Monitoring for change in wildlife and plant communities

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This discussion considers monitoring approaches for community change resulting from habitat management

?

Summary of the problems involved in assessing change

The Kalispel example

Adaptive monitoring

Monitoring for community change presents several problems to overcome

A reference or baseline condition must be determined

?

Sampling is unlikely to reveal all species in a habitat

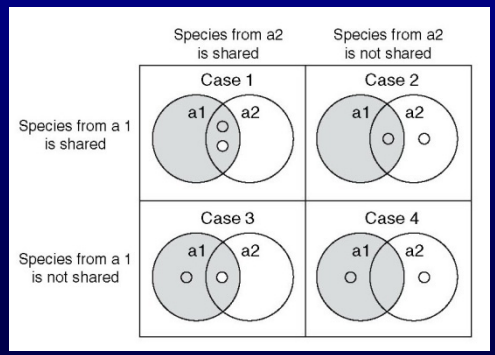
Annual variation must be incorporated

The Kalispel objective: evaluate wildlife response to habitat restoration efforts resulting from mitigation of wetland losses after dam creation

This section examines use of similarity measures to evaluate effects of habitat restoration activities

Mediation of habitat loss due to dam construction

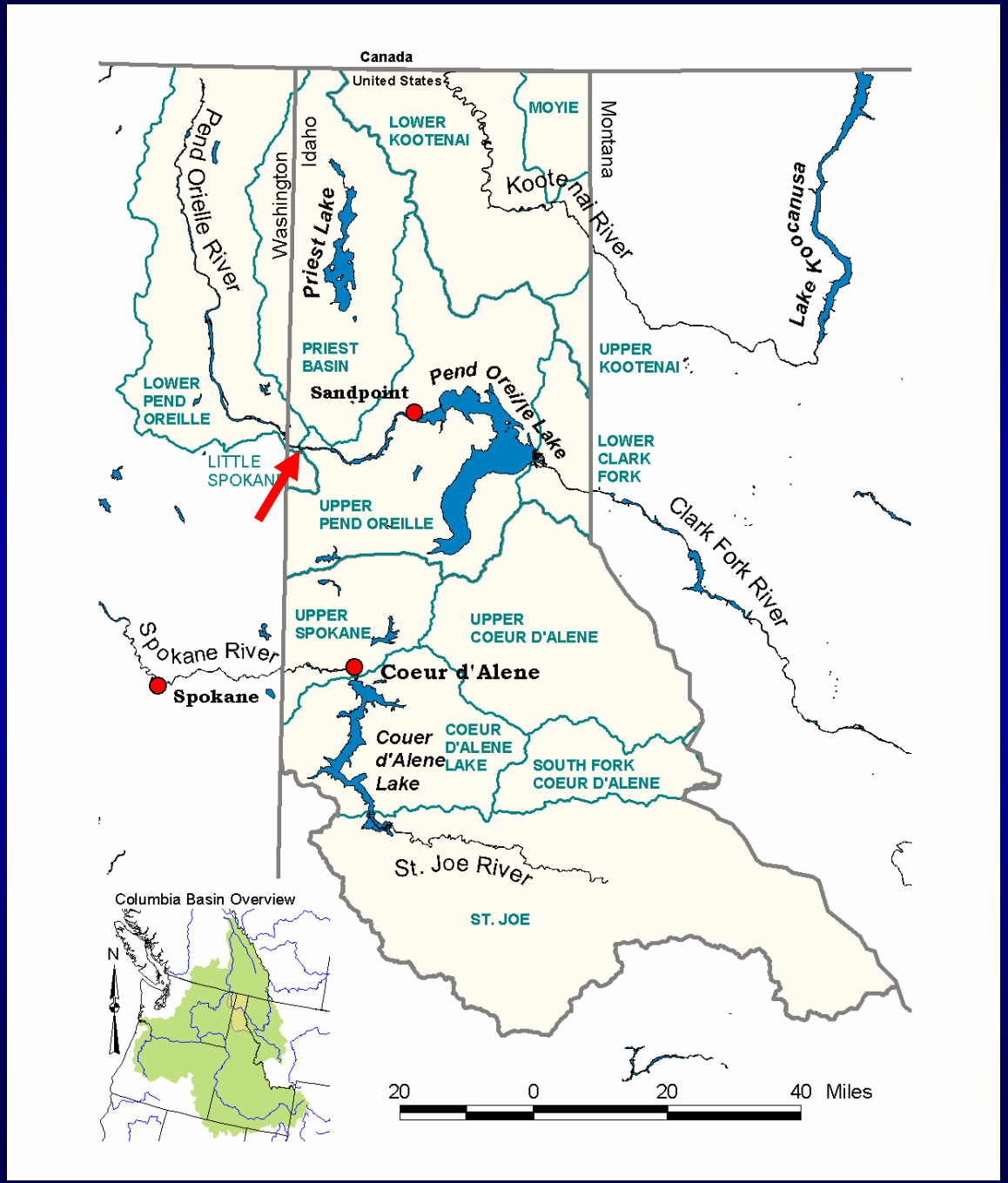
Monitoring of wildlife response to habitat restoration



