UCUT Wildlife Monitoring and Evaluation Project (UWMEP): a Regional Approach for Assessing Ecological Restoration

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The UWMEP objective

To implement a wildlife- and habitat-monitoring program to assess restoration activities across five tribal ownerships in northeastern Washington and northern Idaho.

The UWMEP will provide M&E for 4 BPA mitigation projects

Tribe	Project
Kalispel	Albeni Falls
Kootenai	Albeni Falls
Coeur d'Alene	Albeni Falls including Lake Creek Acquisition Hangman restoration
Spokane Tribe	STOI Wildlife Mitigation
Colville Confederated	CCT Wildlife Mitigation

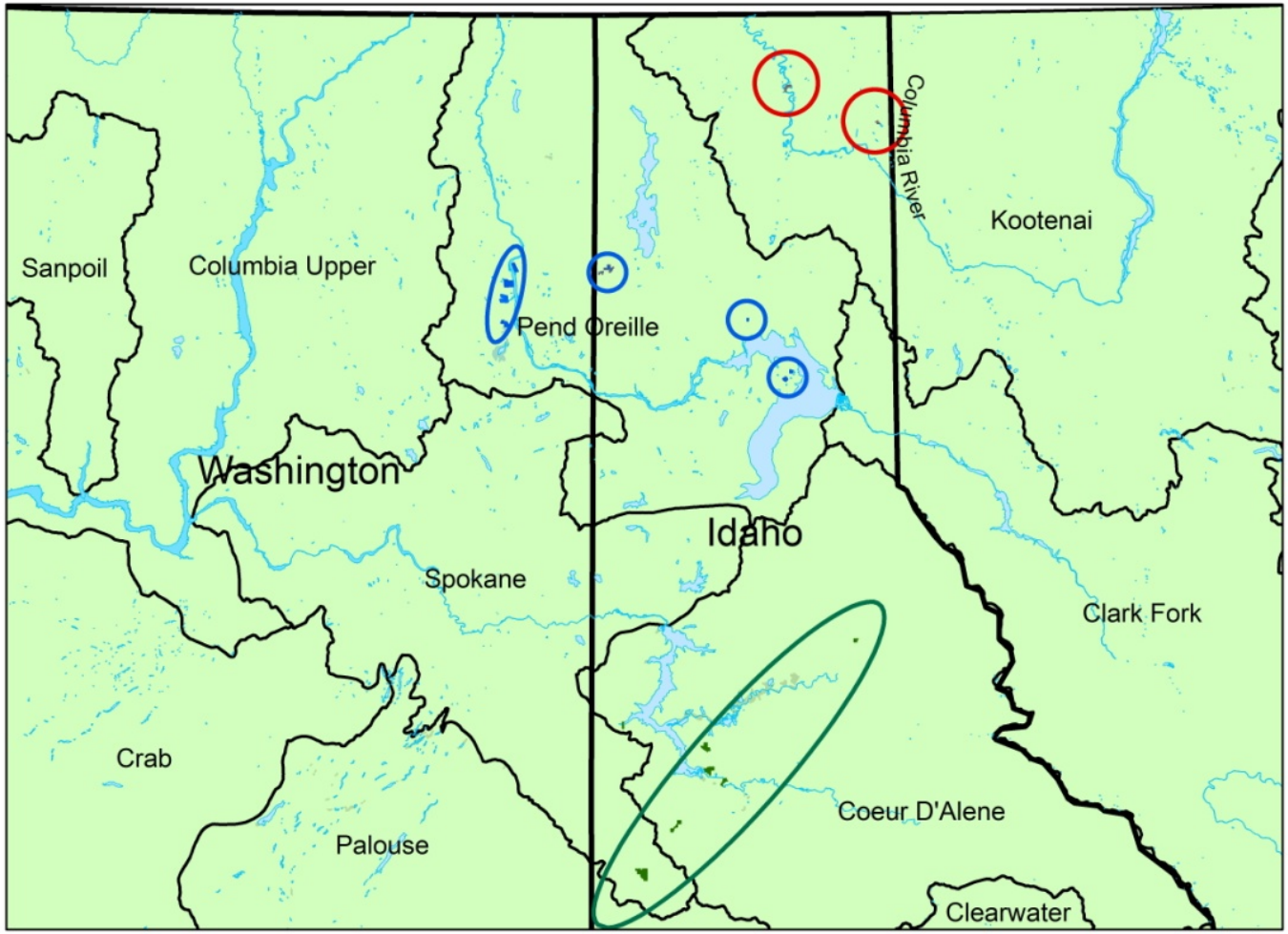
The UWMEP rationale

Provide consistent monitoring for mitigation lands in seven subbasins for the five UCUT Tribes

