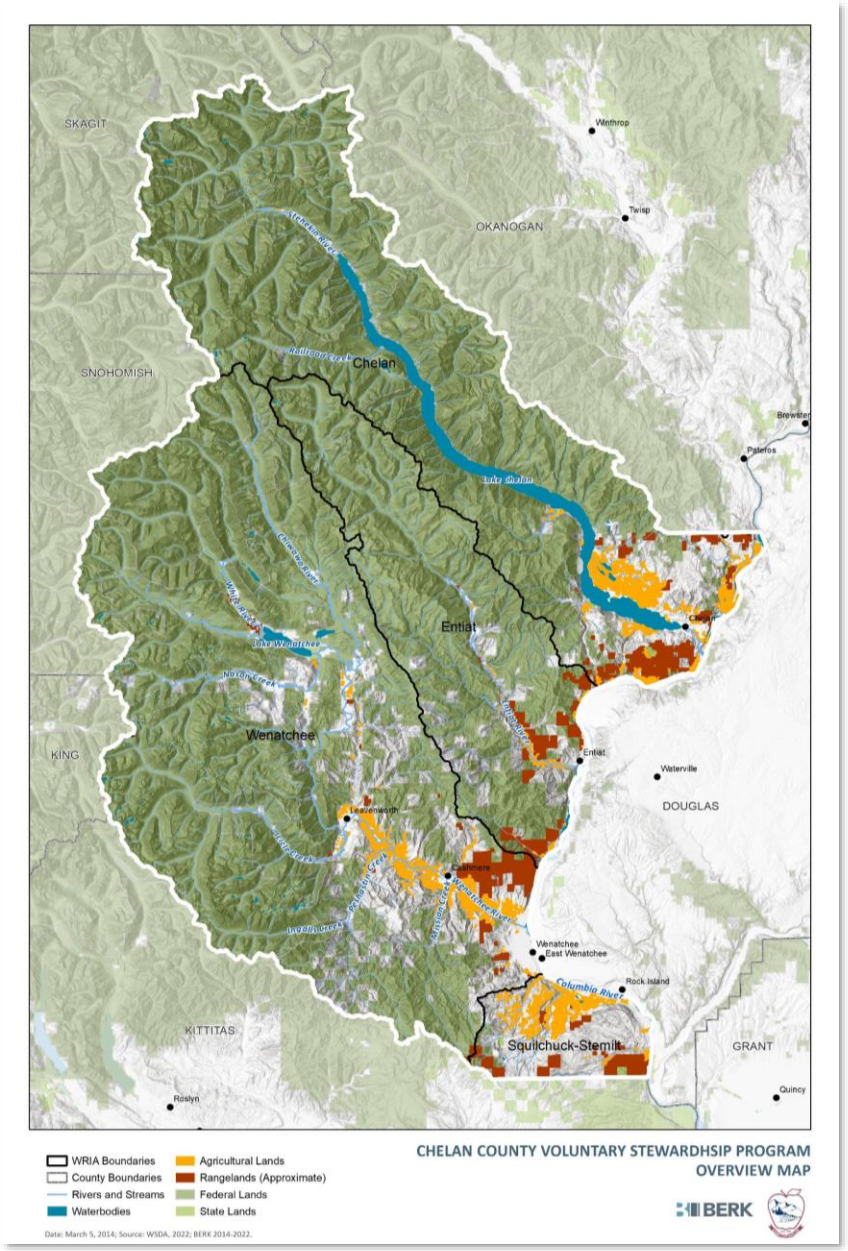
Chelan VSP Work Group

April 4, 2024

BERK, CORE GIS, Confluence

Topics

- Monitoring Plan Components
- Shrub-Steppe Goal/Benchmark
  - Work Group Review Benchmark
  - RAP Spatial Results
- Riparian & Wetland Remote Sensing
  - Monitoring Questions
  - Spatial Results
- Field Prioritization
- Other Benchmarks & Monitoring Questions



Monitoring Plan

- A Quality Assurance Project Plan is intended to ensure that projects which collect or analyze environmental data develop plans for field, laboratory, and analytical activities that meet quality standards appropriate to the goals and scope of the project.
  - **Spatial QAPP:** Guides the use of remote sensing and other spatial data evaluation. Can help direct field QAPP.
  - **Field QAPP:** Guides collection of field data.
  - **Monitoring Plan:** Will include critical area monitoring questions and methods and will attach the QAPPs.

Shrub Steppe Definition

State Definition

- Shrub steppe is considered a type of priority habitat.
- Priority habitats and species are part of the fish and wildlife habitat conservation areas protected under GMA /VSP.

https://app.leg.wa.gov/WAC/default.aspx?cite=365-190-130.

"**A non-forested vegetation type consisting of one or more layers of perennial bunchgrasses and a conspicuous but discontinuous layer of shrubs**. …Another important component is habitat quality …which may be influenced by soil condition and erosion; and the distribution, coverage, and vigor of native shrubs, forbs, and grasses. **At some more disturbed sites, non-natives such as cheatgrass or crested wheatgrass may be co-dominant species. Fire disturbance is an ecological component of shrubsteppe**. Shrubsteppe disturbed by fire may lack …vegetative components during periods of post-fire recovery."

