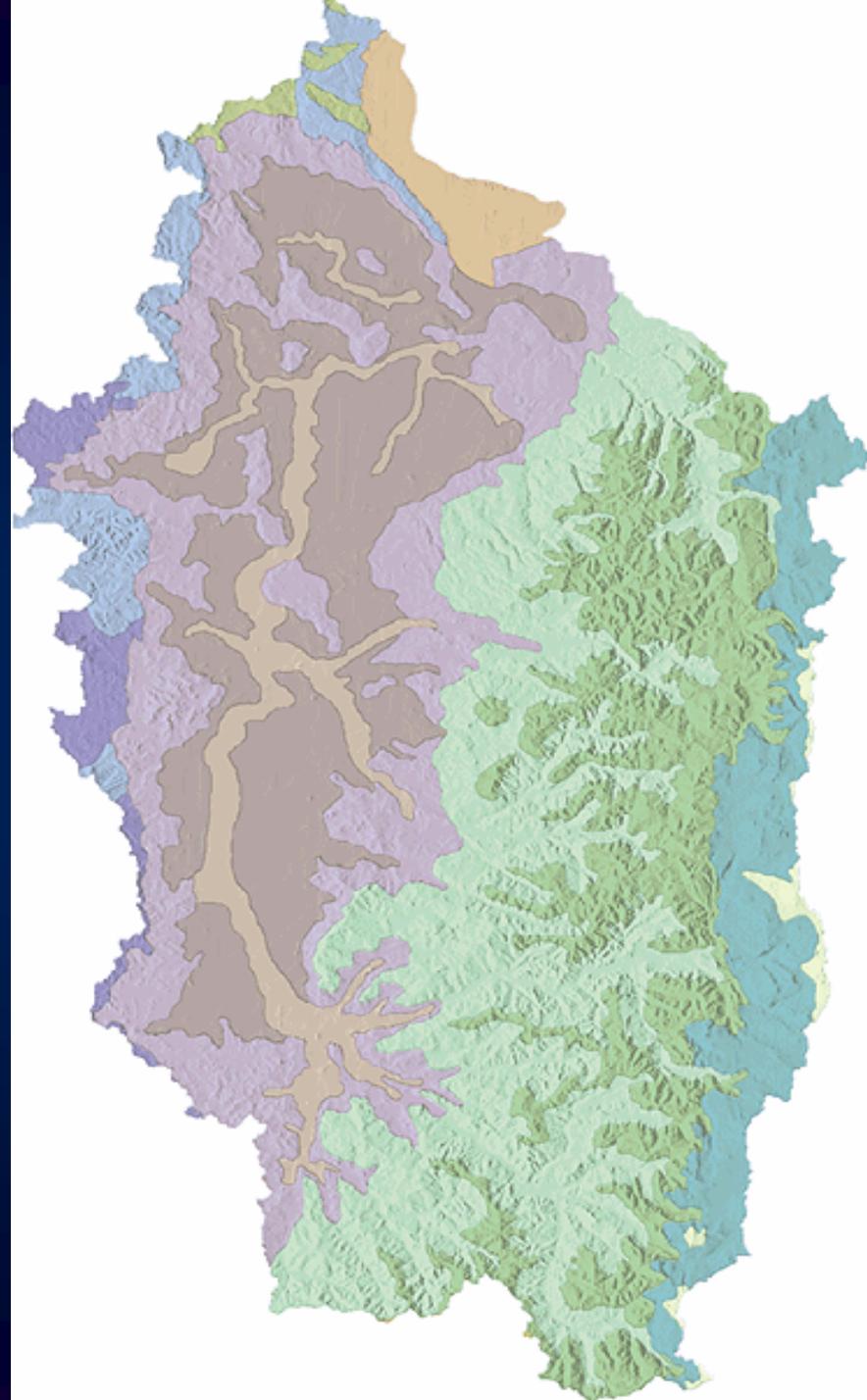


# **Willamette Subbasin Plan**

## ***Conservation Focus***

### **Section 5.2.2.3-**

***“Willamette Valley has lost 80% of its bottomland forests, 97% of its natural grasslands, and nearly 100% of its oak savanna. Restoration efforts should now focus on these valley and hillside habitats to benefit the unique and sometimes rare wildlife species that live there.”***



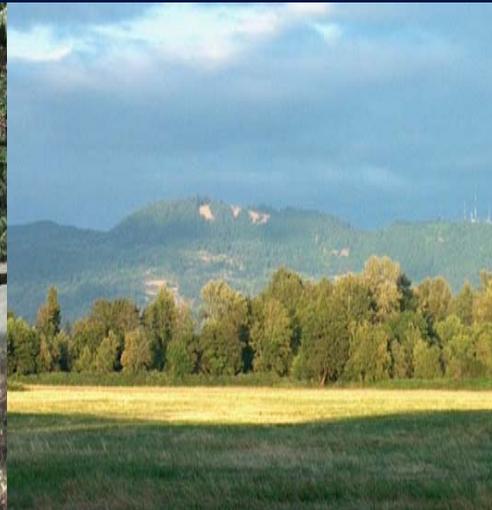
# Oregon Conservation Strategy



- Identified strategy habitats and species not prioritized in loss assessments
- Conservation Opportunity Areas identified in the Willamette Eco-region mostly located in Willamette Valley

# Willamette Subbasin Focal Habitats-Current Status

- Oak Woodlands-7%
- Upland Prairies-1%
- Wetland Prairies-2%
- Riparian Areas-30%



# Willamette Subbasin Mitigation Projects



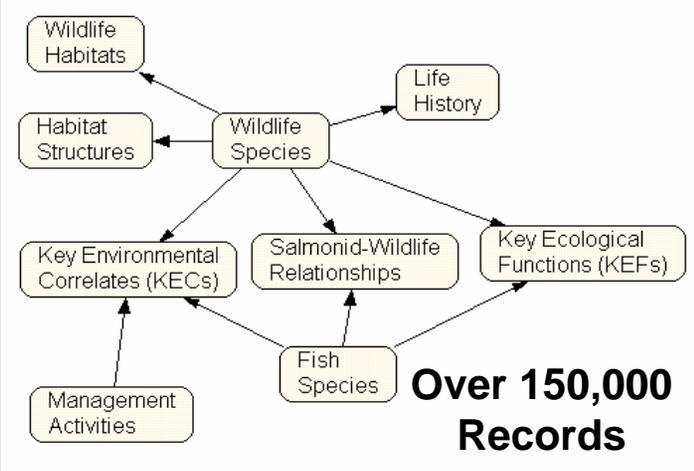
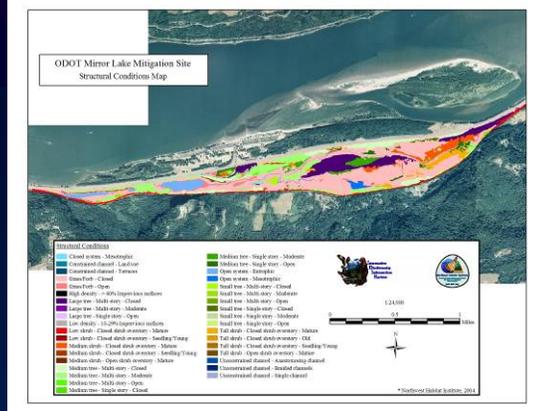
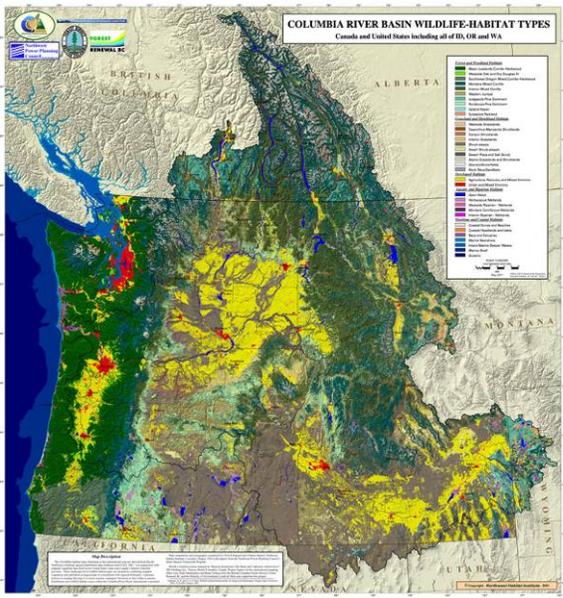