Increase access to monitoring data and products across ownerships

Provide independent evaluation of the results of restoration activities

Become a model for regional wildlife M&E

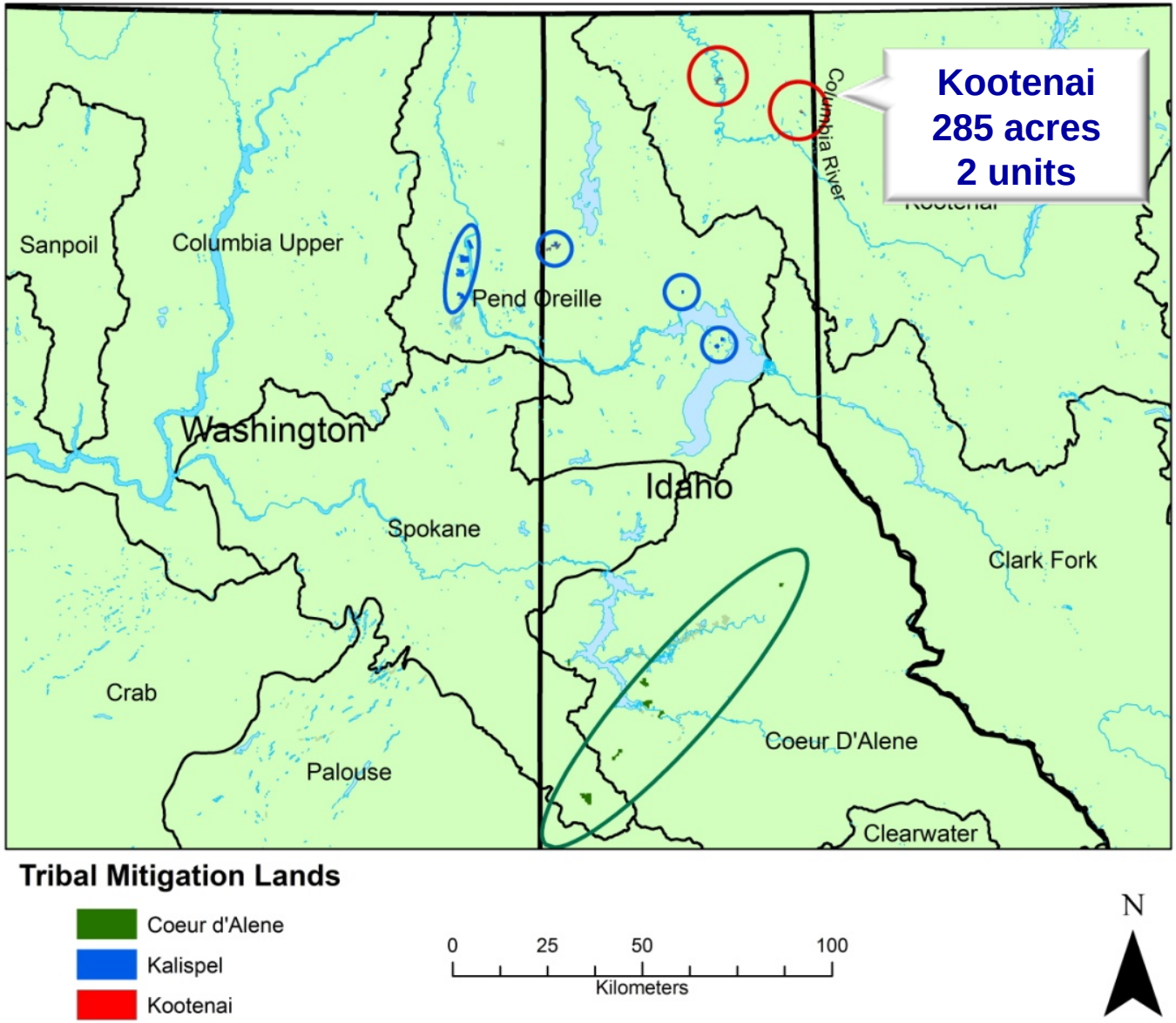


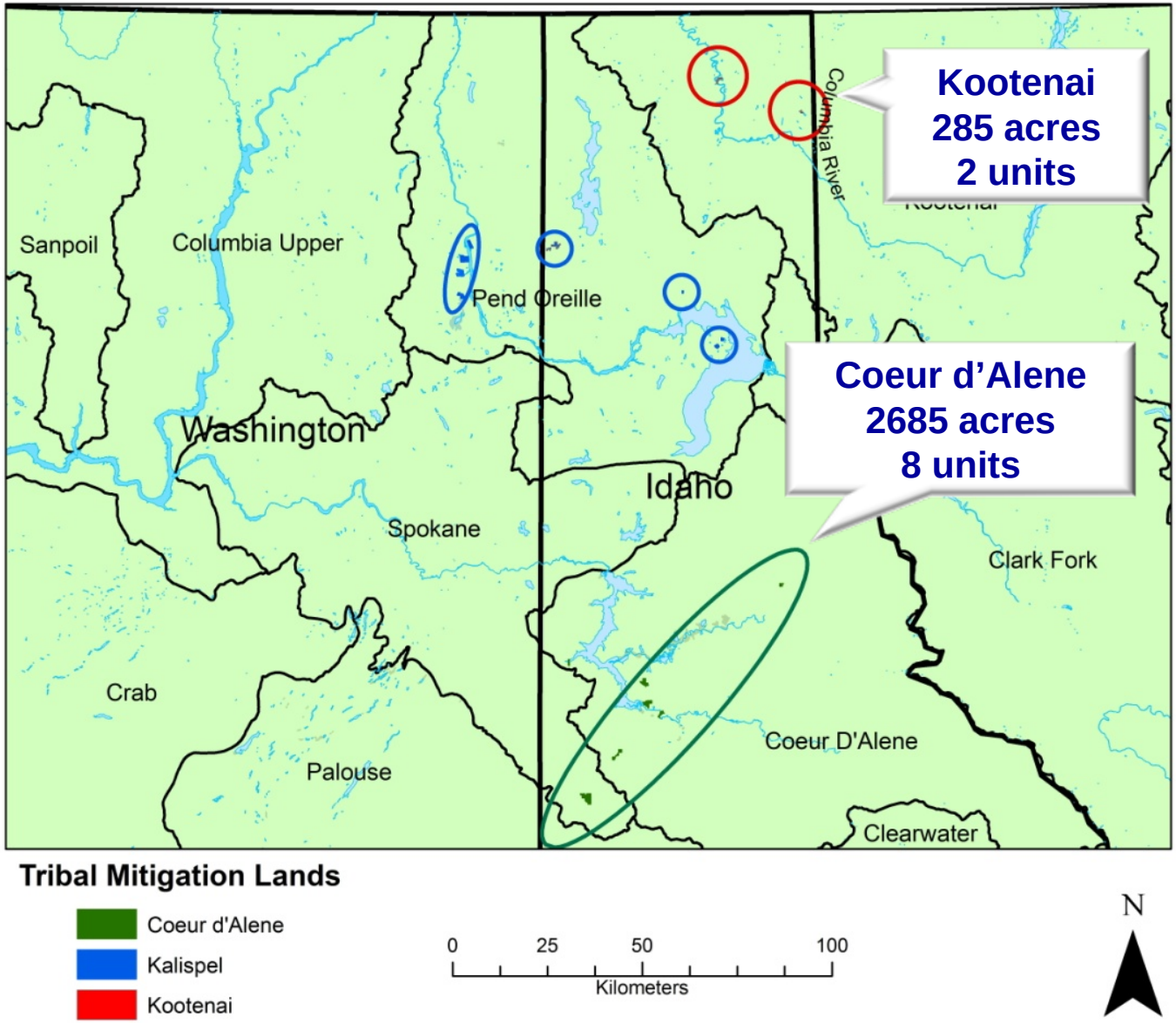
Tribal Mitigation Lands

- Coeur d'Alene
- Kalispel
- Kootenai

0 25 50 100
Kilometers

N


Kootenai
285 acres
2 units
Columbia River
Sanpoil
Columbia Upper
Pend Oreille
Washington
Idaho
Spokane
Clark Fork
Crab
Coeur D'Alene
Palouse
Clearwater
Tribal Mitigation Lands
Coeur d'Alene
Kalispel
Kootenai
0
25
50
100
Kilometers
N