Analysis of species similarity

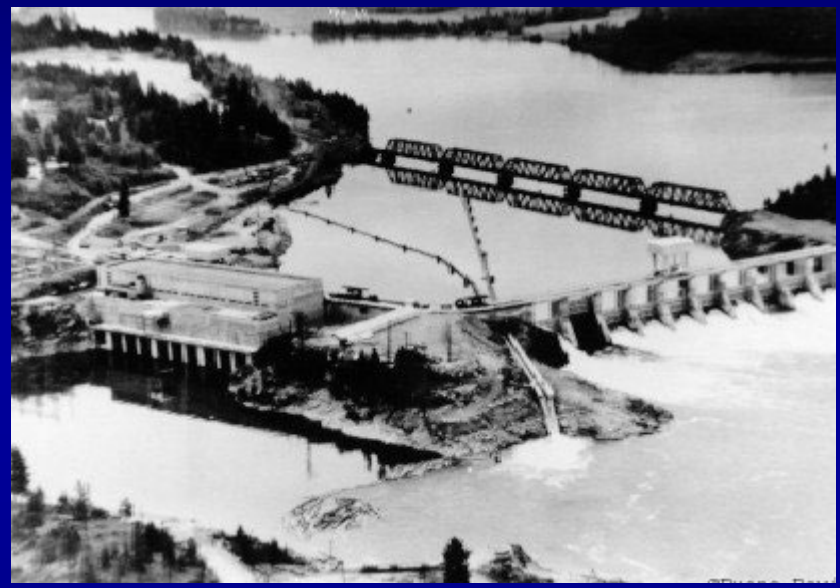
Albeni Falls Dam

1955



Creation of Albeni Falls dam in Idaho converted 6617 acres of wetlands to open water