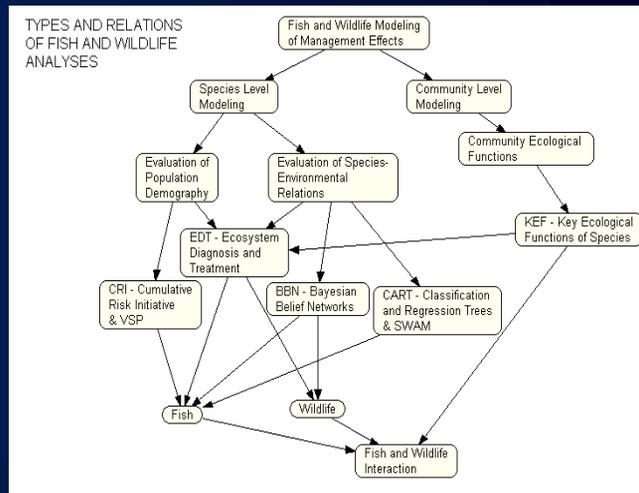
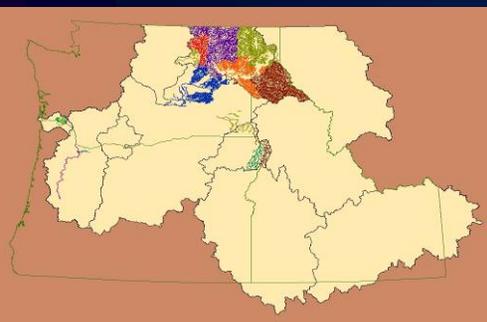
# Habitat Assessment Process



- **Ecologically Comprehensive**
- **Linkage and Legacy**
- **Easily Understood**
- **Scientifically Based**
- **Referenced**



# Tom O'Neil Northwest Habitat Institute (GAP, IBIS, HAB, CHAP)



**PNW HABITAT CLASSIFICATION SYSTEMS**

INTRODUCTION | SYSTEM INFO. | CROSS-WALKS

[Link to Project Description](#)

NED  
Northwest Environmental Data Network

nbi  
Northwest Inland Forest Institute

**A Guide to Oregon's FOREST WILDLIFE**

Red-tailed Hawk  
*Buteo borealis*

Sharp-shinned Hawk  
*Accipiter cooperii*

**Birds of Washington**  
Status and Distribution

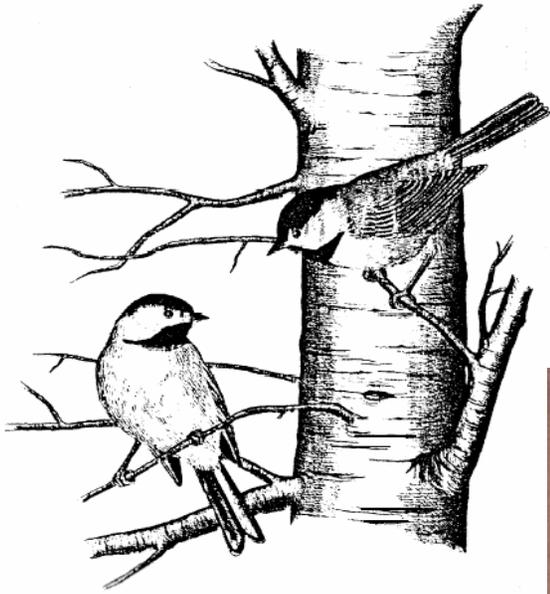
**WILDLIFE-HABITAT RELATIONSHIPS**  
IN OREGON AND WASHINGTON

DAVID H. JOHNSON  
and THOMAS A. O'NEIL  
Managing Directors

**Atlas of Oregon Wildlife**  
Distribution, Habitat, and Natural History

BLAIR CURTIS  
A. JON KIMERLING  
THOMAS A. O'NEIL  
MARGARET M. SHAUGHNESSY  
LUCIANO J. GALINA  
MARCELLA M. P. HUSO

## HABITAT SUITABILITY INDEX MODELS: BLACK-CAPPED CHICKADEE



### Wildlife Impact Assessment

Bonneville, McNary, The Dalles, and  
John Day Projects



Annual  
Reports  
1989

U.S. Department of Energy  
Bonneville Power Administration  
Division of Fish & Wildlife

U.S. Department of Interior  
U.S. Fish and Wildlife Service

October 1990

Fish and Wildlife Service  
U.S. Department of the Interior

**Paul Ashley**  
**CBFWA Regional**  
**HEP Team**  
**Coordinator**

# Current method: HEP

## What does HEP assess?

*HSI Model :  
Black-capped  
Chickadee*



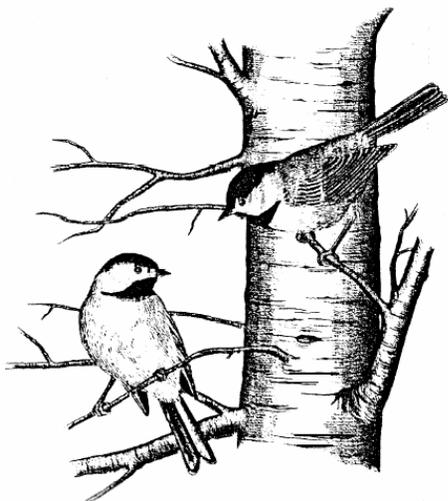
**HEP = # acres x HSI (measure of habitat quality on a scale 0 to 1)**

# Current method: HEP

## What does HEP assess?

FWS/OBS-82/10.37  
APRIL 1983

### HABITAT SUITABILITY INDEX MODELS: BLACK-CAPPED CHICKADEE



Fish and Wildlife Service  
U.S. Department of the Interior

### HSI Model : Black-capped Chickadee



#### Habitat variable

#### Life requisite

#### Cover types

Note: Use either the first two variables in combination, or the third alone, to determine food values.