Kootenai
285 acres
2 units
Coeur d'Alene
2685 acres
8 units
Columbia River
Sanpoil
Columbia Upper
Pend Oreille
Washington
Idaho
Spokane
Clark Fork
Crab
Palouse
Coeur D'Alene
Clearwater
Tribal Mitigation Lands
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0
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Kilometers
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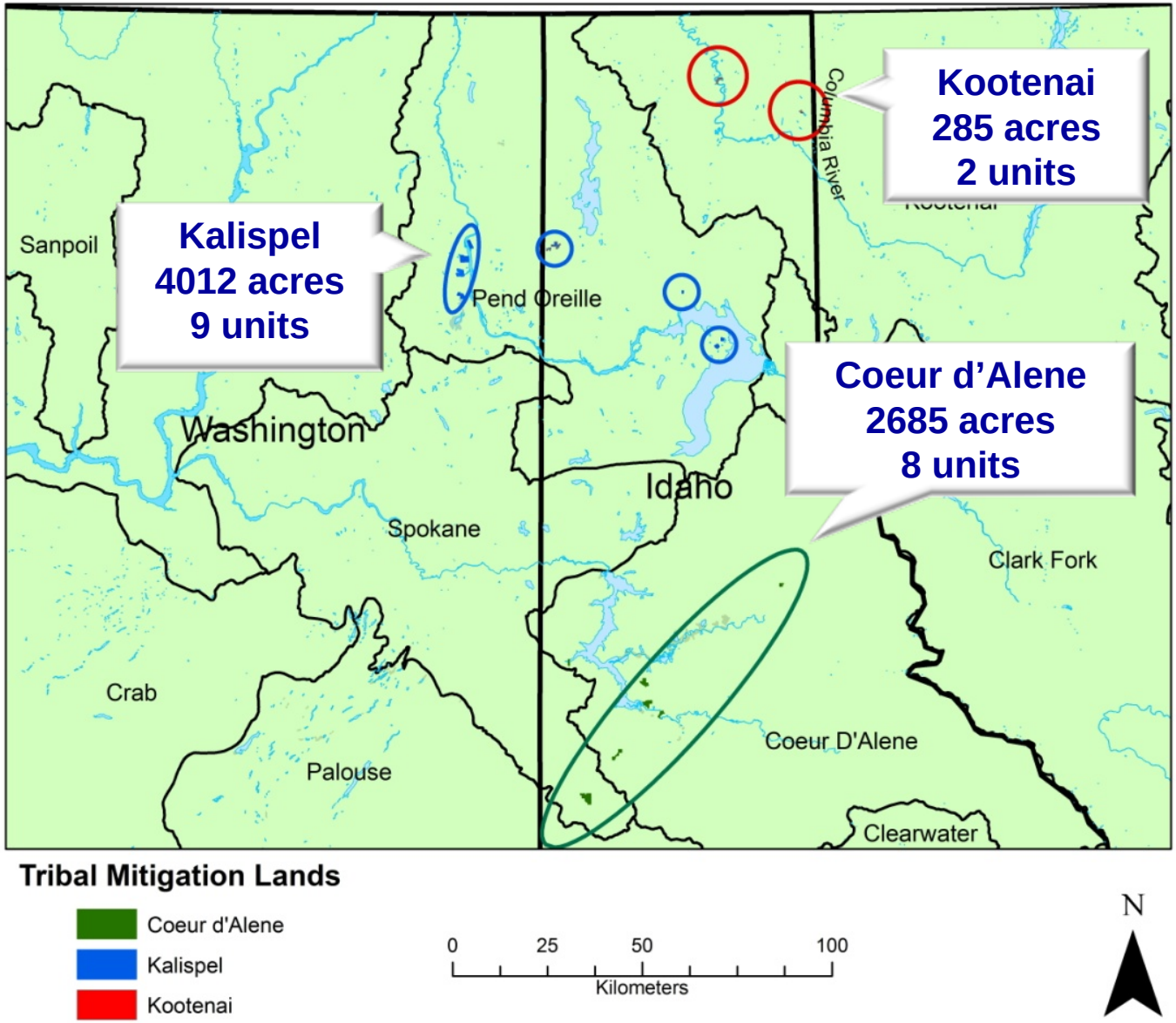
Kootenai
285 acres
2 units
Kalispel
4012 acres
9 units
Coeur d'Alene
2685 acres
8 units
Columbia River
Sanpoil
Pend Oreille
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Idaho
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Clark Fork
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Kalispel
Kootenai
0
25
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Kilometers
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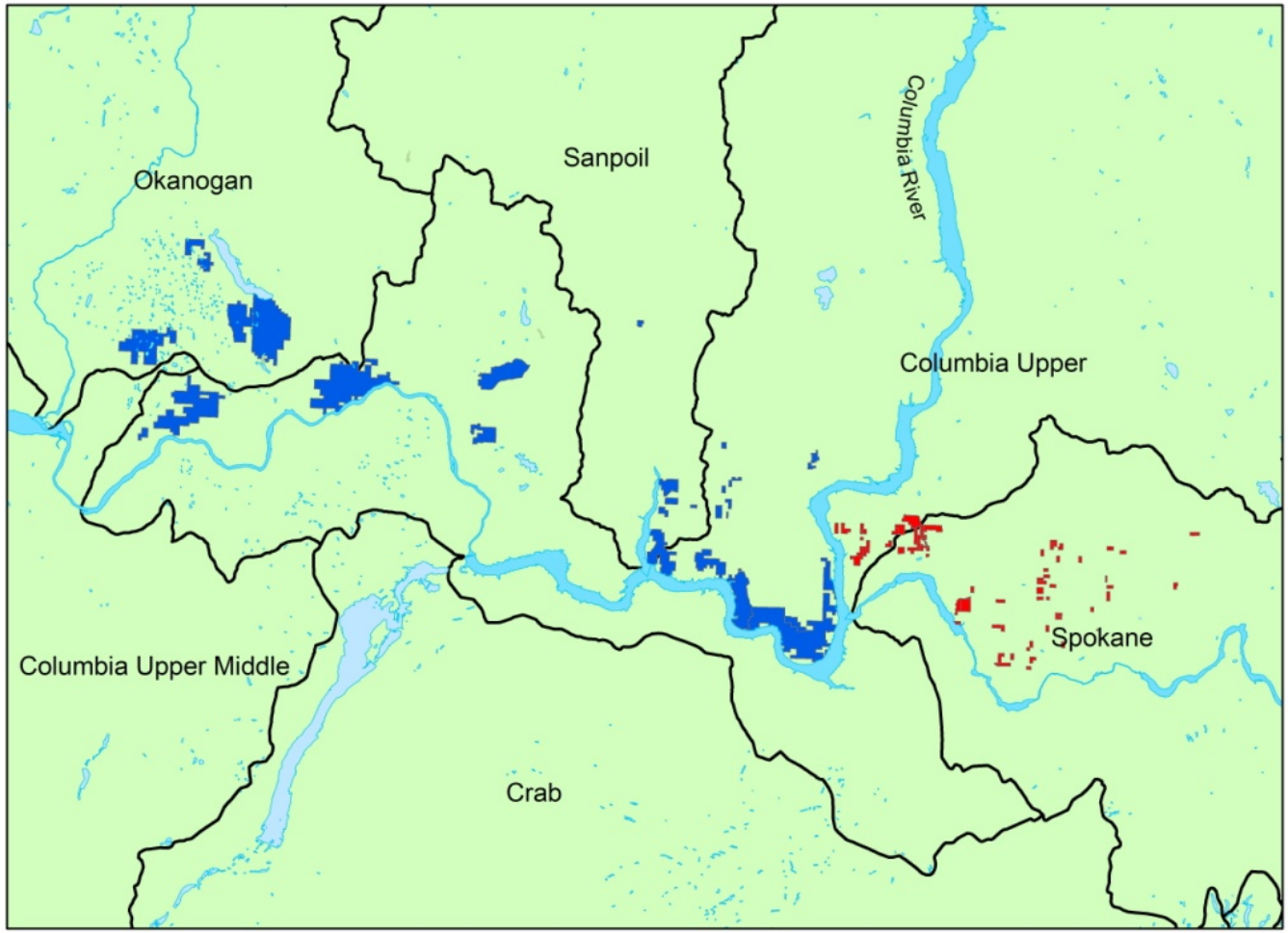
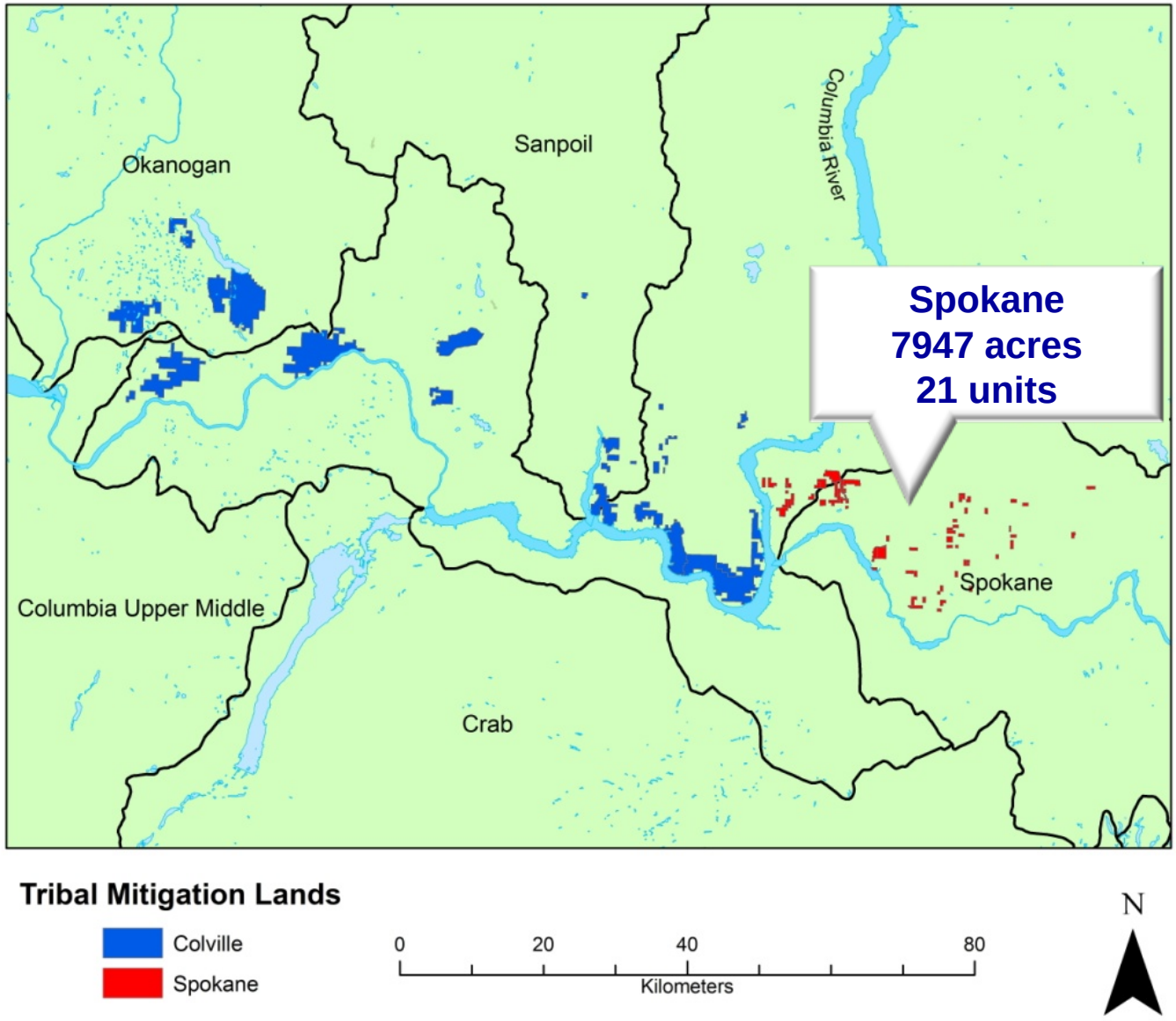
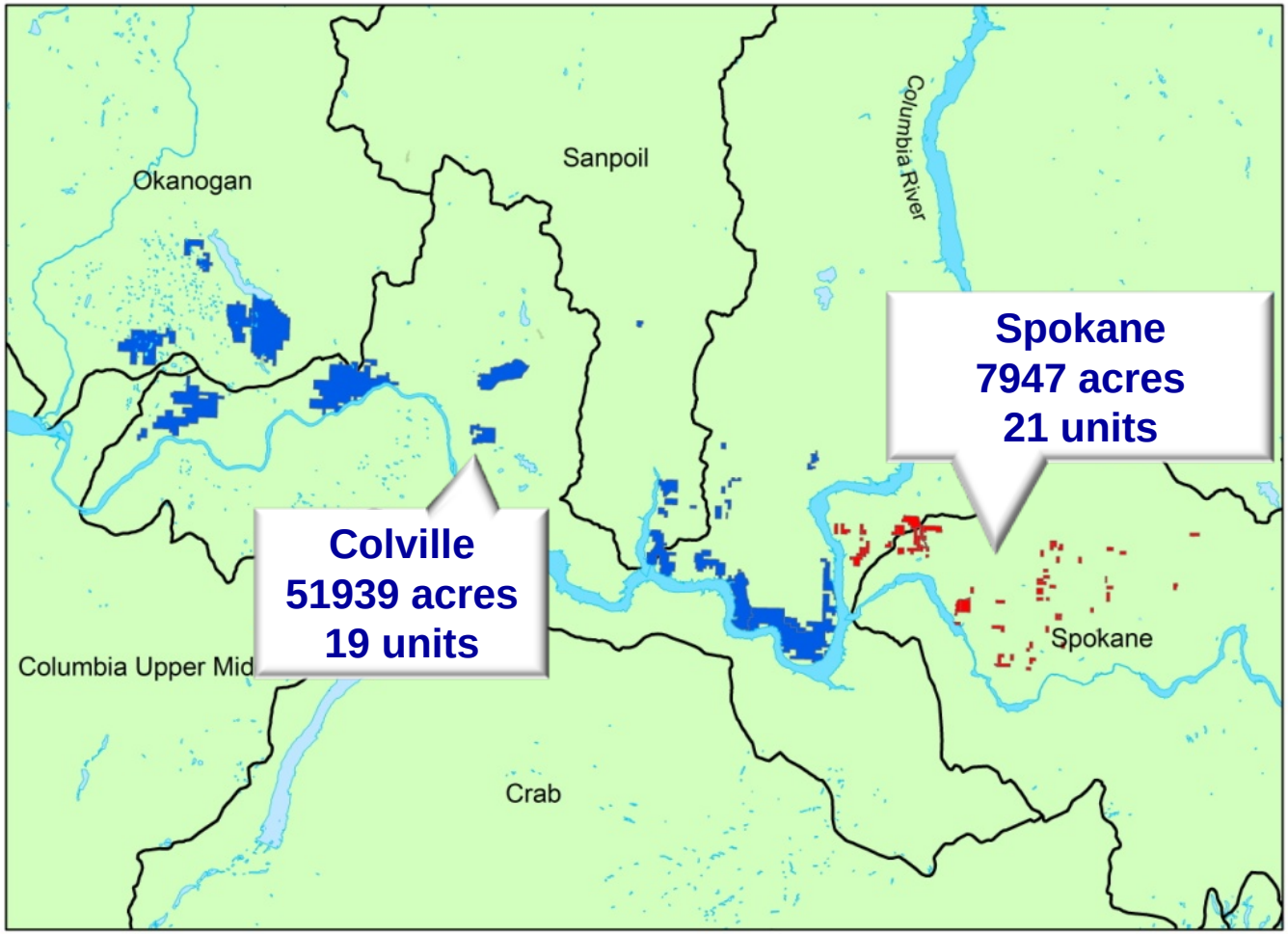