Remote Sensing Data:

- WDFW Priority Habitats and Species (PHS)
- USDA Rangeland Analysis Platform (RAP)
- Washington Shrubsteppe Restoration and Resiliency Initiative (WSRRI)

Shrub Steppe Rangeland Intersect (PHS 2022)

Much of the Rangeland Intersects Shrub Steppe Habitat

County		Chelan	Entiat	Squilchuck/ Stemilt	Wenatchee
Rangeland Acres	Habitat Intersect	Shrub-steppe	Shrub-steppe	Shrub-steppe	Shrub-steppe
44,590	29, 367	9,572.8	6,856.8	4,432.8	8,504.0

Cropland /Shrub steppe Intersect (PHS 2022)

- **The acres of intersect in cropland is small**, and primarily with open space forms of agriculture, such as conservation reserve program (CRP), wildlife feed, or fallow land.
- **The amount of intersect has increased in 2022**, which means that some small conversion of shrub steppe has occurred to crop types.
  - The amount of cropland intersect in 2022 is 1.5% but was about 0.6% in 2011.
  - Removing CRP, Fallow, Wildlife Feed, the percent is 0.6% in 2022, growing from0.3% in 2011.

WRIA	Basin Habitat Intersect	Year	Acres	Percent	CRP, Fallow, Wildlife Feed	Net Acres	Percent
Chelan	9,573	2011	92.3	0.96%	80.4	11.9	0.12%
		2022	97.3	1.02%	44.1	53.2	0.56%
Entiat	6,857	2011	3.37	0.0%	0.7	2.67	0.0%
		2022	11.55	0.2%	4.7	6.85	0.1%
Squilchuck/Stemilt	4,433	2011	49.4	1.1%	9.9	39.5	0.9%
		2022	60.88	1.4%	9.8	51.08	1.2%
Wenatchee	8,504	2011	45.04	0.5%	16.9	28.14	0.3%
		2022	269.26	3.2%	207.8	61.46	0.7%
All	29,366	2011	190.11	0.6%	107.9	82.21	0.3%
		2022	438.95	1.5%	266.4	172.55	0.6%

Shrub Steppe Intersect/Change (RAP 2022)