Percent tree canopy closure

Average height of overstory trees

Tree canopy volume/  
area of ground surface

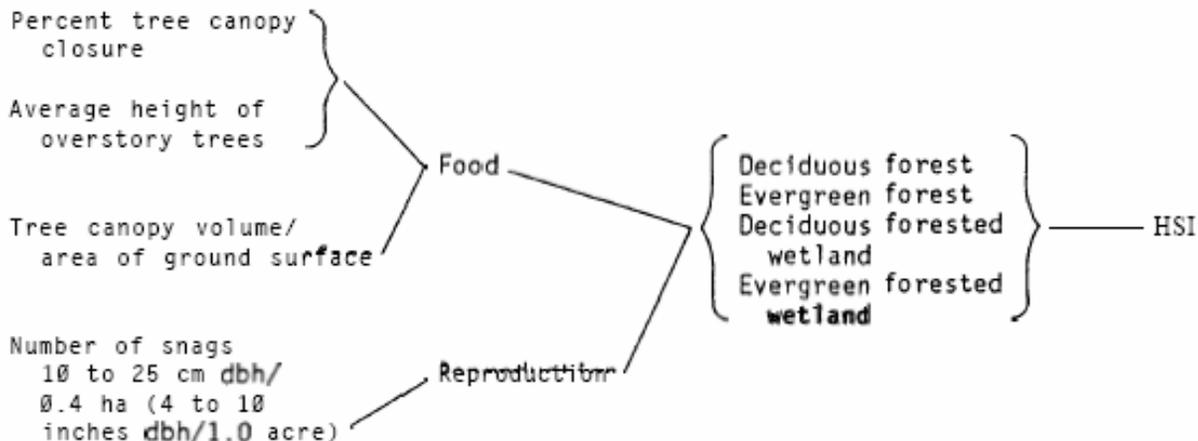
Number of snags  
10 to 25 cm dbh/  
0.4 ha (4 to 10  
inches dbh/1.0 acre)

Food

Reproduction

Deciduous forest  
Evergreen forest  
Deciduous forested  
wetland  
Evergreen forested  
wetland

HSI



# Loss Assessments in Willamette Basin



- ▶ **First attempt to identify losses (1980s)**
- ▶ **Little guidance for the technical teams**
- ▶ **Subjective evaluations**
- ▶ **Selected many more species (24)**
- ▶ **Included above pool estimates  
(construction areas and buffers)**

# Loss Assessments in Willamette Basin (HEP)



- ▶ Few HSI models available for early assessments
- ▶ 13 of 24 Willamette loss assessment species currently have no models
- ▶ Many of the 12 models were developed in different eco-regions with different habitat characteristics.



## **Why Not HEP?**

- ▶ **Few models and species not relevant to Willamette Basin habitats**
- ▶ **Costs and effort to develop species models prohibitive**
- ▶ **Out of kind (habitat types) conservation focus**
- ▶ **Who uses HEP? Outdated and overly simplistic?**



## **Why Not HEP?**

- ▶ **HEP attributes do not characterize historic habitat conditions**
- ▶ **Do not include invasives**
- ▶ **Need better linkage to Management Plans**

# New Approach

Habitat Appraisal and Barter (HAB) method



**HAB + HEP**

Combined Habitat Assessment Protocols  
(CHAP)

# Habitat Appraisal and Barter (HAB) method

- ▶ **Measures habitat quality using diversity, complexity and available habitat size**
- ▶ **Implements information in IBIS database to make links between species, habitat, and functions**

# “ATM”



The HAB methodology is considered an **Accounting and Tracking Method (ATM)**

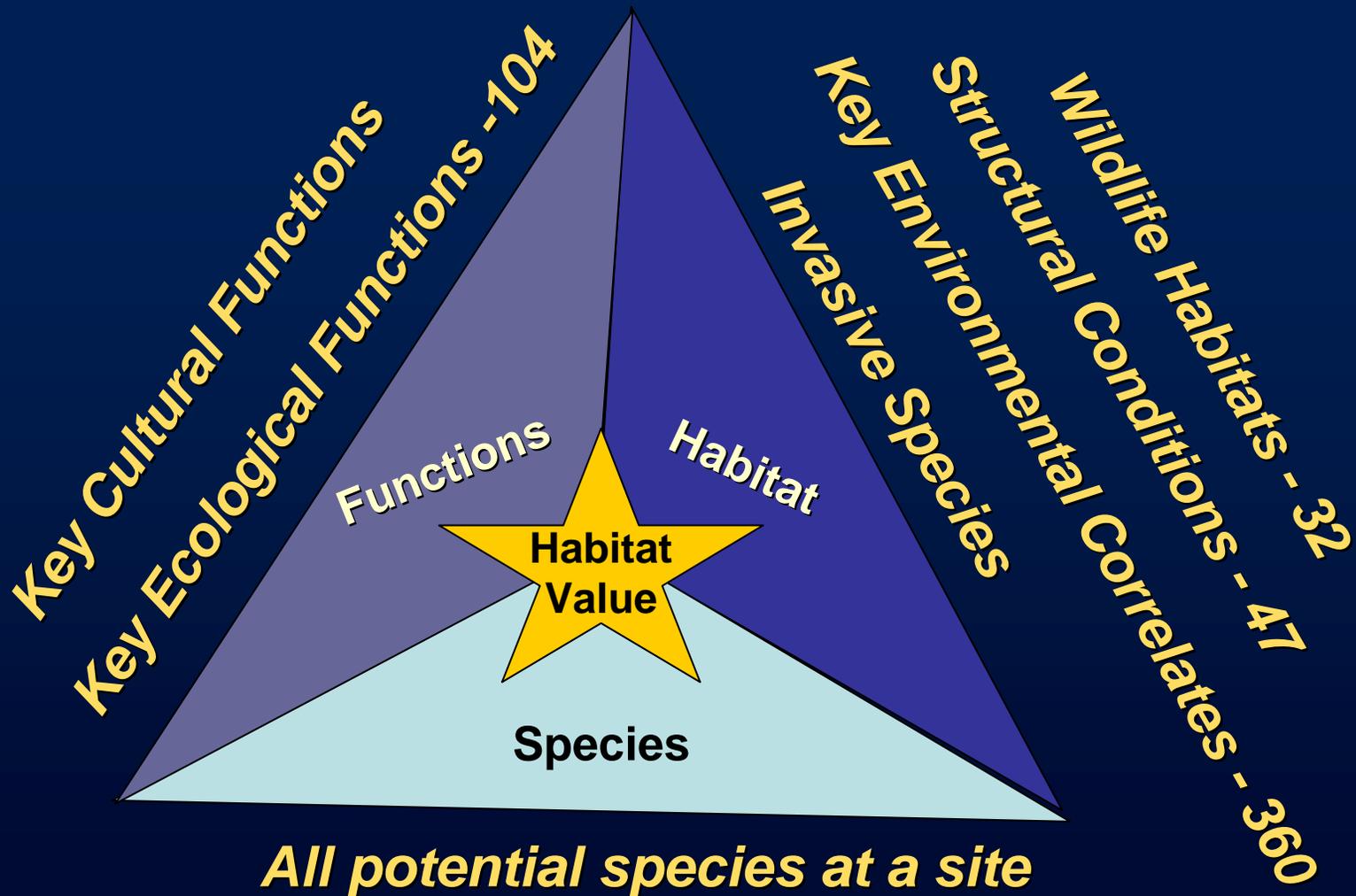
# HAB method: IBIS database



**I**nteractive  
Habitat and  
**B**iodiversity  
**I**nformation  
**S**ystem

- ▶ A collection of wildlife-habitat relationship data integrated into a searchable database
- ▶ Relationships between: species, habitats, functions
- ▶ Peer-reviewed; expert panels based on topic
- ▶ Adaptations used by ODOT, IDFG, Port-of-Portland, Port of Vancouver - EIS, TransAlta - EA