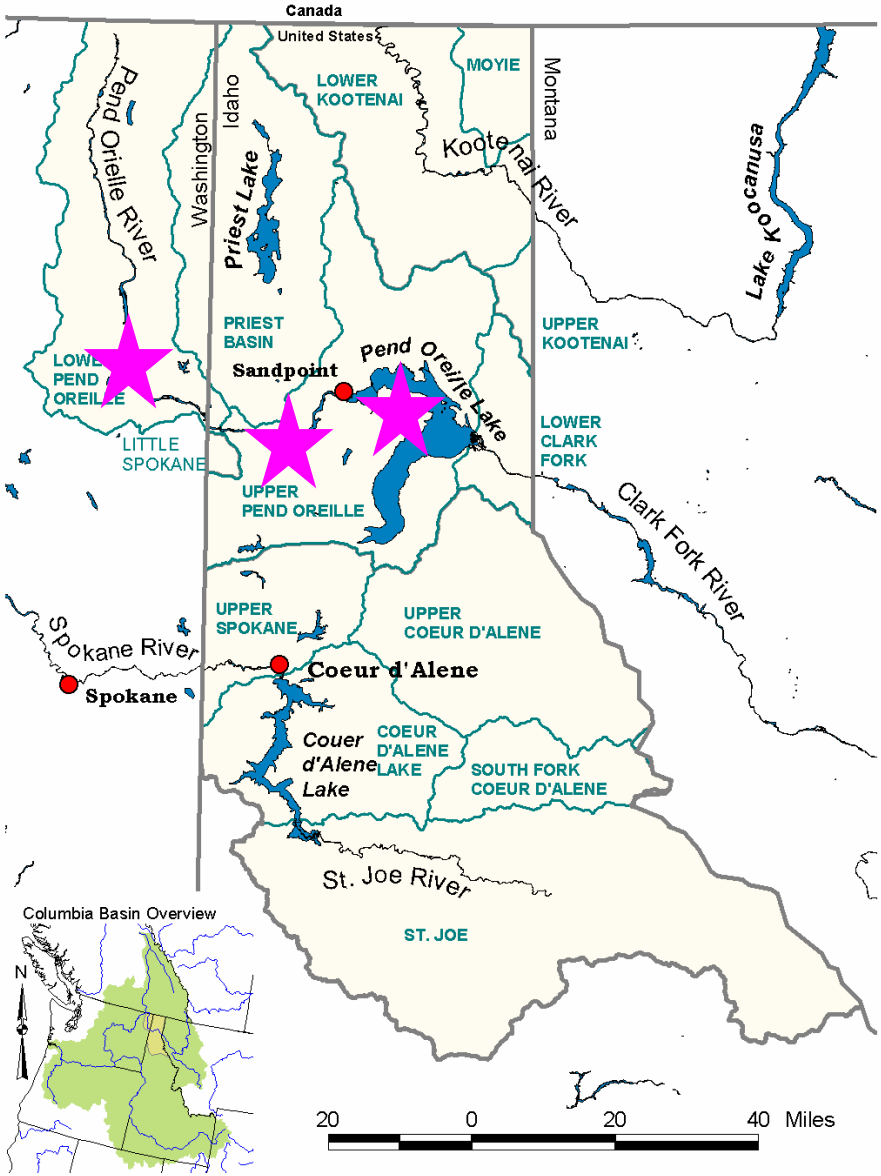
Before



After

Wetlands were lost from Morton Slough, Idaho

Mitigation properties of the Kalispel Tribe of Indians



3096 acres have been purchased for mitigation

1997

Flying Goose Ranch

Water level management

2002

3400+ acres have been purchased for mitigation

Exclude grazing

Control weeds

Restore native vegetation

Site selection for sampling

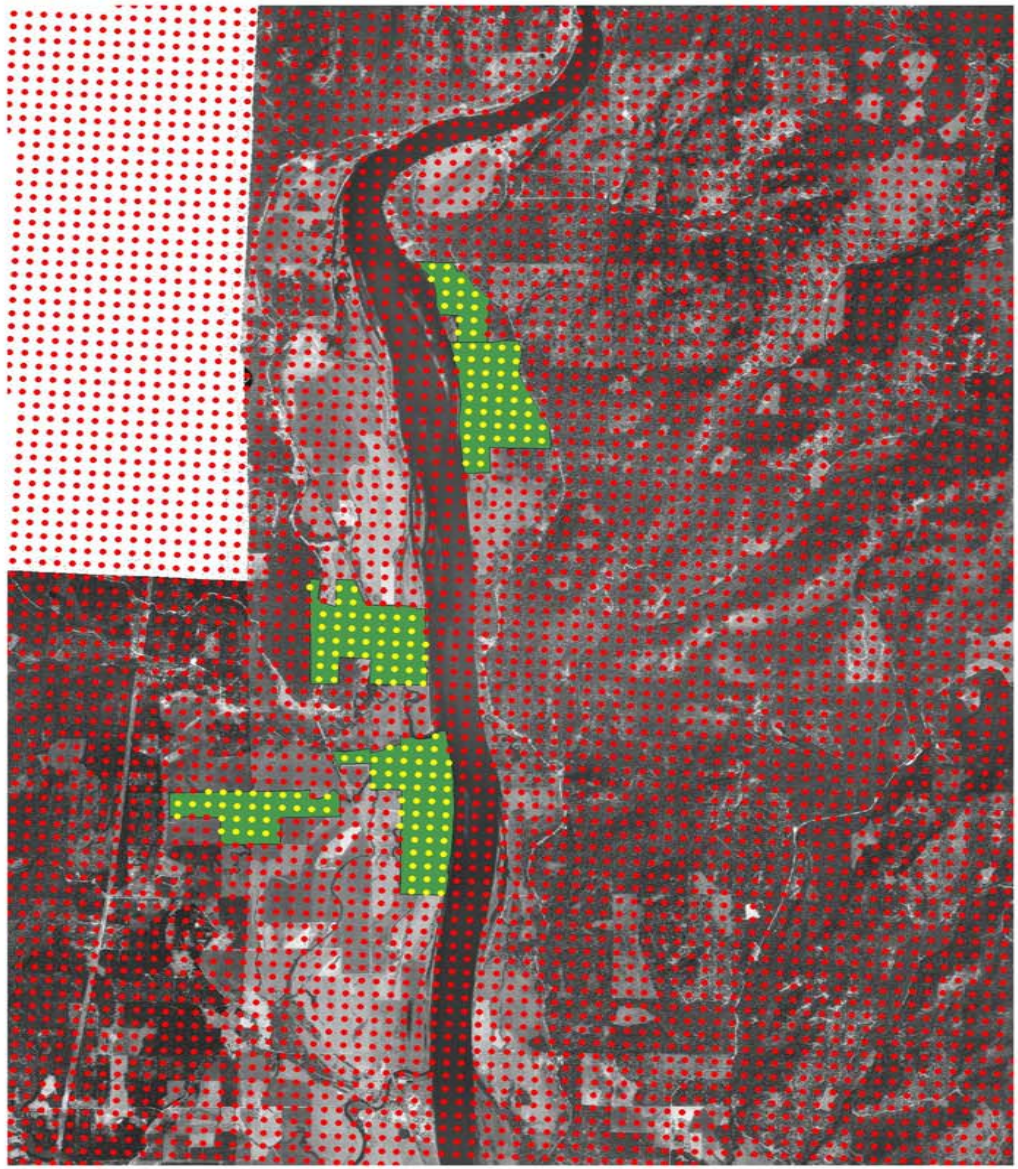
200 Meter Grid - centroids placed at 200 m interval across Kalispel ceded land.