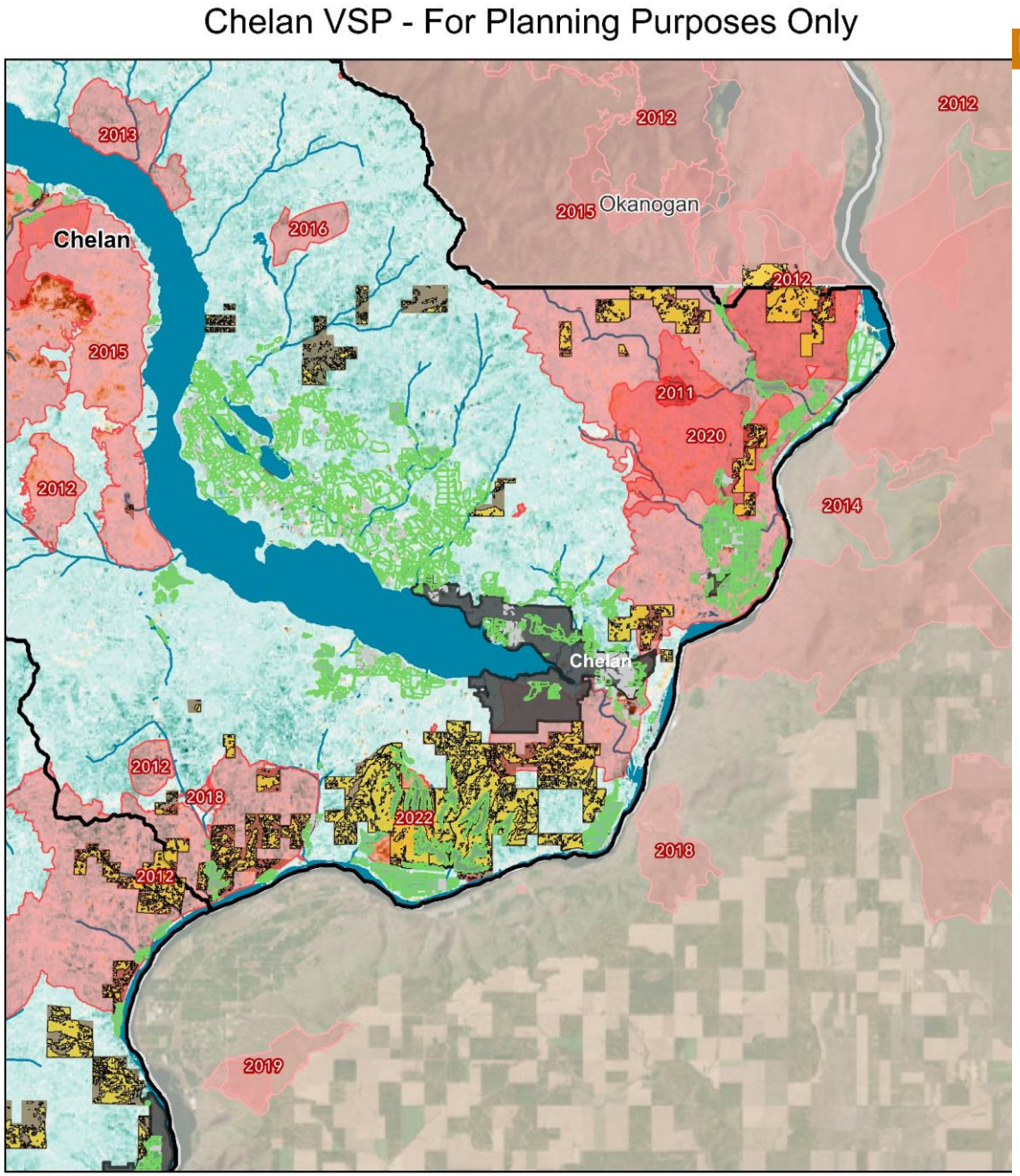
Bare Ground Change

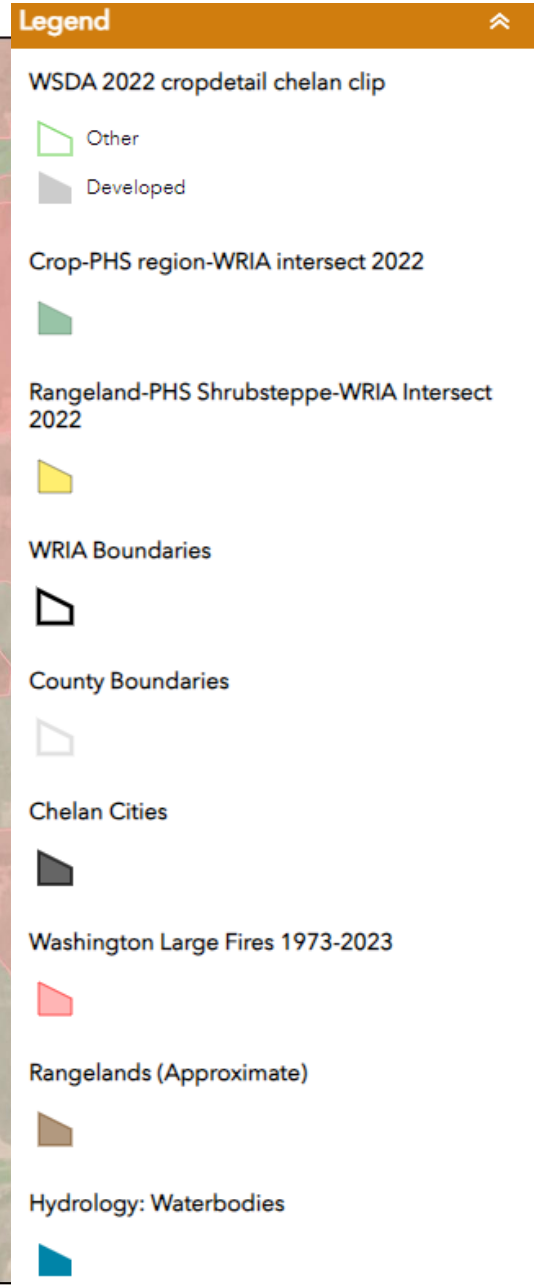
Some conversion in the period is likely explained by non-agricultural sources, e.g. fire

Bare Ground Summary - Excluding Developed Crop Type

	Acres of Intersect - All	2011 Acres	2019 Acres	2022 Acres	2011-2019 Change in Acres	2011-2019 Absolute Change (% Difference)	2011-2022 Change in Acres	2011-2022 Absolute Change (% Difference)
Chelan	22,984	605	709	824	103	0.5%	218	0.9%
Entiat	11,578	232	172	196	-61	-0.5%	-36	-0.3%
Squilchuck/Stemilt	14,433	271	190	247	-81	-0.6%	-24	-0.2%
Wenatchee	22,234	258	241	214	-17	-0.1%	-44	-0.2%

RAP Bare Ground & Fire





https://arcg.is/1j59nr

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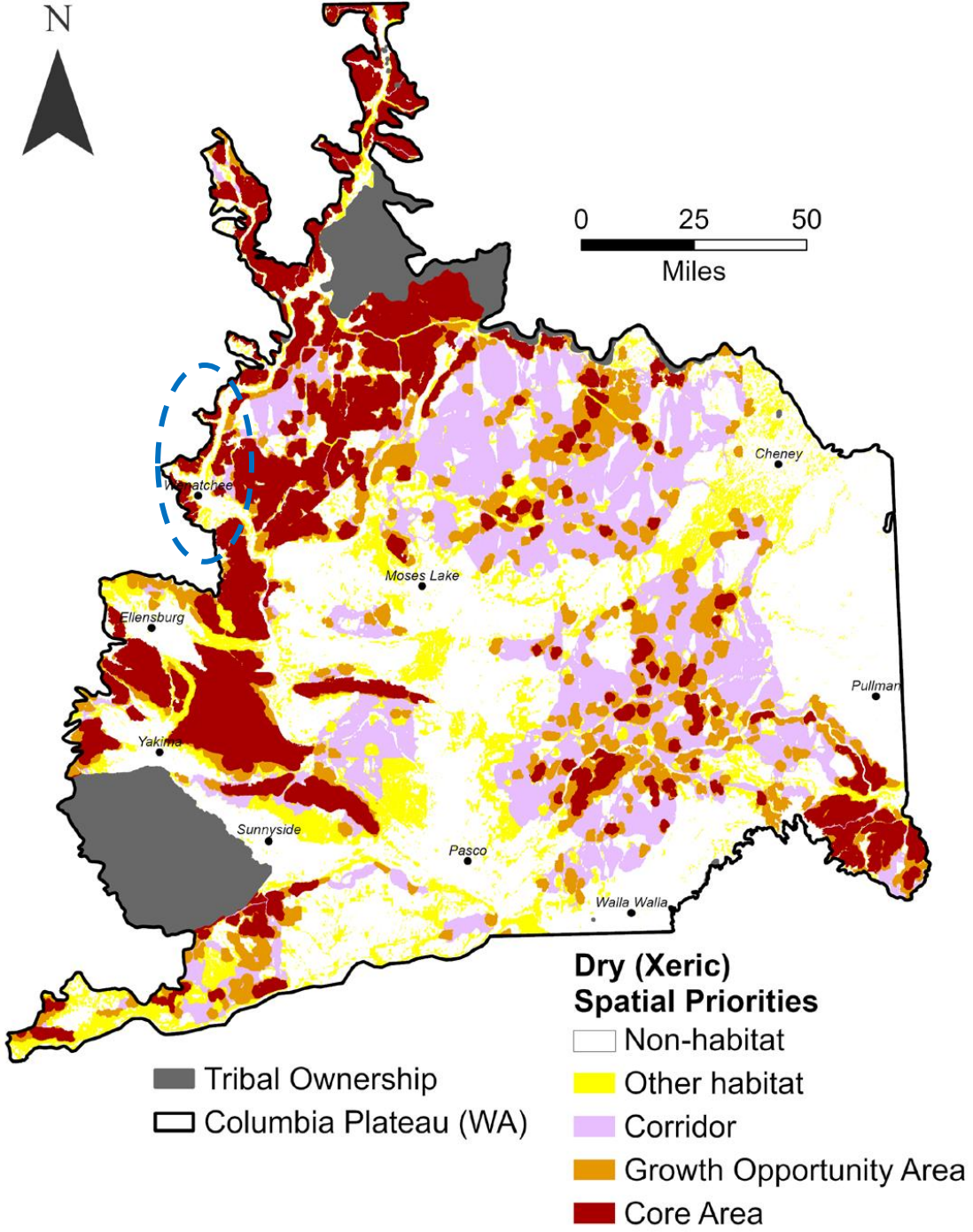
WSRRI