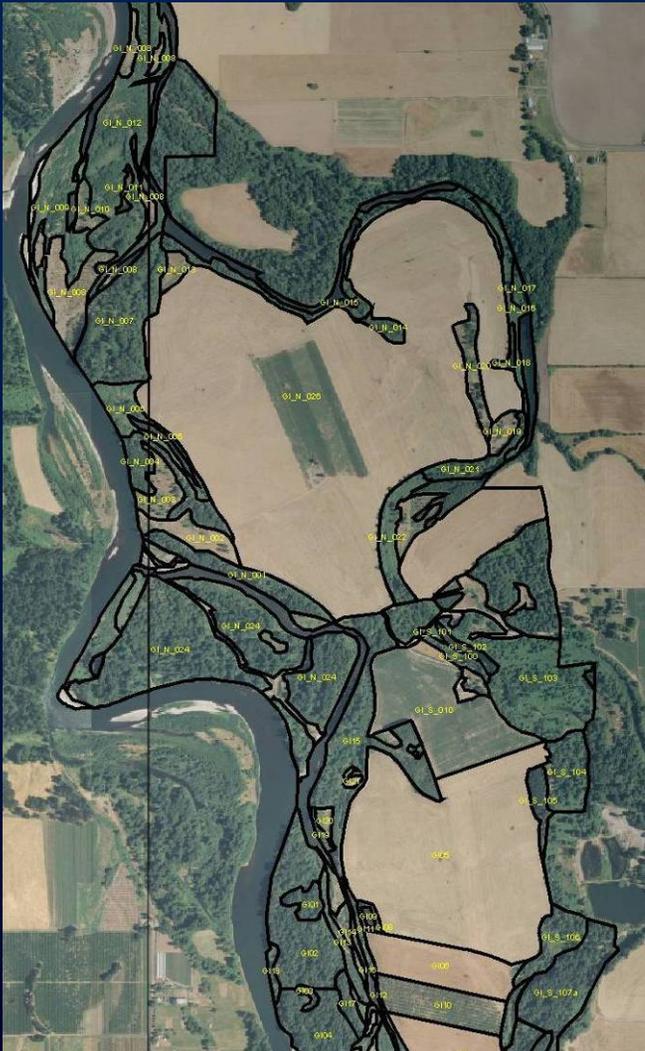
# HAB method: Assessment Factors



# HAB method: Process

- 1) Preliminary Mapping**
- 2) Field Inventory**
- 3) Species-Habitat-Functions Relationships**
- 4) Calculations**
- 5) Final Maps and Reports**

# HAB Process: Preliminary Mapping



- ▶ **Geo-referenced aerial imagery for site**
- ▶ **Habitat types delineated using GIS (in-office)**
  - **Visual land formation differences**
  - **Vegetation (color, texture)**
  - **Structural conditions**

# HAB Process: Field Inventory



## SITE VISIT



- ▶ **Check/refine delineations**
- ▶ **For each polygon:**
  - **Record invasive plant abundance**
  - **Record Key Environmental Correlates for each polygon**

# Key Environmental Correlates (KECs):

Habitat elements (physical or biological)  
thought to most influence potential species presence.



**Example**



**Northern  
River Otter  
has 57 KECs**

**down wood in riparian areas**  
**beaver/muskrat activity (dams, lodges, ponds)**  
**burrows (aquatic or terrestrial)**  
**oxbows**  
**overhanging vegetation**  
**coarse woody debris in streams and rivers**  
**ephemeral pools**

# HAB Process: Species-Habitat-Function Relationships

**IBIS queried to obtain site-specific info:**

- ▶ **Potential species list**
- ▶ **Key Ecological Functions (KEFs) performed by species** (the principal ways organisms influence the environment)

# Key Ecological Functions (KEFs):

The principal ways an organism influences the environment.



**Example**



**Northern  
River Otter  
has 12 KEFs**

**piscivorous**

**secondary burrow user**

**creates runways**

**eats aquatic macroinvertebrates**

**eats terrestrial invertebrates**

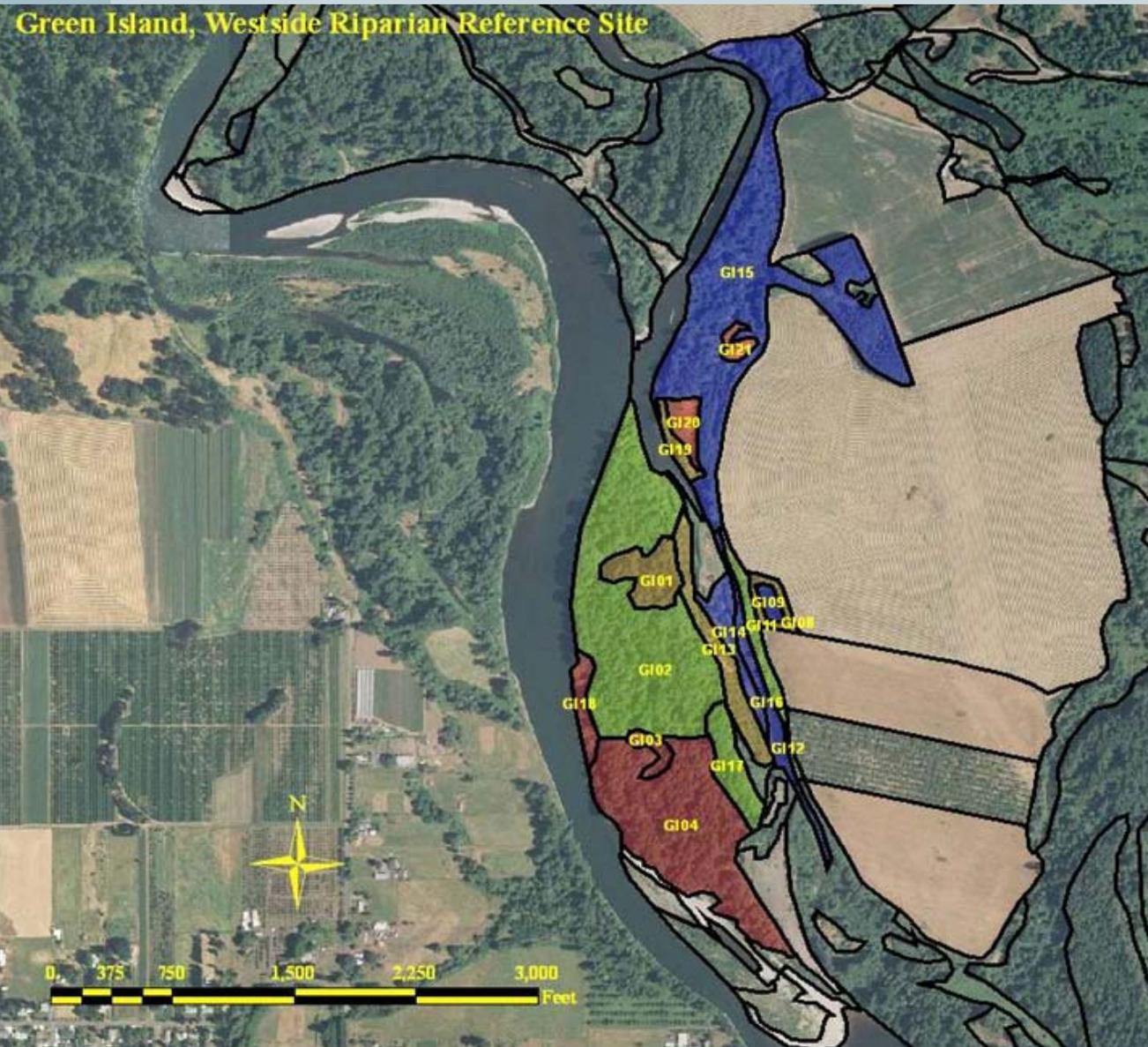
# Species List

## Determined by:

- ▶ **Occurrences**
  - **State/County**
  - **Range Maps**
  - **Survey/Museum Records**
- ▶ **Life History**
  - **Elevation Ranges**
- ▶ **Habitat Associations**
  - **Habitat Type**
  - **Structural Conditions**
  - **KECs from field inventory**