Okanogan
Sanpoil
Columbia River
Columbia Upper
Columbia Upper Middle
Spokane
Crab
Tribal Mitigation Lands
Colville
Spokane
0
20
40
80
Kilometers
N


Okanogan
Sanpoil
Columbia River
Spokane
7947 acres
21 units
Spokane
Columbia Upper Middle
Crab
Tribal Mitigation Lands
Colville
Spokane
0
20
40
80
Kilometers
N


Okanogan
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Colville
51939 acres
19 units
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Spokane
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Tribal Mitigation Lands
Colville
Spokane
0
20
40
80
Kilometers
N

The M&E plan must be designed for the greater spatial extent

>74,000 acres are being managed on 60 units

Active and passive management

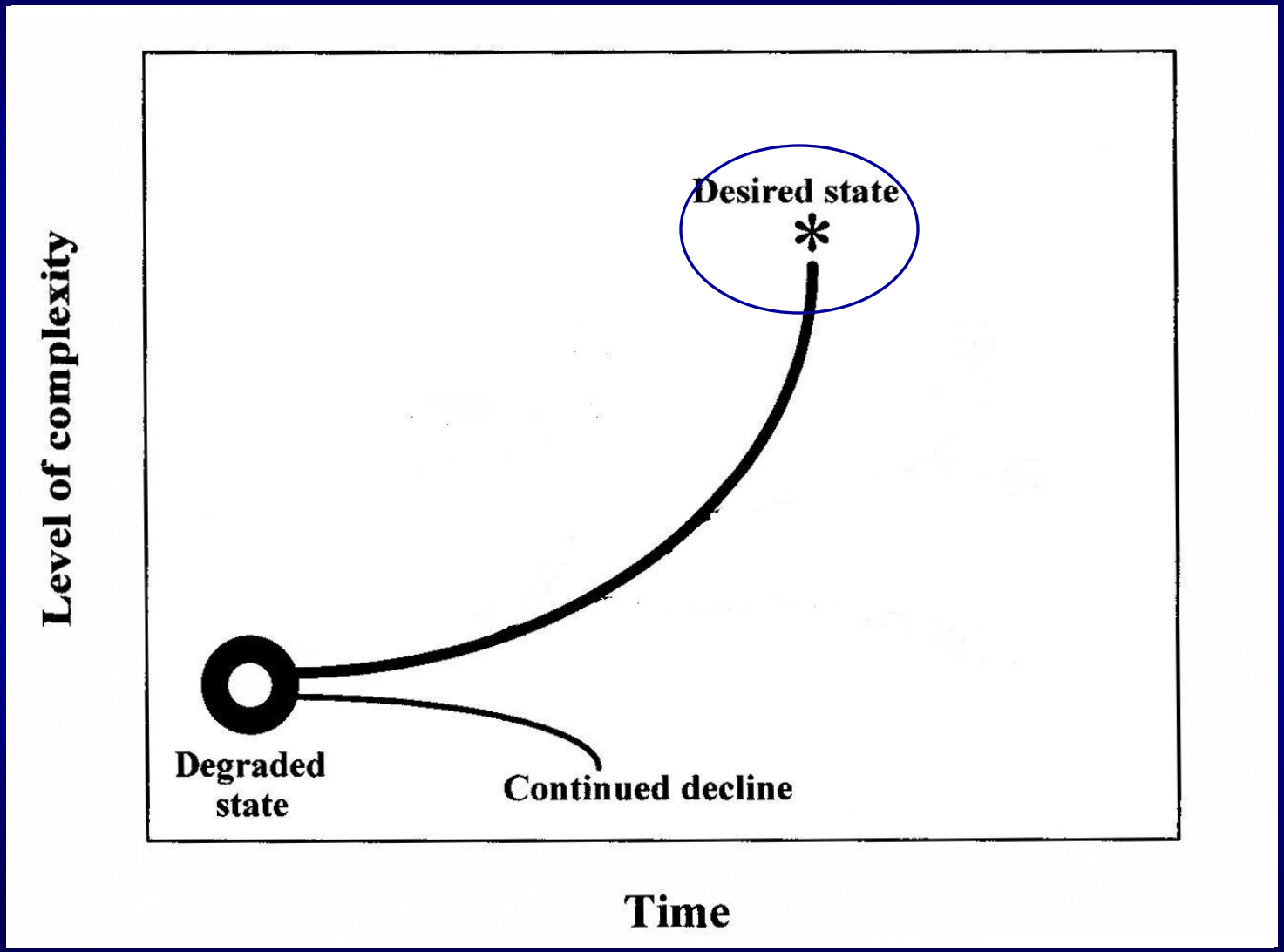
The M&E plan must be designed for the greater habitat diversity