- Foundation is RAP, Modified
- Available in April 2024 from WDFW
- Identifies Priorities



Shrub Steppe Goal and Benchmark

Work Plan Edits For Work Group Consideration

Benchmark	Performance Metric	Monitoring Method	Adaptive Management Threshold
Benchmark-D. In areas of critical area intersect with agricultural activities, and at the watershed level: Extent and quality of shrub-steppe habitat. ~~Miles of fencing and its proper management for wildlife exclusion is maintained or improved.~~ ~~• Avoid animal "hang ups" such as with plastic fencing; protect young trees/crops during establishment.~~	~~P-8 Percent in miles of exclusion fencing with material that avoids animal hang-ups in areas of intersect.~~ ~~P9 Percent in length or area of alternative wildlife management measures that protect trees/crops and protect wildlife in areas of intersect.~~ P-8 Performance Metric (Implementation): WSRRI Strategies, including but not limited to: reduced invasives and fire danger, habitat restoration especially in important corridors, deferred grazing, and wildlife friendly fence opportunities. P-9 Performance Metric (Resource Measurement): Area of shrub-steppe protected (annual/seasonal review of area and native cover compared to baseline).	M-9 Preferred: Remote sensing imagery interpretation of area and native shrub-steppe cover. ~~Sample areas using aerial photography and conduct brief survey (mailed, phone, or online).~~ Alternative: Equivalent alternatives to imagery interpretation include: Technical Provider field visits, periodic watershed assessments by experts, or Conservation practice implementation (tracking tool). M-10 Reserved ~~Length or area of conservation practices that install or replace wildlife exclusion fencing or other management techniques in areas of intersect during monitoring period using tracking tool.~~	~~Miles of fencing or area of management practices is reduced more than 10% due to agricultural activities.~~ 5% net reduced priority habitat in areas of intersect due to agricultural activities.

Shrub Steppe Monitoring

MONITORING QUESTION

- Has there been a net loss of shrub-steppe (area and native cover) in the area of intersect?

METHODS:

- Watershed
- Remote sensing imagery interpretation of area and native shrub-steppe cover (RAP). Review grass, shrub, and bare ground. Could review conditions pre-2011 and forward.
- Washington Shrubsteppe Restoration and Resiliency Initiative (WSRRI | tool)
- **Question:** Possible to use the WDFW WSRRI to stratify the 'significance' of the protected areas?
- Implementation
- WSRRI Strategies, including but not limited to: reduced invasives and fire danger, habitat restoration especially in important corridors, deferred grazing, and wildlife friendly fence opportunities.
- Effectiveness
- Area of shrub-steppe protected (annual/ seasonal review of area and native cover).

Riparian & Wetland Critical Areas Remote Sensing

- Monitoring Questions
- Spatial Results
  - Wetland Intrinsic Potential (WIP) model preliminary outputs and next steps
    - Methods
    - Results
    - Error assessment/refinement
    - Determining probability thresholds
    - Potential applications for VSP
  - 2011 – 2021 NAIP-based riparian vegetation change detection preliminary results
    - Quick review of methods
    - Gain/loss results
    - Illustrative examples
    - Next steps