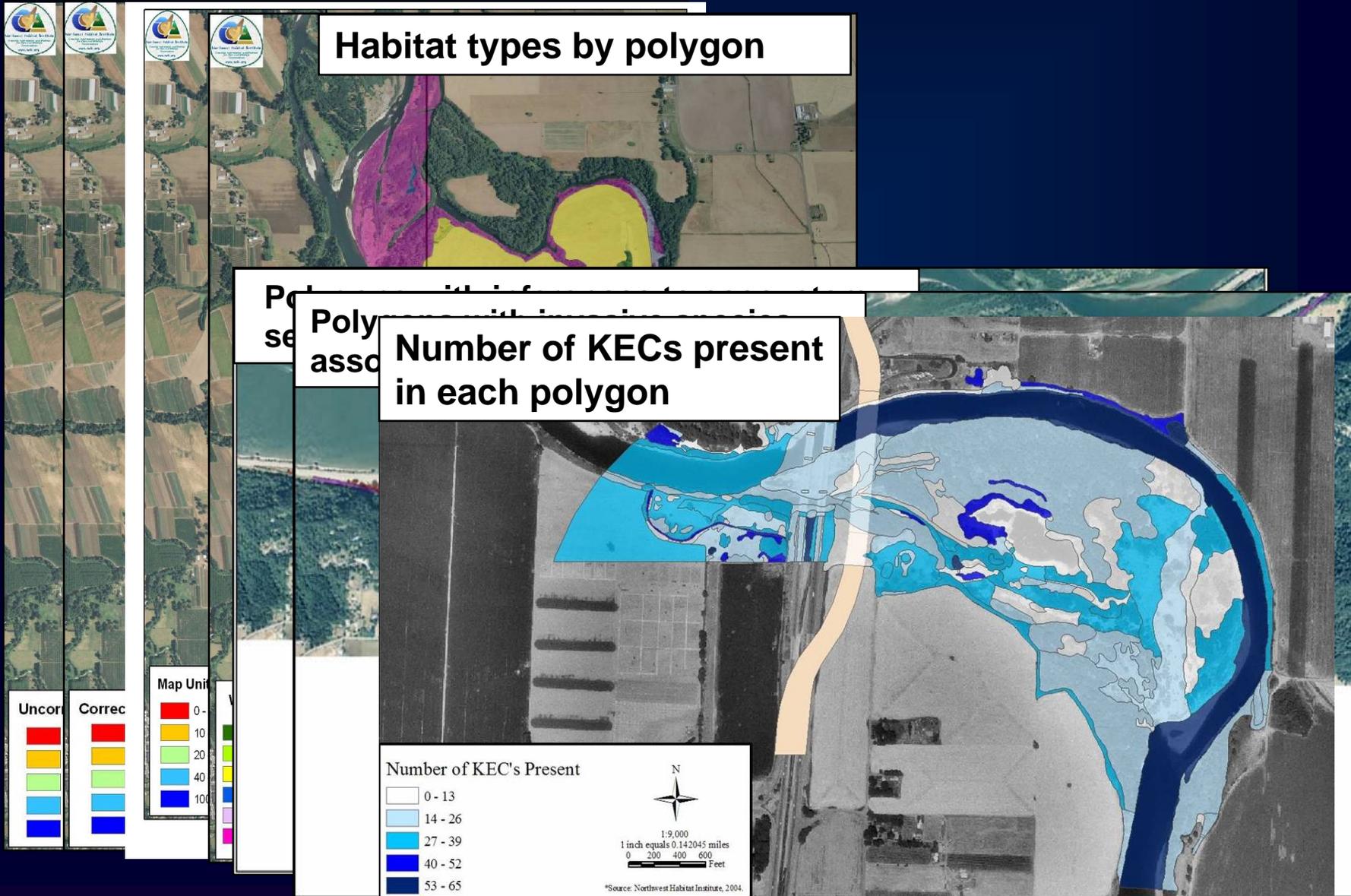


# HAB Process: Calculations



Information tracked for each polygon at a site.

# HAB Process: Final Maps and Reports



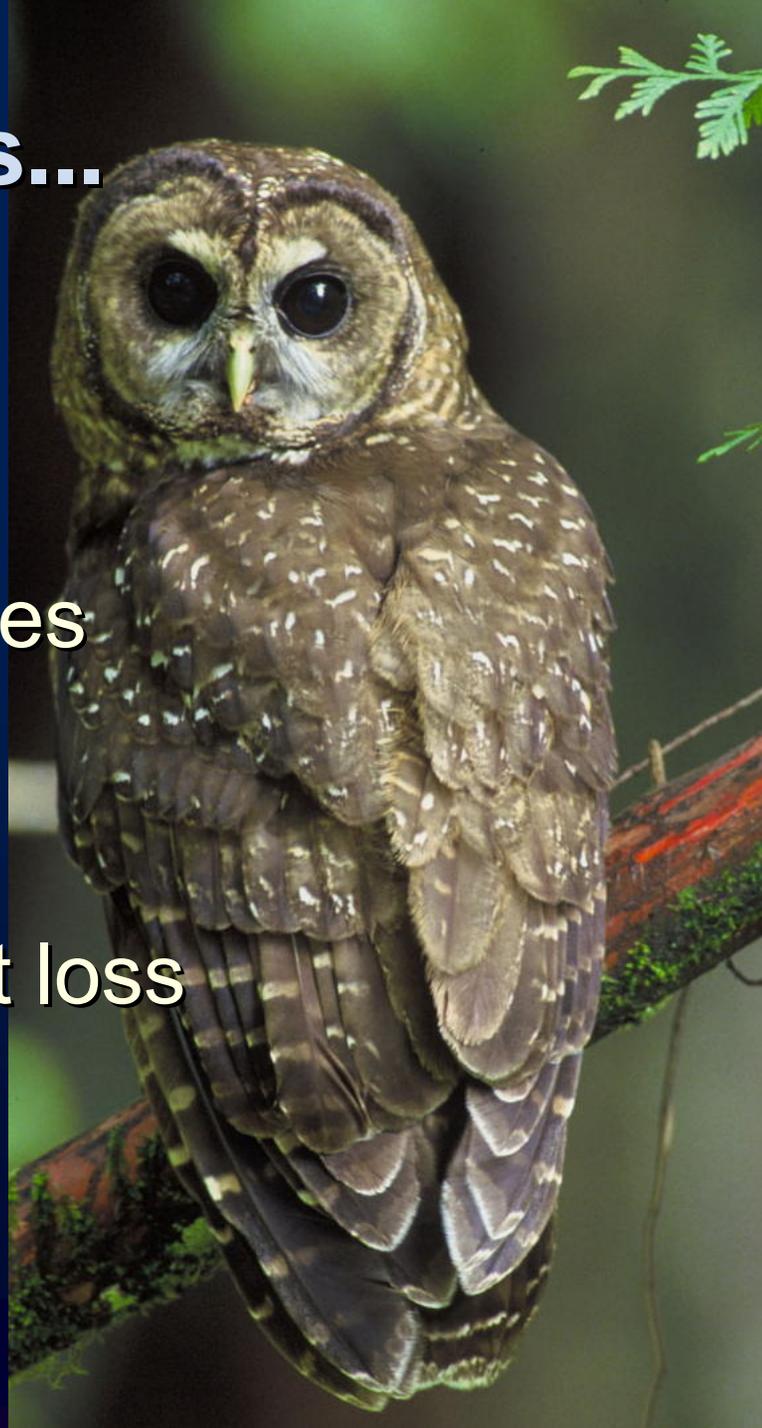
# Special Considerations...