Selected centroids that fall within project property boundaries.

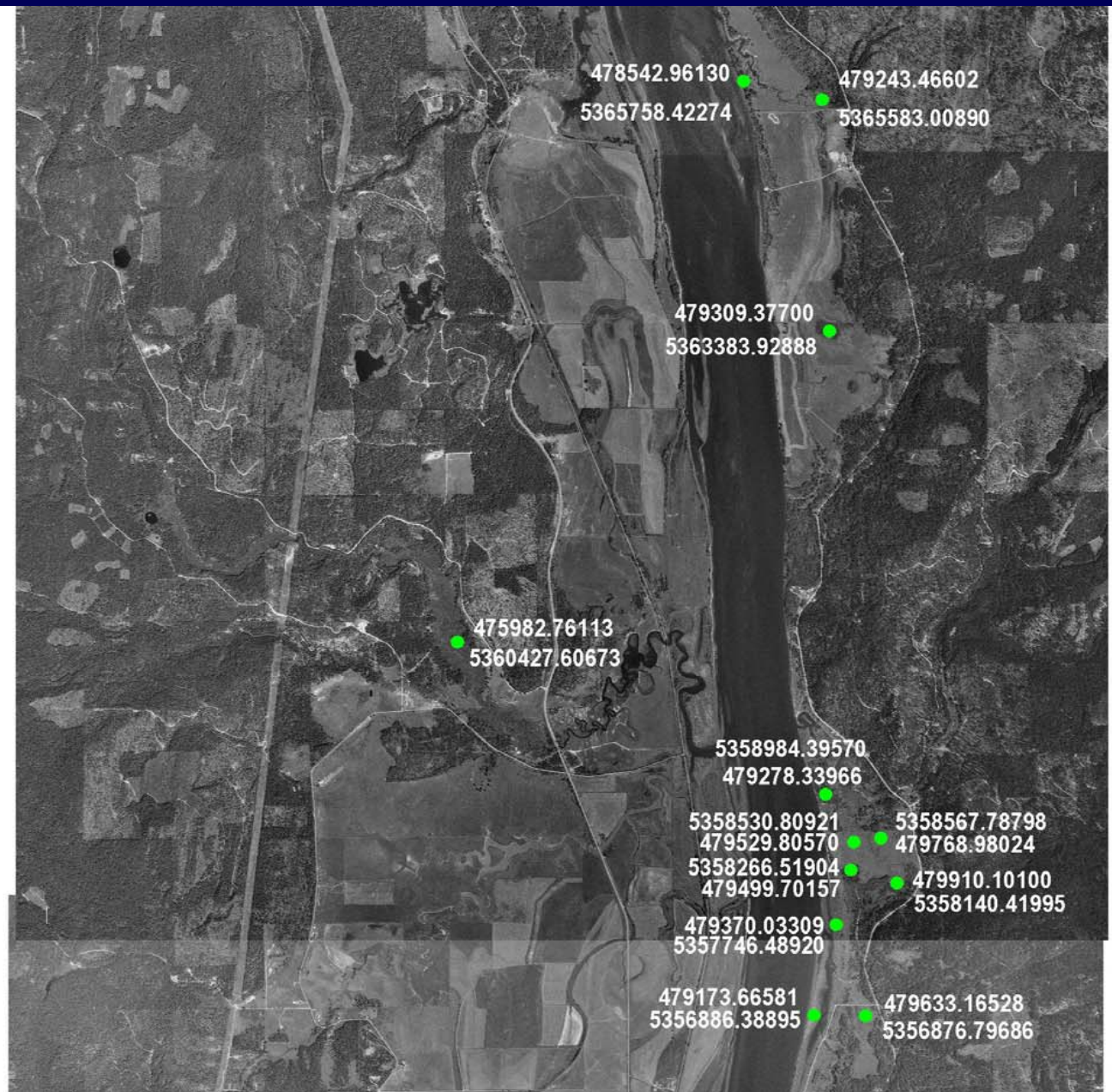
Applied 10% radom selection from those 186 centroids to compile the first 19 permanent sample points.