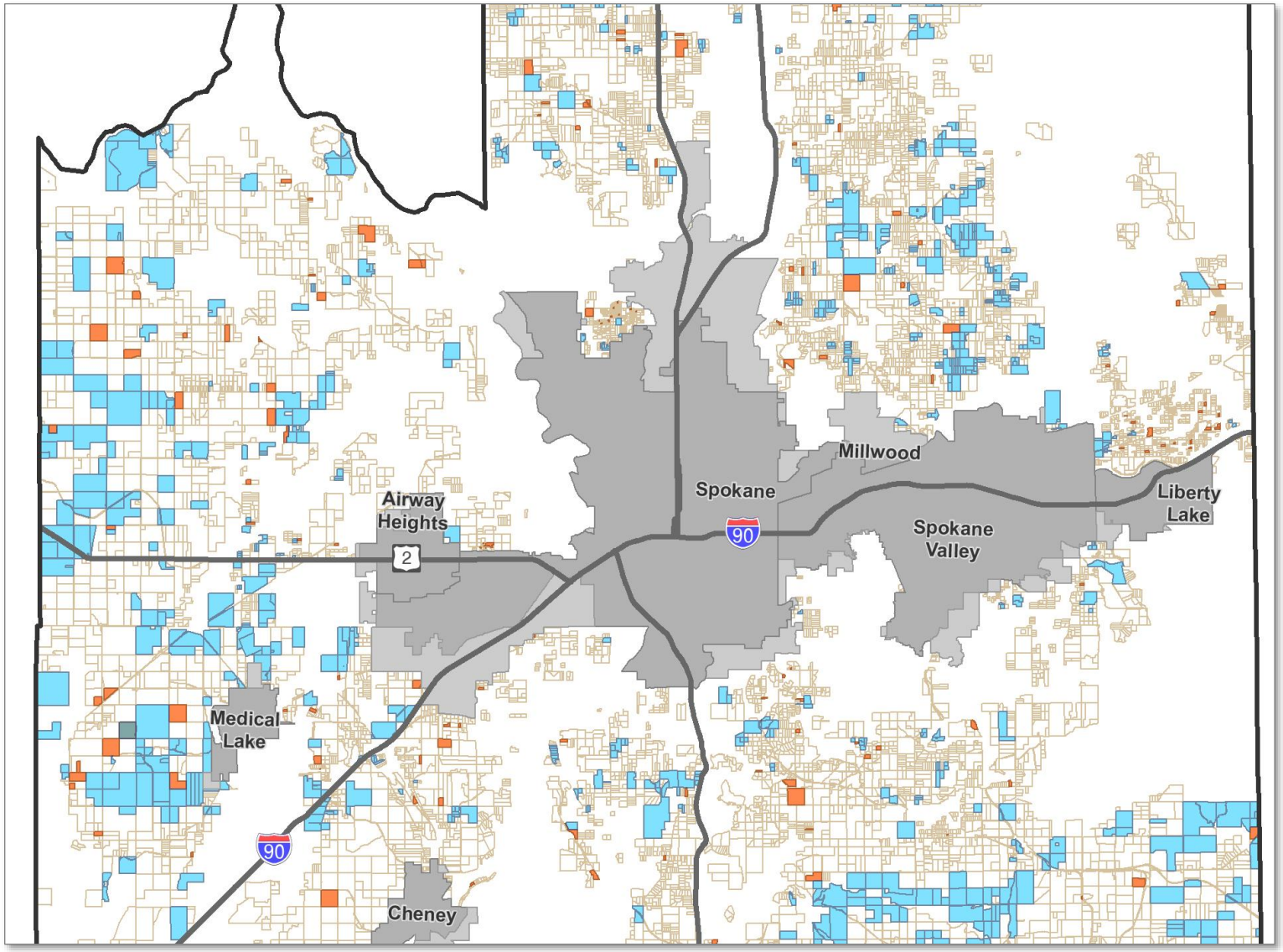
Identifying Random or Fixed Points for Field Review

- **Randomly distributed:** points are distributed within accessible areas every year and reviewed in the field to determine if remote sensing classification is accurate (e.g., riparian loss vs no change)
  - **Example:** randomly selected parcels for assessing omission error in Spokane County

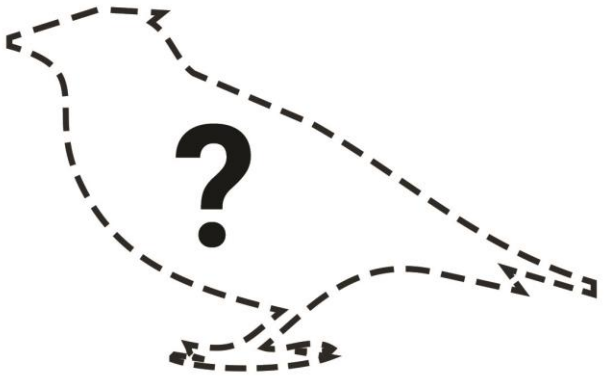
- **Fixed points:** points are distributed in a spatially balanced manner within accessible areas, do not change over time, and are visited at regular intervals. This method also allows for the use of unequal inclusion probabilities
  - **Example:** using GRTS to distribute survey locations for the Streaked Horned Lark in the Willamette Valley

Randomly Distributing Field Review Locations

- **Randomly distributed:** in this example from Spokane County, 100% of the parcels where vegetation losses or gains were detected were reviewed using NAIP imagery and other data (blue); and approximately 200 parcels in agricultural land use (per WSDA) that intersect wetlands/riparian areas were reviewed for omission error (orange). These parcels are randomly generated every time the riparian vegetation change analysis is conducted

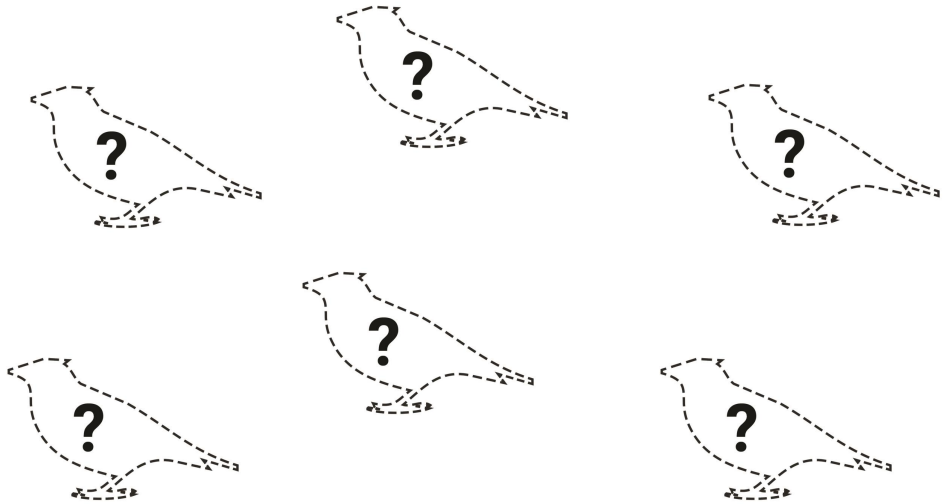


Using Fixed Points to Answer Two Important Questions:



Where are the larks?