## *T & E*

Federally listed T & E species  
considered separately

Special consideration for  
wetlands to ensure no net loss

## *Wetlands*



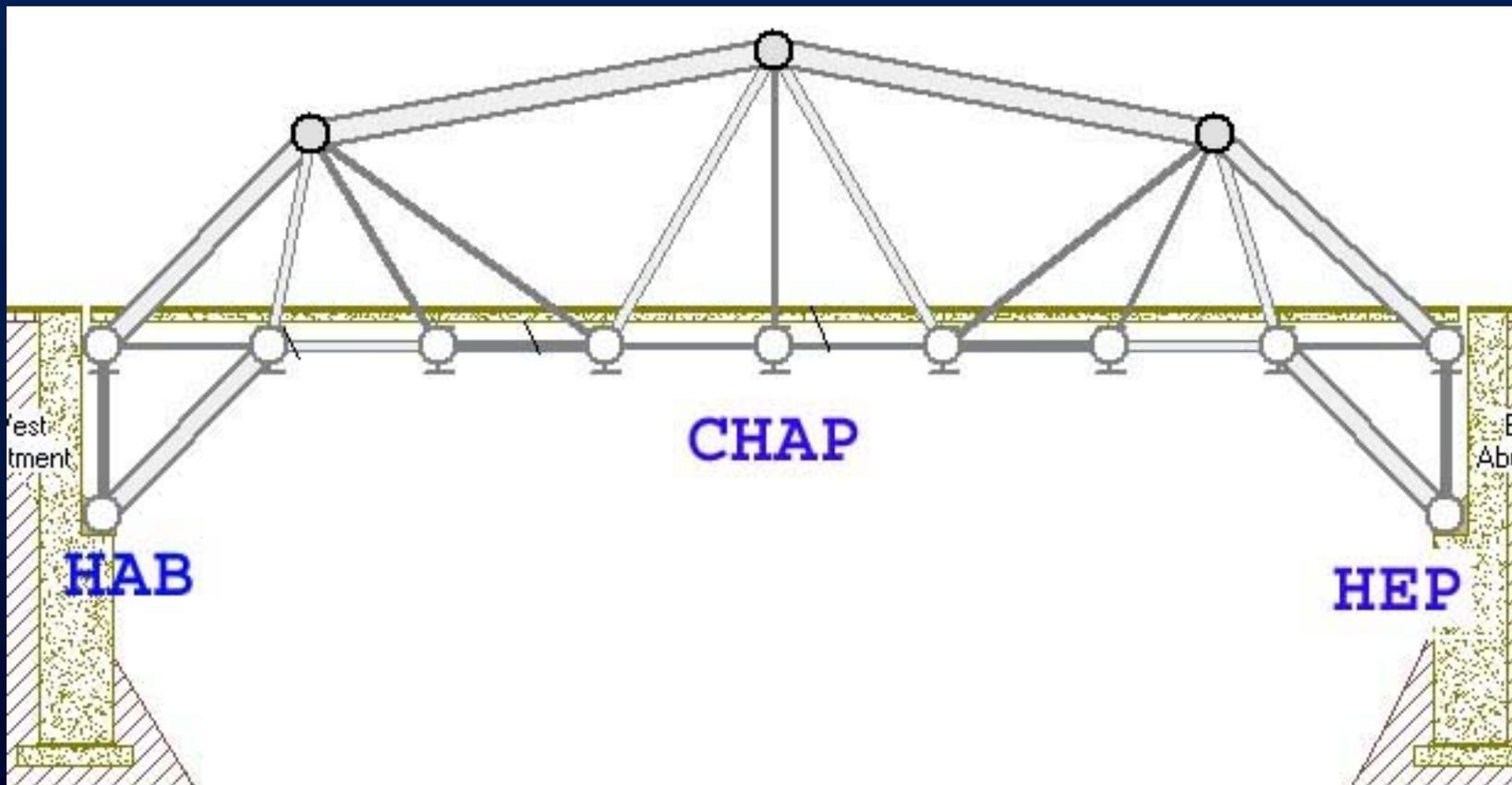
# HAB: Explorations



- **Areas of high/low functional diversity**
- **Areas of high/low species diversity**
- **Invasive species**
- **Restoration scenarios**
- **Relationships between upland habitat and stream habitat**



# Combined Habitat Assessment Protocols (CHAP)



# Potential Outcomes

- ▶ **Ecologically-based method to evaluate potential mitigation sites**
- ▶ **Brings consistency and conformity to evaluation process**
- ▶ **Allows for tracking of restoration activities through time**
- ▶ **Adaptive (continually updated by new reference information)**



# Combined Habitat Assessment Protocols (CHAP)

## *Information Recorded*

### HEP

- ❖ Individual Species
- ❖ Specific Habitat Type(s)
- ❖ Number of Snags
- ❖ Percent Canopy
- ❖ Species Specific Elements

### HAB

- Multiple Species
- All Habitat Types
- Snag Abundance
- Percent Canopy
- All KECs



# Combined Habitat Assessment Protocols (CHAP)

- ▶ **Combines HEP & HAB (Habitat Appraisal and Barter) methods**
  - ▶ **Quantifies a multi-species *habitat value*, providing a more meaningful ecological assessment**
  - ▶ **Deeply imbedded in development histories of habitat assessments in PNW**



# Combined Habitat Assessment Protocols (CHAP)

## Determine:

- Species List
- Key Ecological Functions
- Existing Key Environmental Correlates (habitat elements)

## Goal:

Habitat Quality by Habitat Type

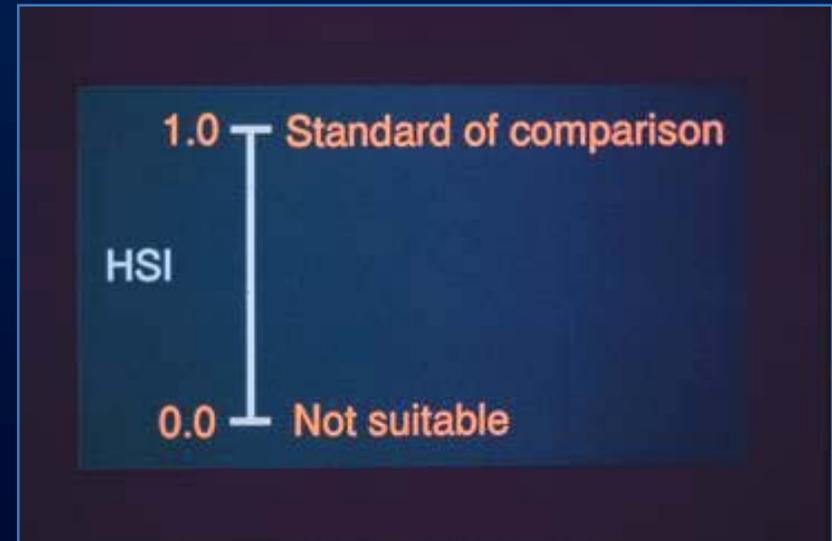




# CHAP Rating Process for Habitat Quality

## HEP:

- **Habitat Quality x Habitat Quantity = Habitat Units;**
- **Habitat Suitability Index (HSI) =**  
**Potential Site Area Conditions ÷ Standard Area of Comparison**
- **Habitat Units =**  
**HSI X Area of Available Habitat**
- **HEP verification transects**