Shrub-steppe	Grassland steppe	Conifer Woodland	Mixed Conifer	Riparian Forest	Riparian Shrub	Wetland Meadow	Emergent Wetland
23718	14658	4410	25084	1604	1800	2977	564
32%	**20%**	**6%**	**34%**	**2%**	**2%**	**4%**	**1%**

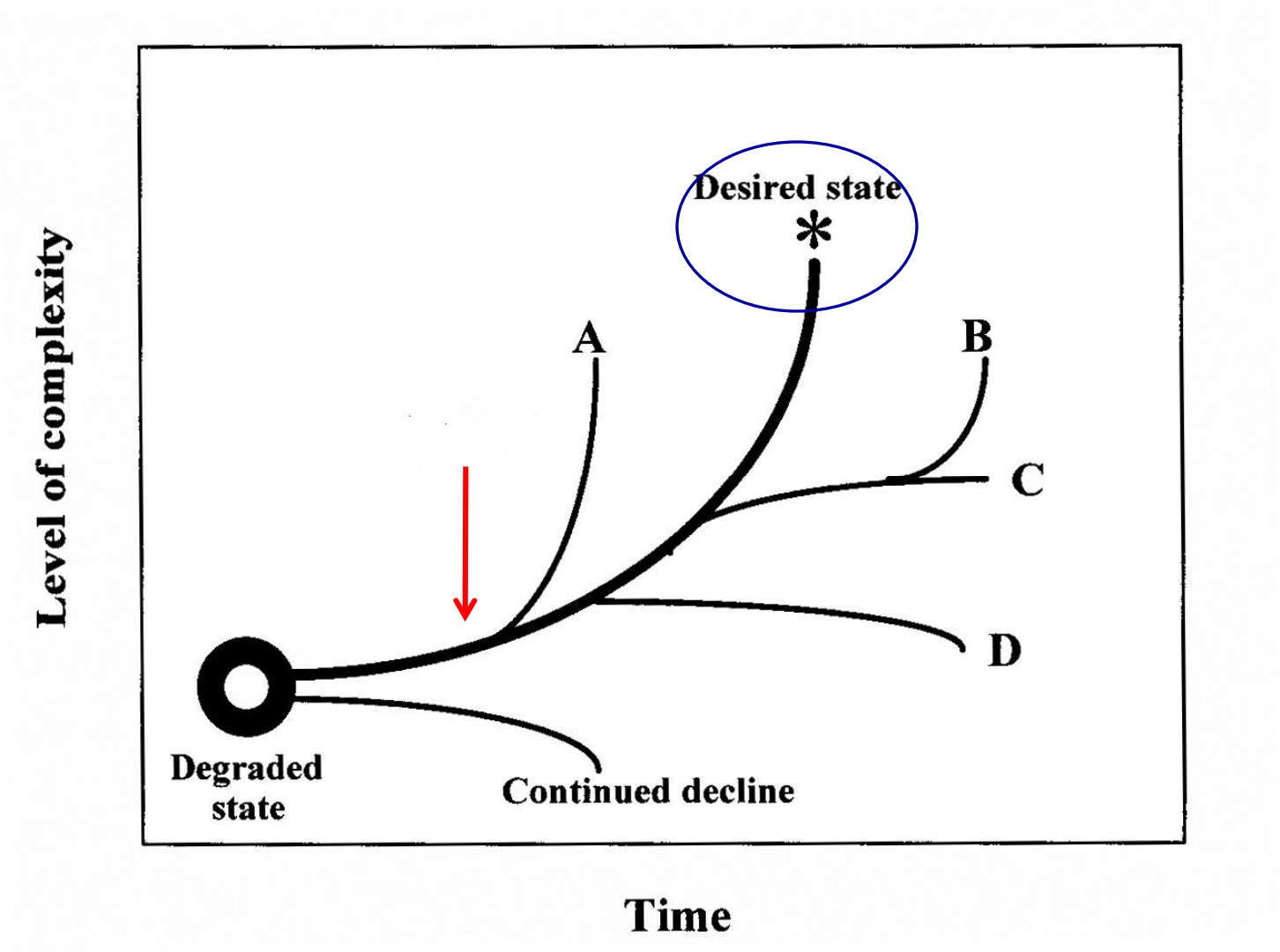
Ecological restoration is the process of assisting the recovery of an ecosystem that has been degraded, damaged, or destroyed.

Society for Ecological Restoration

We attempt to move an ecological system from a degraded state to a “desired state.”



Restoration trajectories may vary



Some criteria for restoration success (Hobbs & Norton 1996; SER 2004)

- Composition and relative abundance of indigenous species characteristic of reference
- All functional groups required for continued development or maintenance are represented
- Physical environment can sustain these organisms

Monitoring for community change presents several problems to overcome

A reference or baseline condition must be determined

Annual variation must be incorporated

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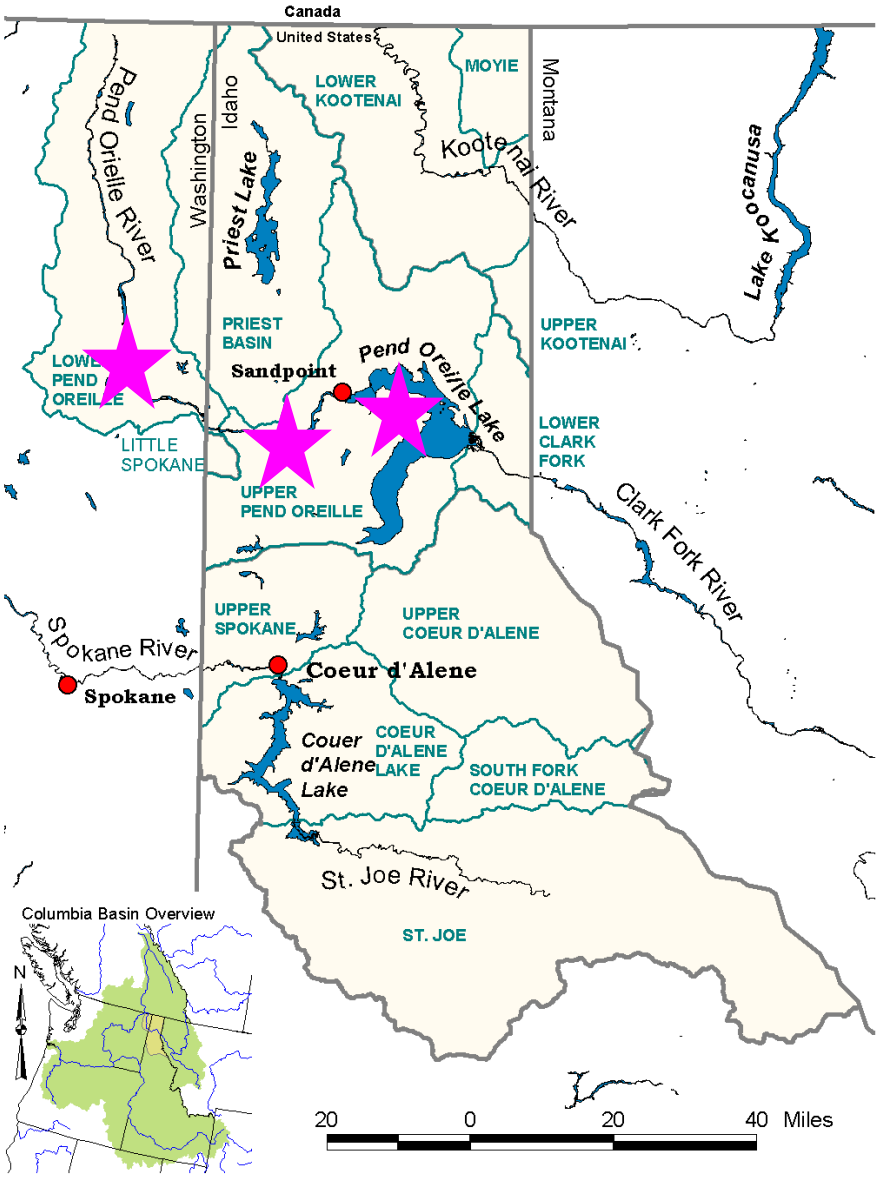
Limited sampling is unlikely to reveal all species in a habitat

UWMEP will build on the Albeni Falls M&E plan

Mitigation properties of the Kalispel Tribe of Indians



4,000 acres have been purchased for mitigation

1997

Flying Goose Ranch

Water level management

2002

4,000 acres have been purchased for mitigation

Control weeds

Restore native vegetation

Exclude grazing

Eight reference sites provide a baseline for comparison with mitigation sites

Riparian shrub

Wetland meadow

A stratified-random sample of 30 restoration sites were selected for comparison to reference