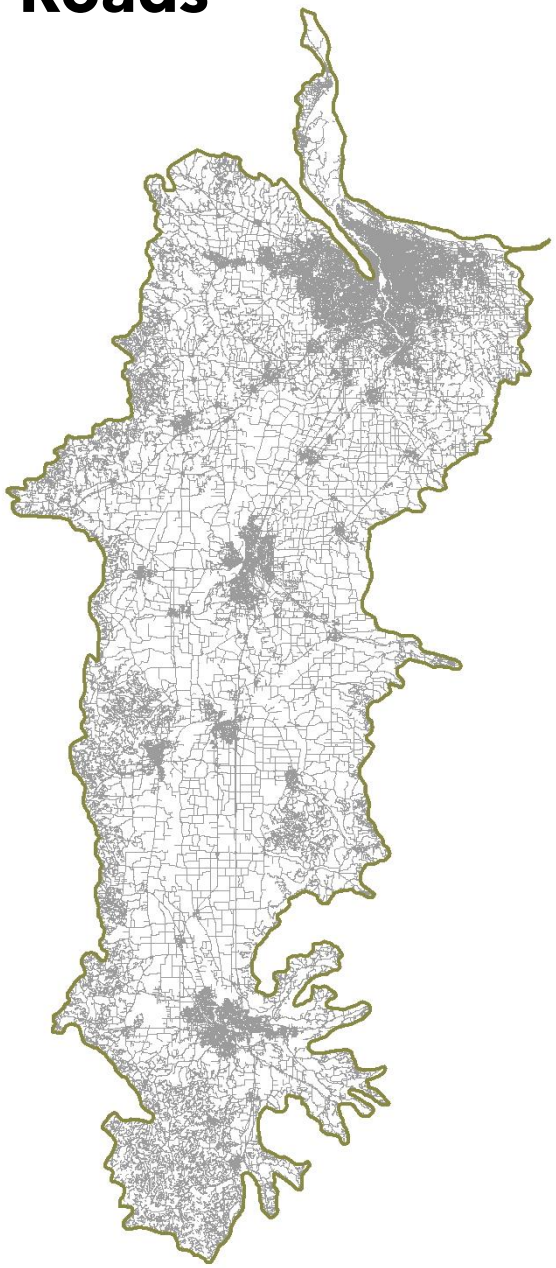
(Did change occur?)



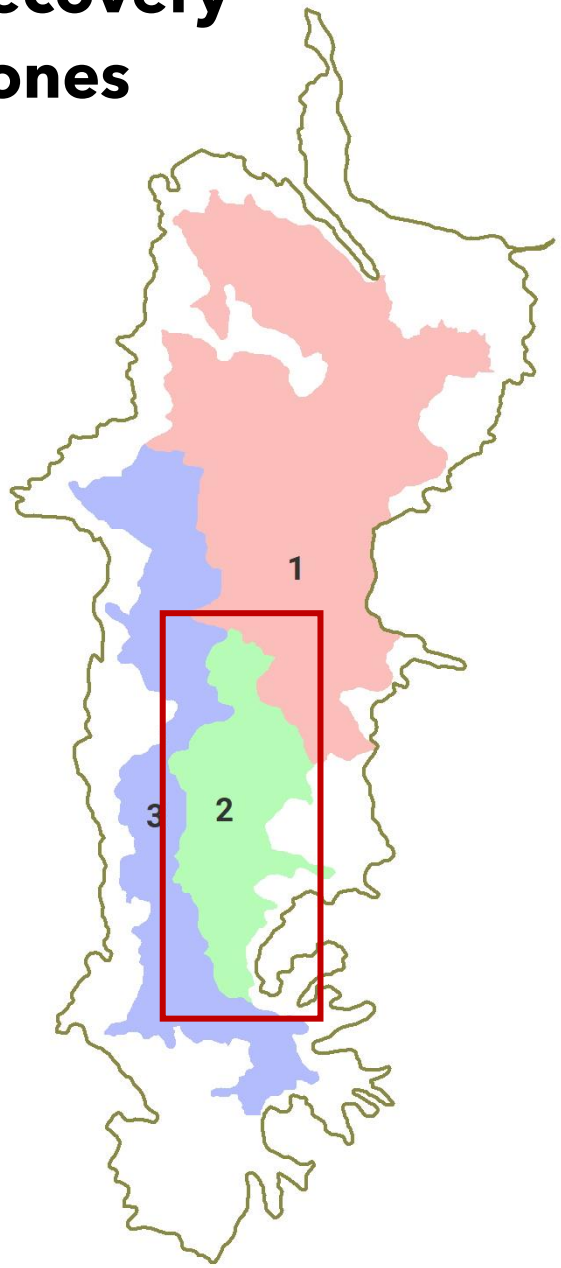
How many larks are there?

(How much change, of which type, and what caused it?)