# CHAP Rating Process for Habitat Quality

## HAB:

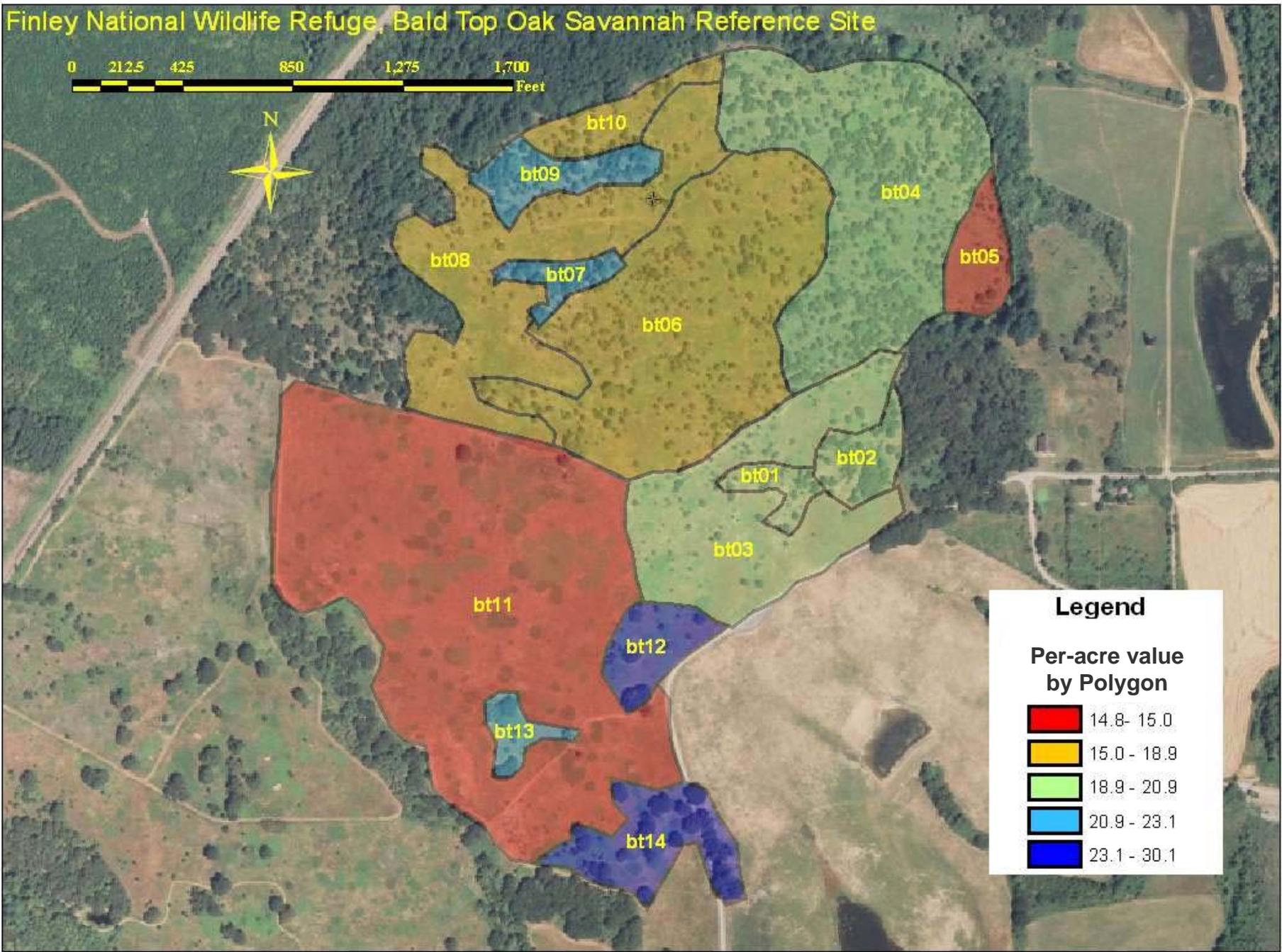
- **Habitat Quality = More Species, Functions, Habitat types and elements the higher the quality**

## By Habitat Type Determine:

- **Potential Number of Species**
- **Actual Habitat Types and Structural Conditions**
- **Actual Key Environmental Correlates**

# Finley National Wildlife Refuge, Bald Top Oak Savannah Reference Site

0 212.5 425 850 1,275 1,700 Feet

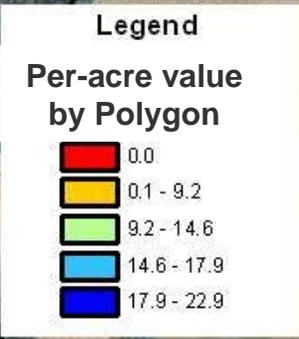
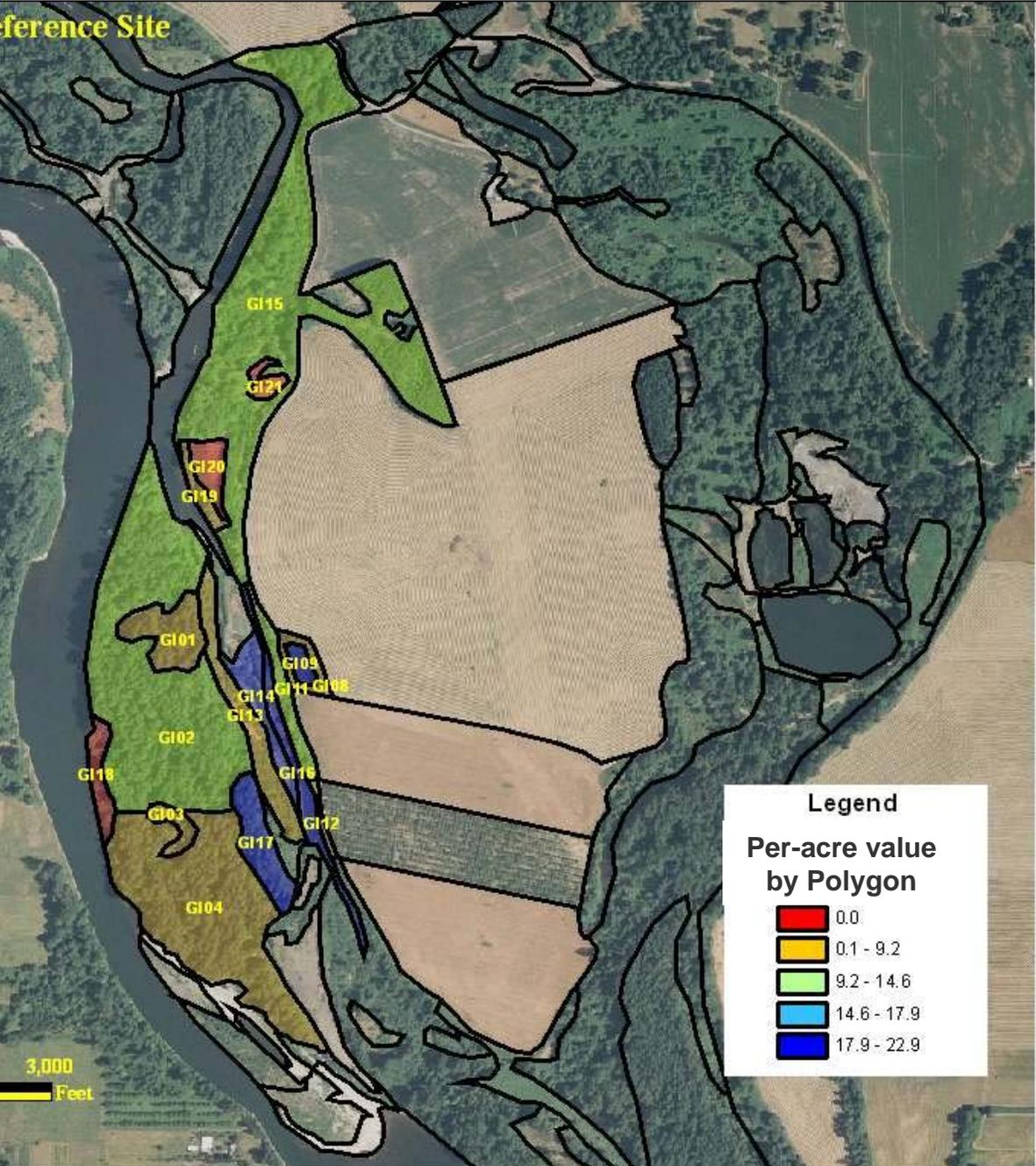