Of which, 7 will have data collected on for 2002.

As new porperties come on line, additional sites will be selected for future monitoring.



Reference site selection



Twelve reference sites provide a baseline for comparison with restoration targets

Scrub-shrub

Floodplain grassland

Permanent site selection

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

Restoration sites once every 3 years

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

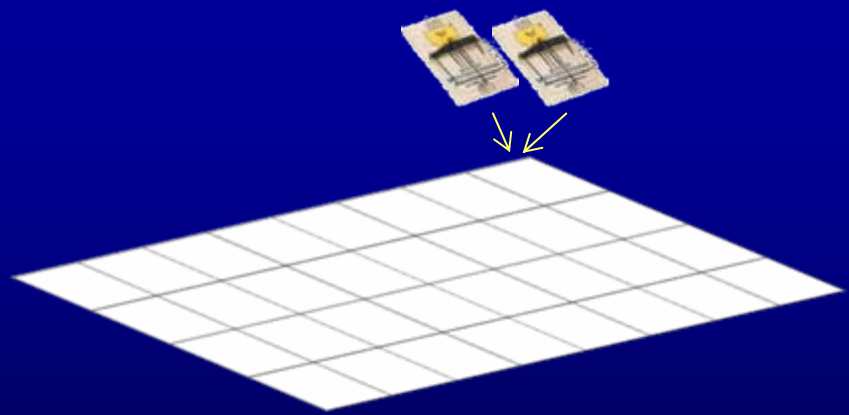
Birds

Costs prevent exhaustive monitoring

Small-mammal monitoring

Removal trapping

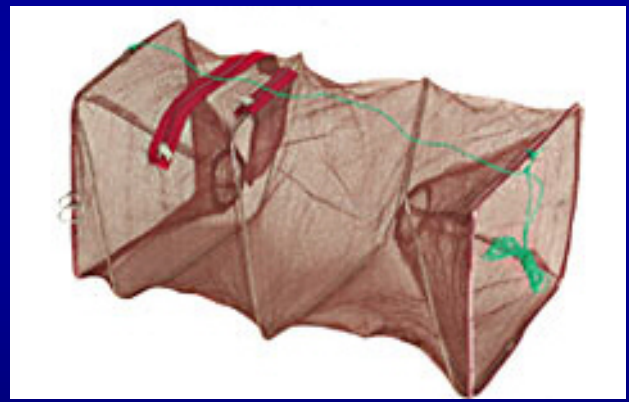
- **5 × 9 grid (12-m spacing)**
- **2 traps per station**
- **3 nights per site**
- **June – August**