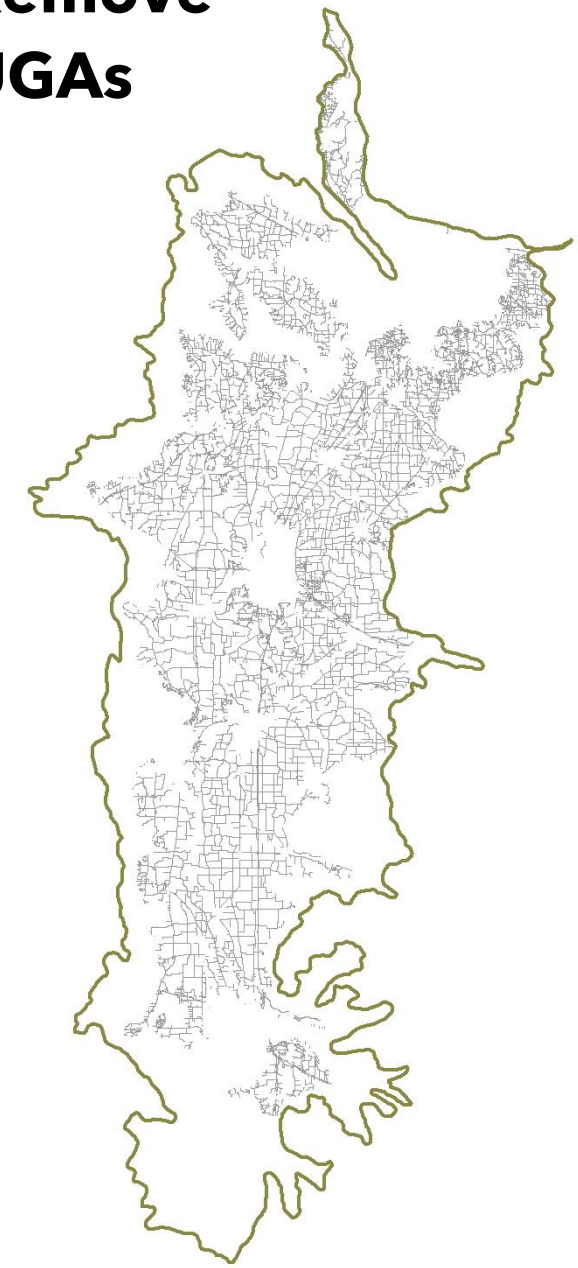
Roads



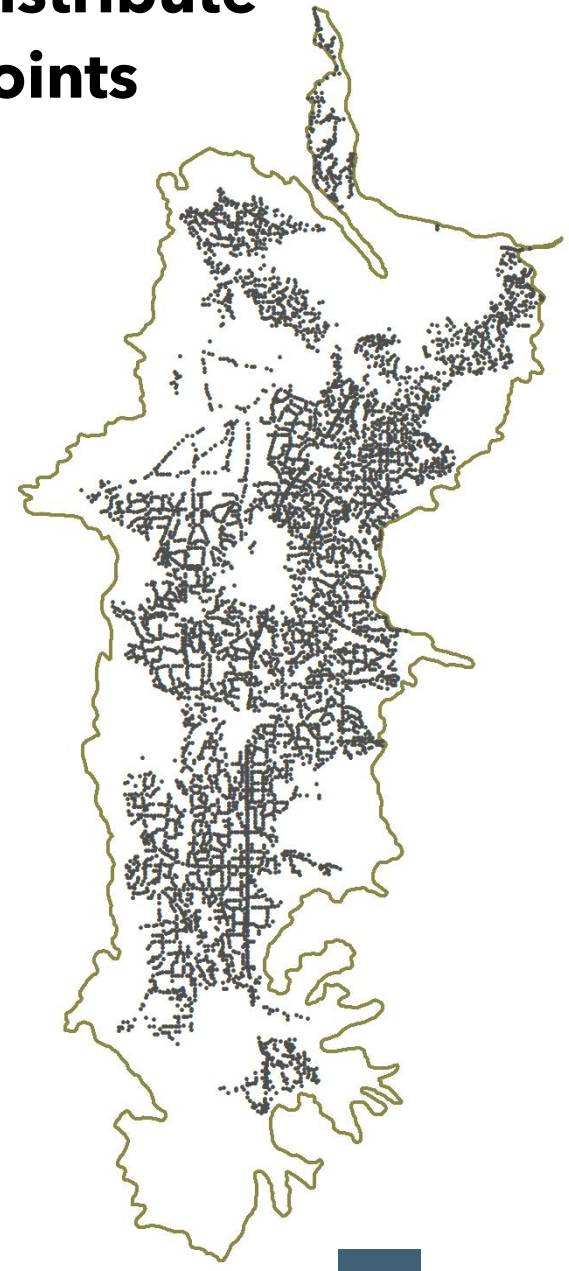
Recovery Zones