An initial sampling strategy was chosen

Reference sites monitored for 3 consecutive years to evaluate temporal variation

Restoration sites sampled once every 3 years to evaluate change

Habitat monitoring began in 2002

Shrub species and volume

Cover and diversity of grasses and herbs

Trees

Characterize both structure and species composition

Wildlife monitoring began in 2002

Larval amphibians

Small mammals

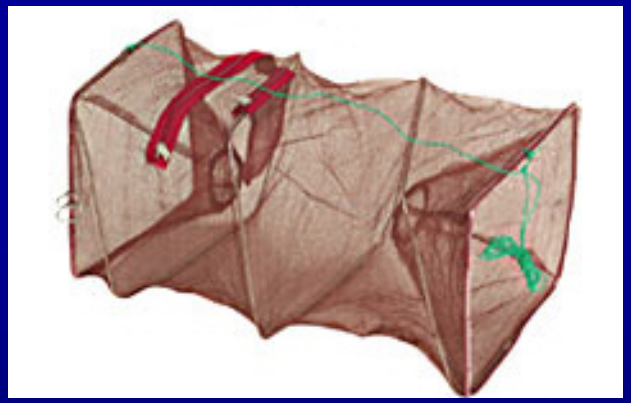
Birds

Costs prevent exhaustive monitoring

Larval amphibian monitoring

Trapping

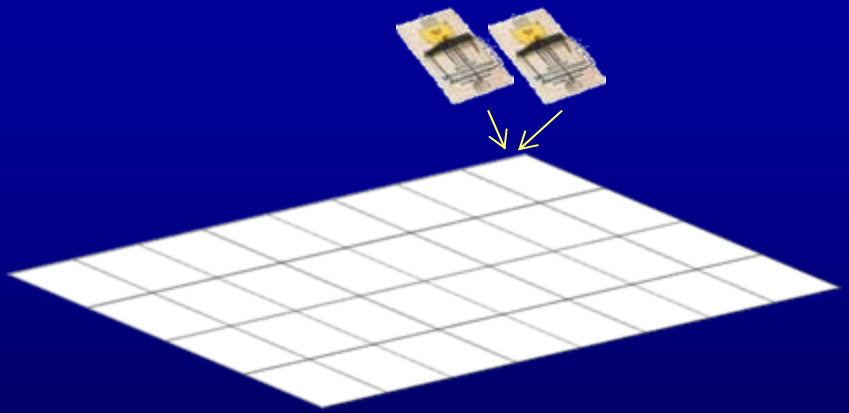
- 5 minnow traps per station
- 10 nights per sample
- Spring and late summer samples to include early and late breeding species



Small-mammal monitoring

Removal trapping

- **5 × 9 grid (12-m spacing)**
- **2 traps per station**
- **3 nights per site**
- **June – August**