## Legend

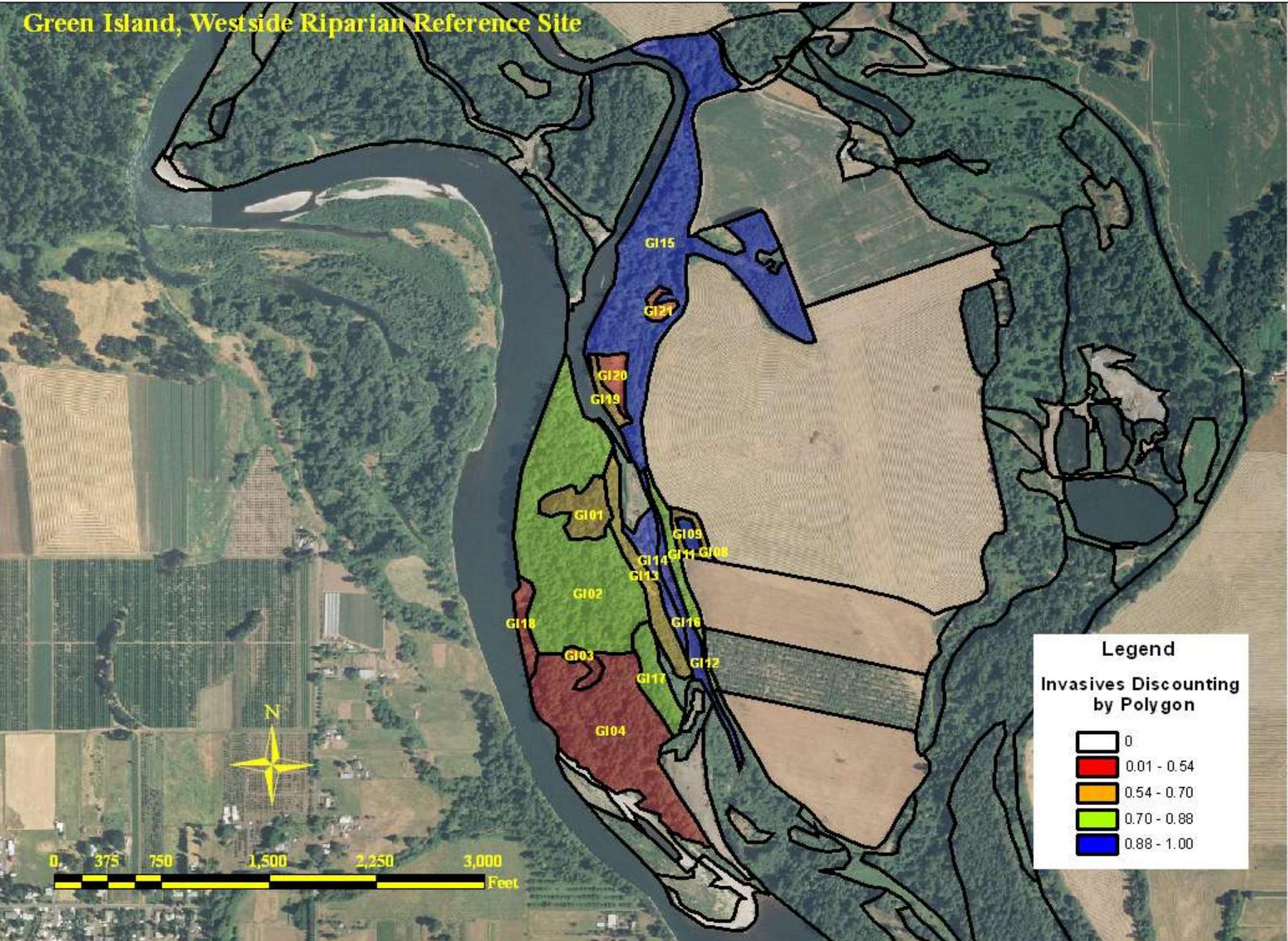
Per-acre value by Polygon

- 14.8 - 15.0
- 15.0 - 18.9
- 18.9 - 20.9
- 20.9 - 23.1
- 23.1 - 30.1

# Green Island, Westside Riparian Reference Site



# Green Island, Westside Riparian Reference Site





# CHAP Value Conversion to HEP/HSI Values

## ► Compare Reference Site to Evaluation Site:

Site	Per-acre Value
Westside Riparian-Wetland Reference Site (Green Island)	16.81
Westside Riparian-Wetland Evaluation Site (hypothetical)	13.52
Dry Douglas-fir & Oak Reference Site (Bald Top, Finley)	14.92
Dry Douglas-fir & Oak Evaluation Site (hypothetical)	9.77

$$\frac{\text{Per-acre Value}_{\text{eval}}}{\text{Per-acre Value}_{\text{ref}}} = \text{HSI value}$$

### Examples:

$$13.52 / 16.81 = 0.80 \text{ HSI}$$

$$9.77 / 14.92 = 0.65 \text{ HSI}$$



# CHAP Value Conversion to HEP/HSI Values

- ▶ **HSI is then multiplied by acres:**

**HSI Value x Acreage of Habitat Type = Habitat Units (HUs)**

**Example: 0.65 HSI x 10 acres = 6.5 HUs**

- ▶ **Habitat units are then multiplied by number of species used to evaluate a specific cover type 20+years ago:**

**Habitat Units x Number of HEP species = Credited HEP HUs**

**Example: 6.5 HUs x 5 species = 32.5 Credited HUs**

***Questions !***