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**

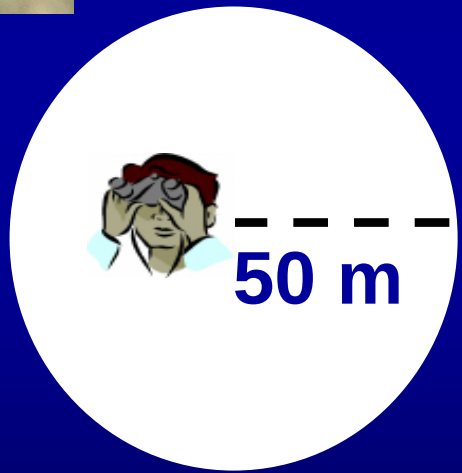


Bird monitoring

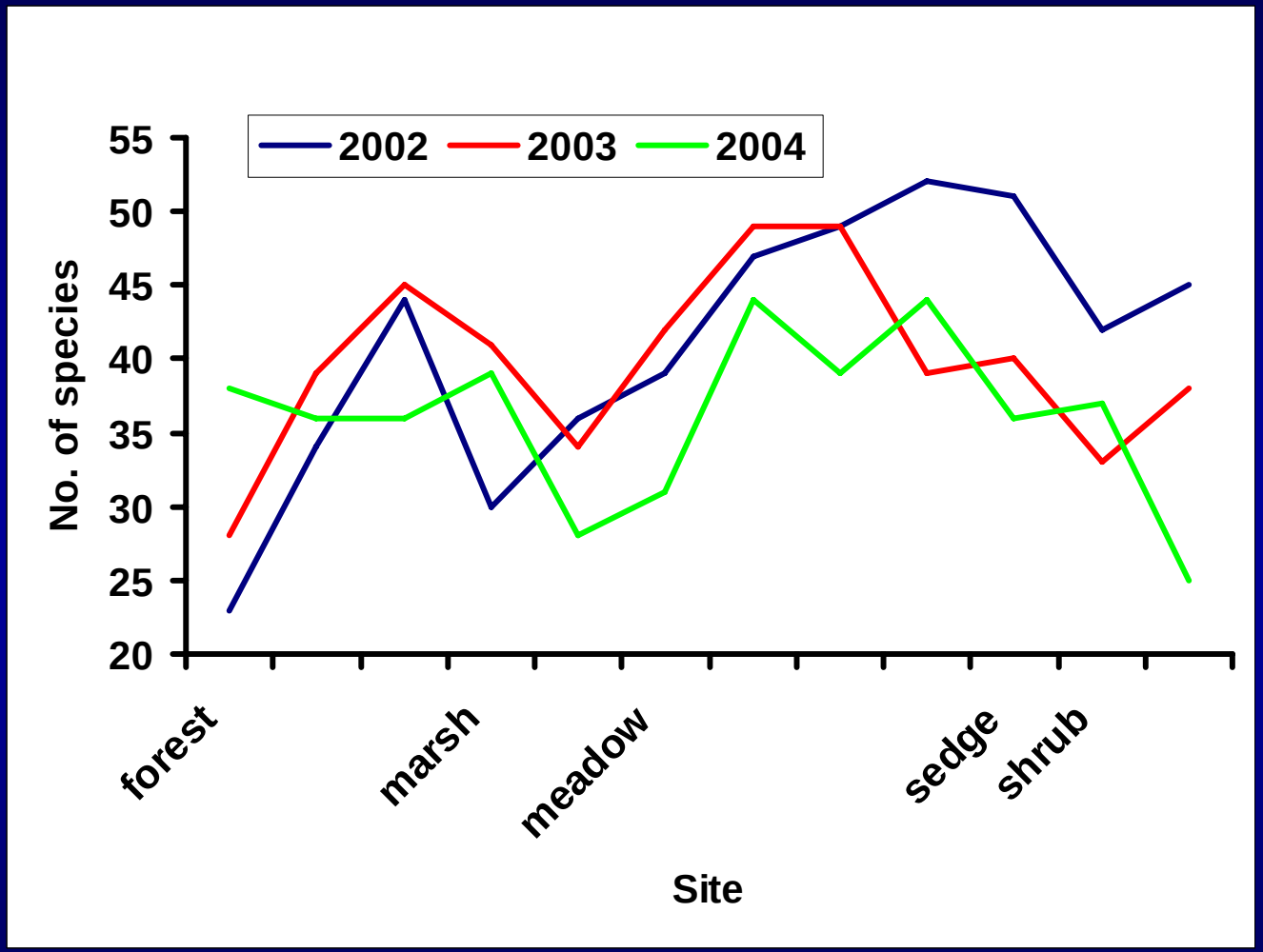
10 minute point-count bird surveys

Breeding season - May to June

7 entries per site

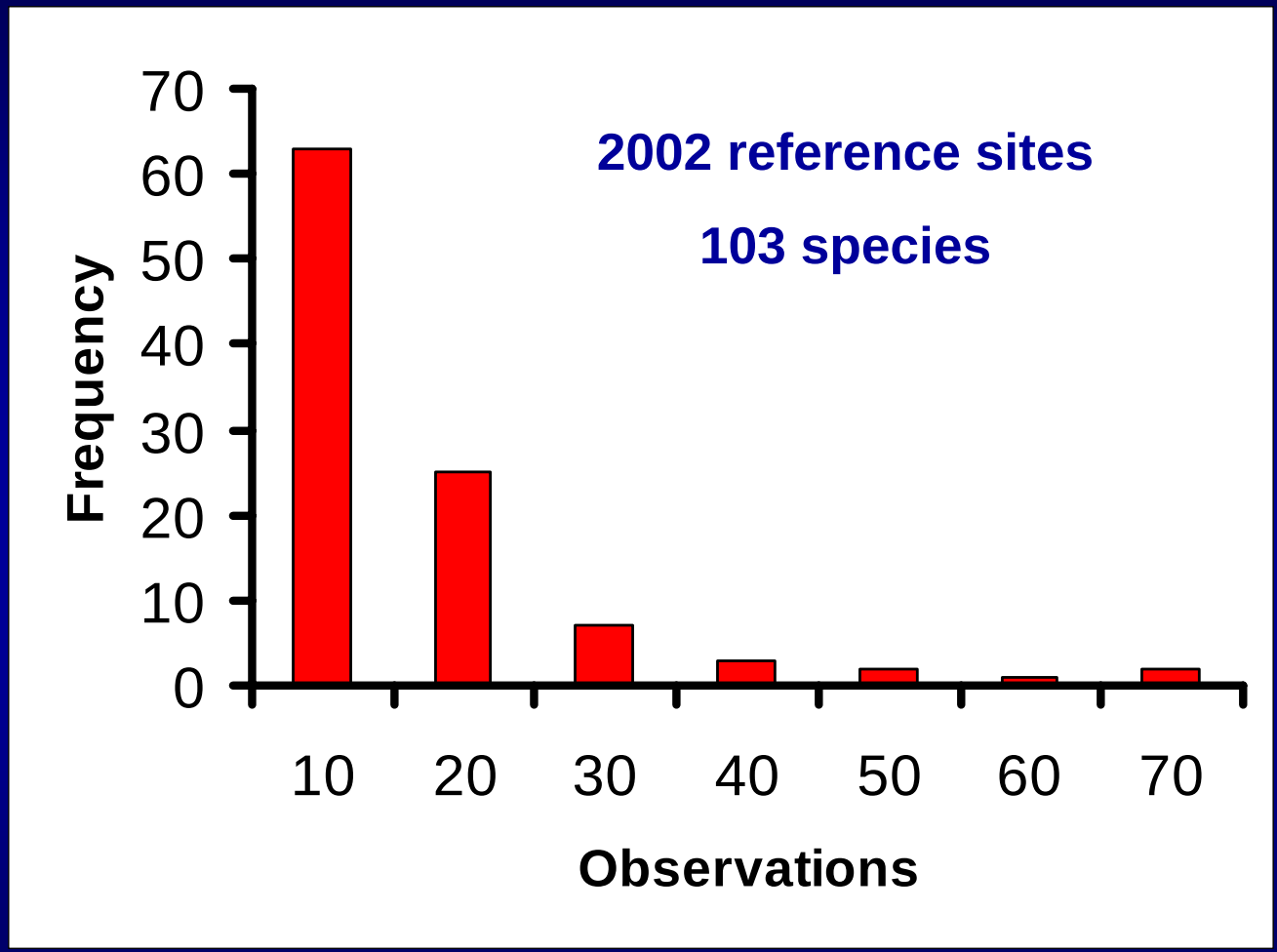


Species detection of birds varies between years



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

Number of detections varies across species



A few species are observed frequently

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

Classic Jaccard

A – Species shared in 2 sites

B – Species unique to site 1

C – Species unique to site 2

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

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

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

Probabilistic Jaccard (Chao)

Incorporate relative abundance

↓