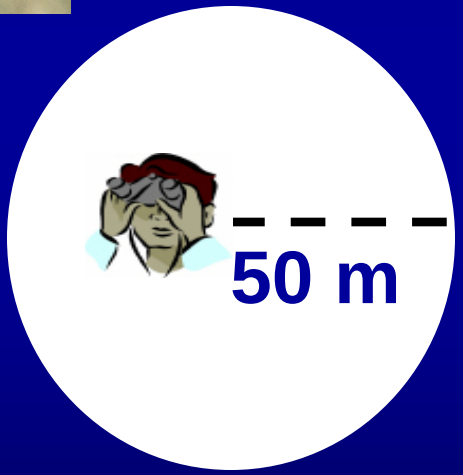


Bird monitoring

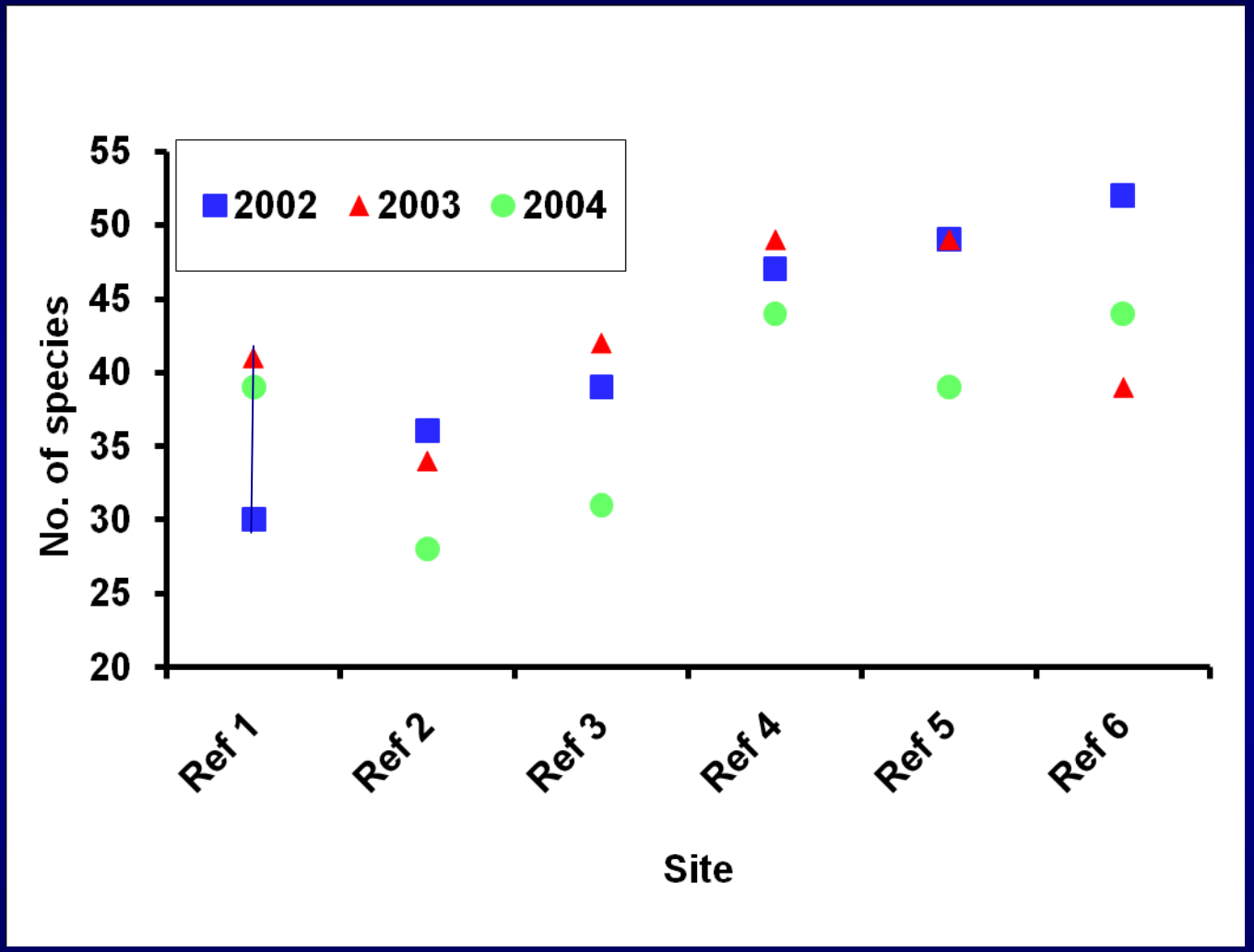
10 minute point-count bird surveys

Breeding season - May to June

7 entries per site

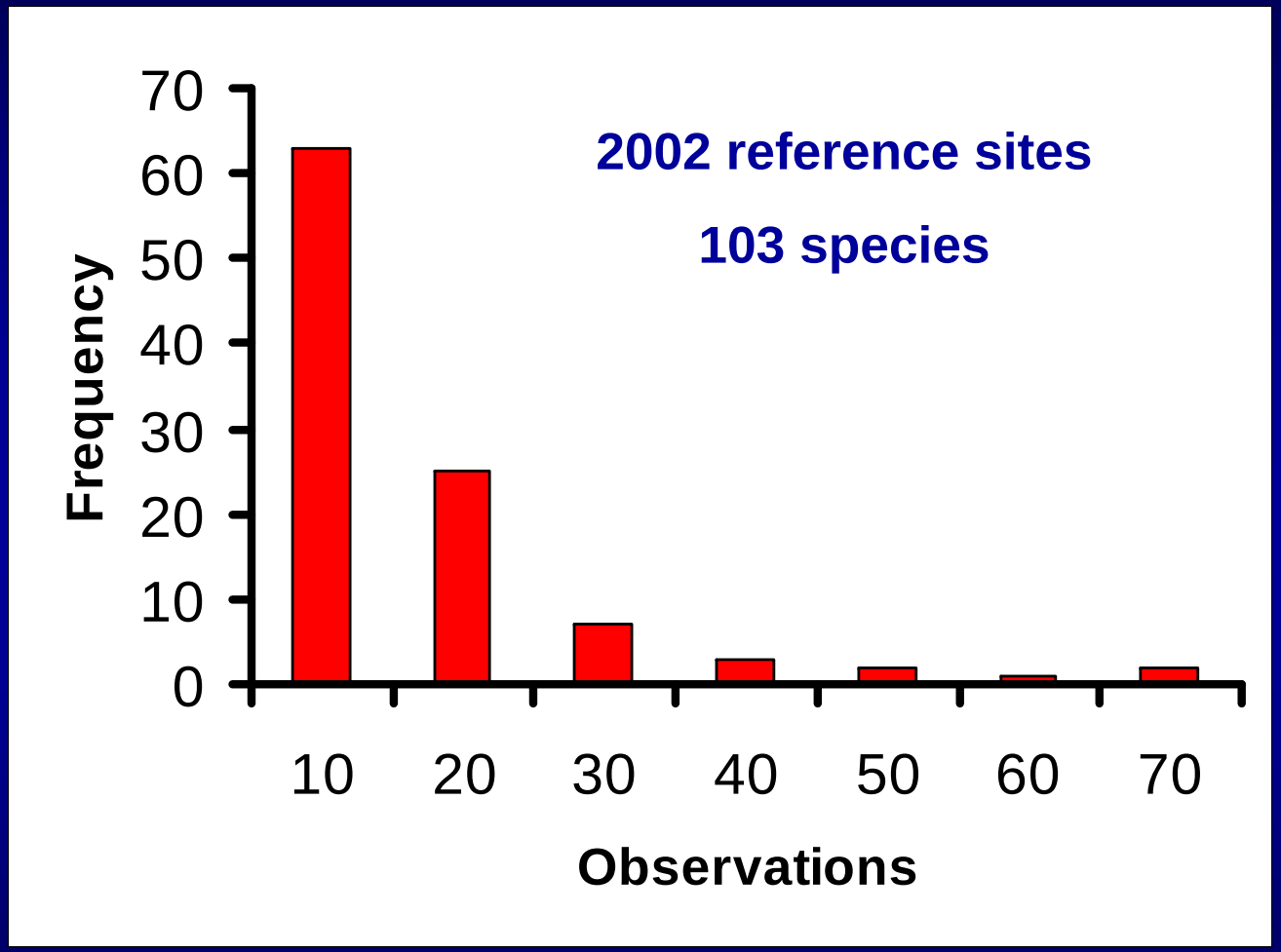


Species detection of birds varies between years



Maximum number of species detected per year varies by >25% for reference sites

Number of bird detections varies across species



A few species are observed frequently

If we consider only the species present, we will underestimate the similarity between reference and restoration sites.

Solutions:

Develop sampling regimes to estimate missed species.

Apply new statistical tools that use information about relative abundance to estimate numbers of species that are *unseen*.

Similarity measures are based on incidence (classic) or on relative abundance (probabilistic)

Classic Jaccard (incidence)

A – Species shared in 2 sites

B – Species unique to site 1

C – Species unique to site 2

$$\frac{A}{A+B+C}$$

Similarity measures are based on incidence (classic) or on relative abundance (probabilistic)

Chao-Jaccard (Probabilistic)

Incorporate relative abundance

↓

Use data on rare species

↓

Estimate unseen species

Development in Chao et al. 2005. Ecology Letters.

Similarity measures are based on incidence (classic) or on relative abundance (probabilistic)

Chao-Jaccard (Probabilistic)

Incorporate relative abundance

↓

Use data on rare species

↓

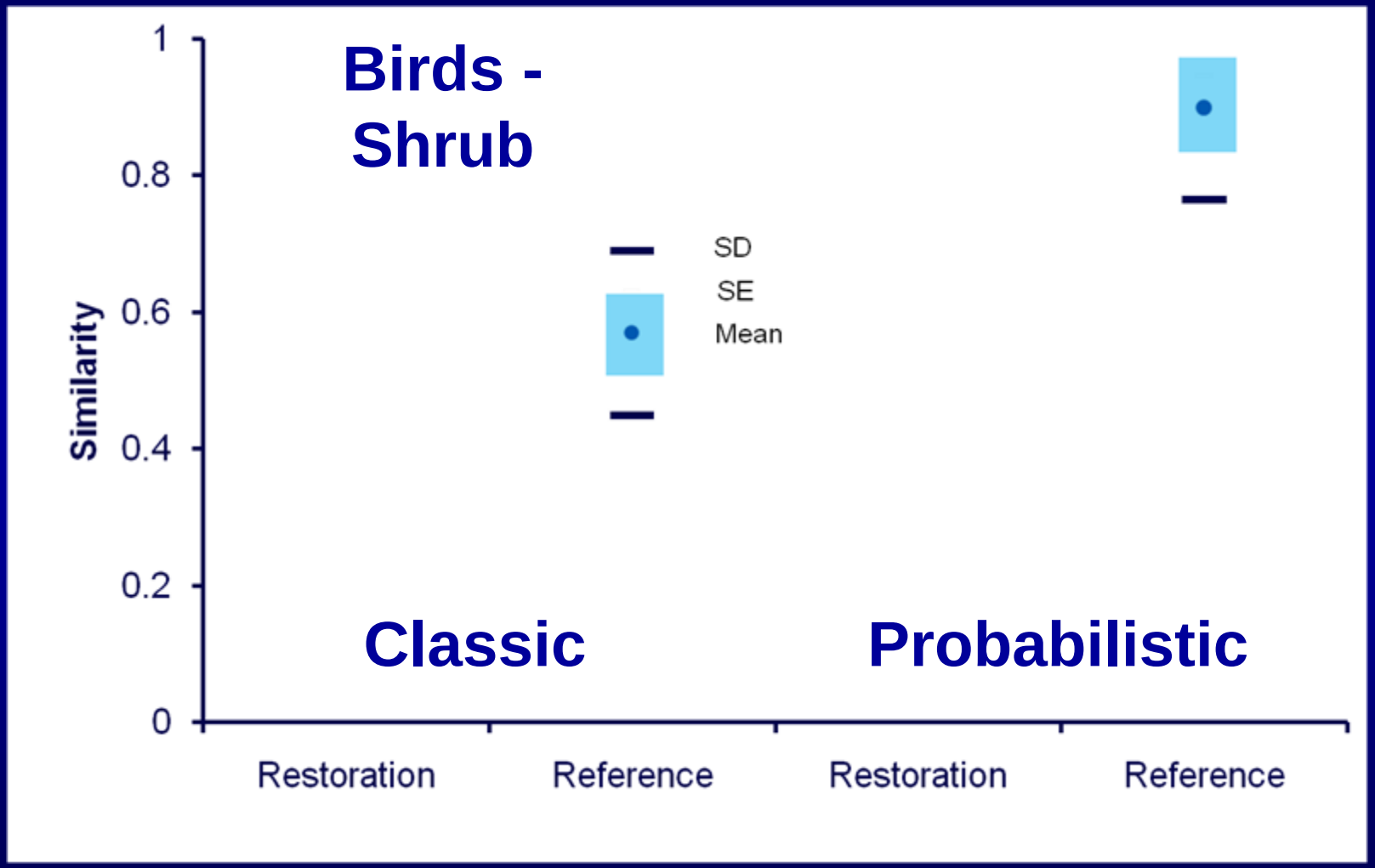
Estimate unseen species

$$\frac{UV}{U + V - UV}$$

U = total abundance of shared species at site 1
V = total abundance of shared species at site 2

Development in Chao et al. 2005. Ecology Letters.