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.

The similarity between years for reference sites is lower for classic versus probabilistic Jaccard

	Interyear Mean	SD
Classic	0.53	0.05
Probabilistic	0.84	0.06

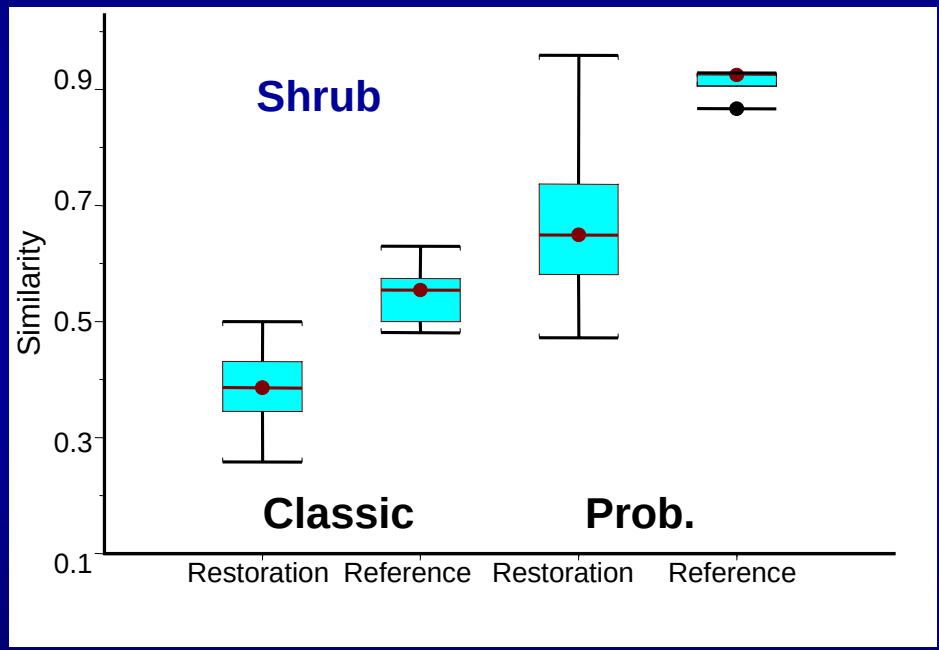
No correlations between classic and probabilistic estimators

In summary, probabilistic similarity measures avoid the underestimation of incidence based measures

Limited monitoring requires tools that can account for unseen species

Incidence measures underestimate similarity

Probabilistic measures have potential to detect significant changes in composition



Adaptive monitoring is necessary because of critical constraints

Funds for monitoring affecting personnel available for sampling

Length of field season relative to size of land base and logistics of travel

Restoration or priority habitats are considered first for monitoring

Spokane Tribe WMA lands of 4701 acres in 6 tracts

Suppose that shrub steppe is priority 1 and grassland steppe is priority 2

Conifer woodland	1439
Conifer forest	1093
Riparian (all)	213
Deciduous tree/shrub	58
Scrub shrub	64
Ag land	772
Grassland steppe	854
Shrub steppe	125

Site selection for sampling
Several sampling issues to be addressed

- Selection of reference sites
- Vegetation variables for “new” habitat cover types
- Vertebrate taxa selection
- Selection of permanent areas to be monitored

Several sampling issues to be addressed

Time frame for sampling

Active or passive management

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

Target sampling depends on probable rates of change. Grassland steppe may change rapidly with active management, whereas shrub steppe may change over longer time intervals

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