Comparisons of restoration and reference vary with the similarity measure used



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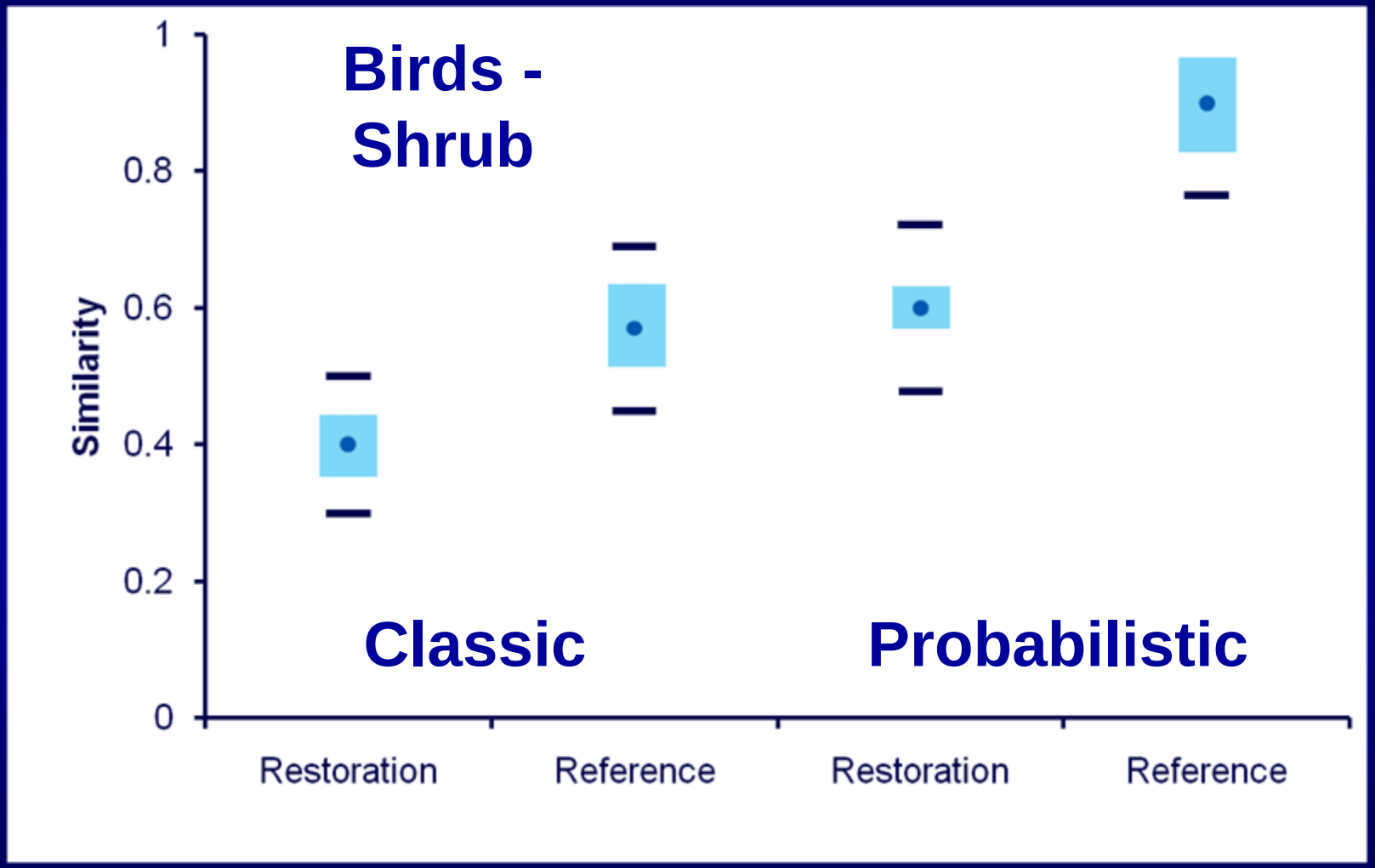
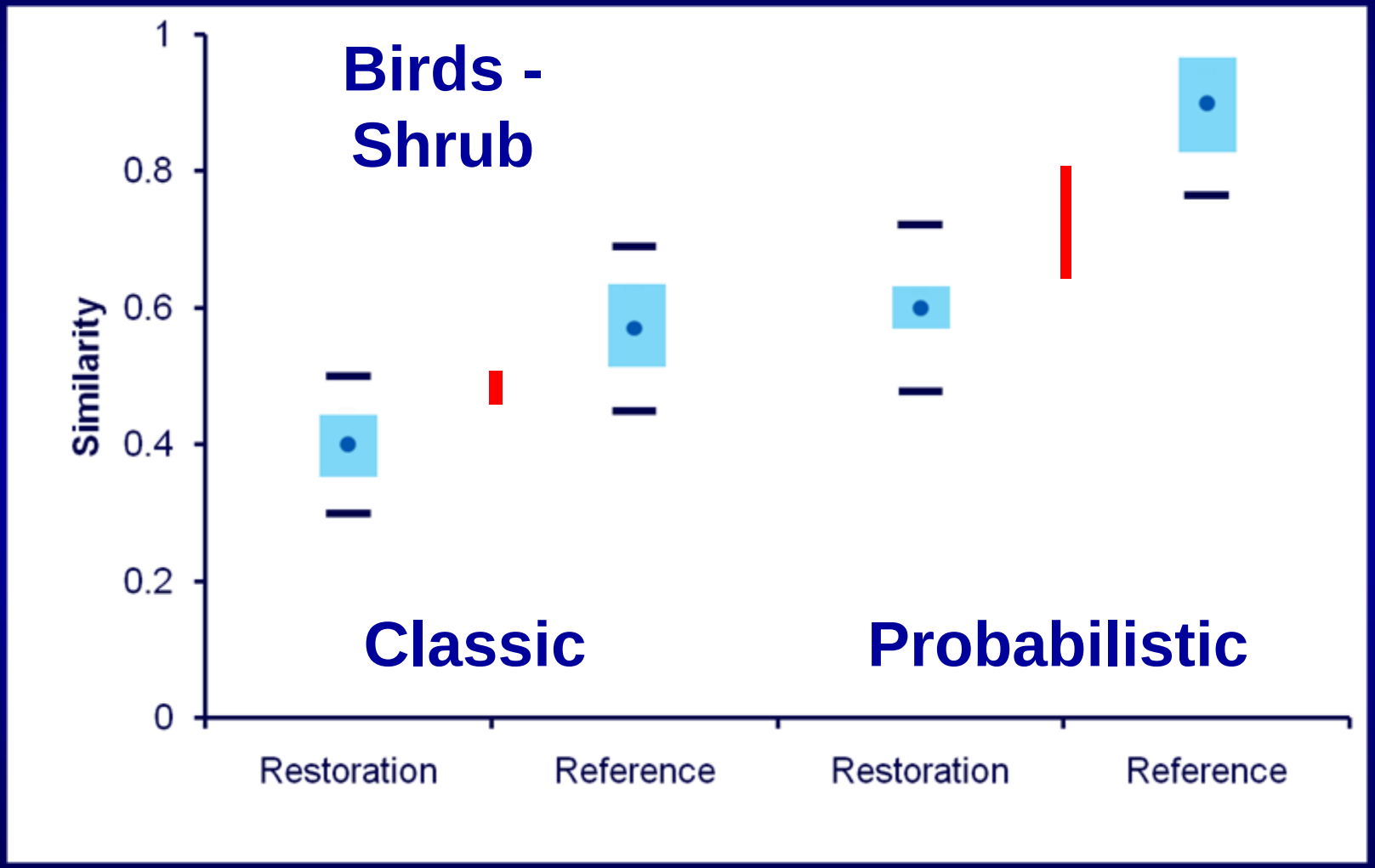


Effect may not be detected for classic with many species

Comparisons of restoration and reference vary with the similarity measure used and habitat



Effect may not be detected for classic with many species

Several sampling issues are being addressed because of the increase in spatial scale

New reference habitats:

- Shrub-steppe
- Grassland steppe
- Dry pine forests
- Mixed conifer

Selection of sites to be monitored

Several sampling issues are being addressed

Time frame for sampling

Active or passive management

Reference requires estimates of annual variation (every year or every other year)

Final monitoring program will have to be adapted to fiscal and time constraints

Approach:

- Complete selection of reference sites and conduct sampling (3-year period) to determine annual variation
- Determine a sampling scheme that is logistically and fiscally feasible.
- Develop web-based data entry system

UWMEP benefits

Consistent monitoring on a regional scale; protocols & personnel remain the same

Data and analytical tools shared across Tribes including web-based data access

A regional database will improve our abilities to evaluate different restoration activities. We can learn from both success and failure.

UWMEP benefits

University involvement:

- Additional research opportunities
- Increased dissemination of results
- Laboratory and library facilities, and GIS and statistical tools
- Cost-sharing reduces costs
- Student involvement and training