Remove UGAs

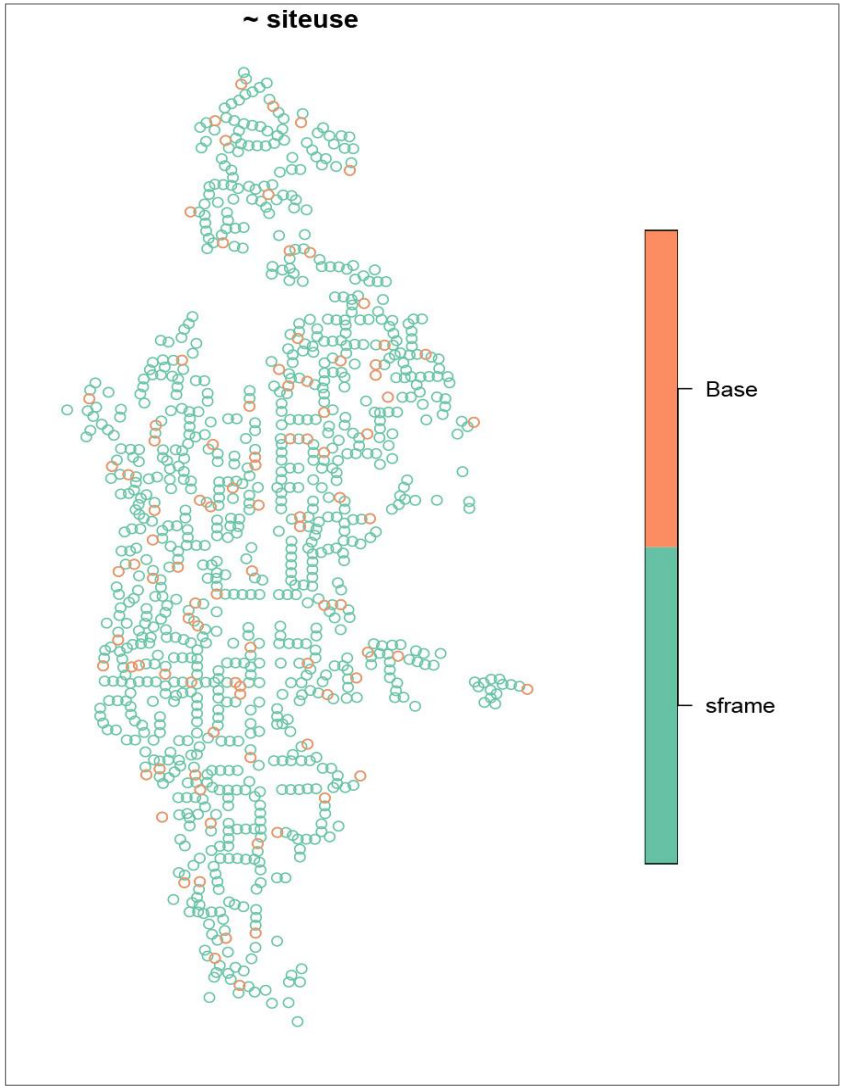


Distribute Points

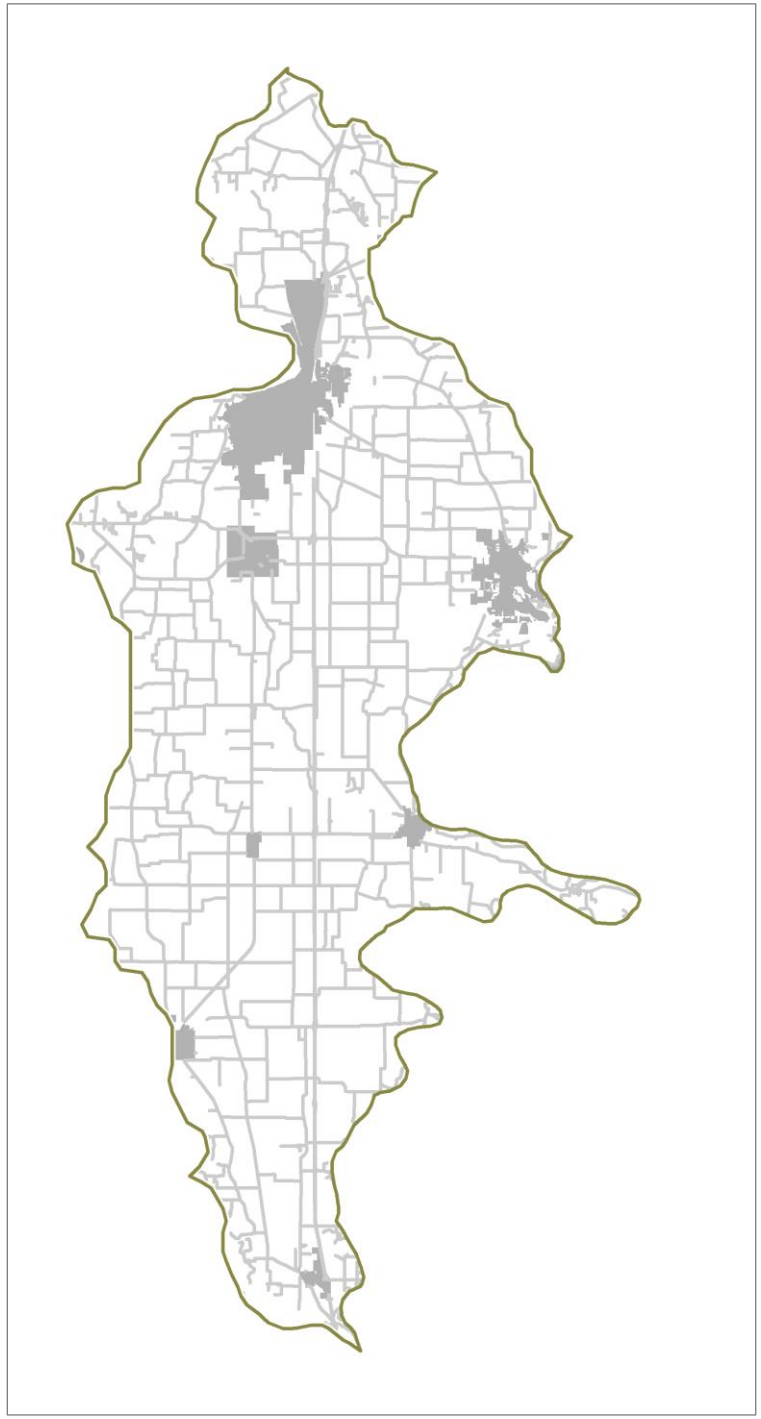


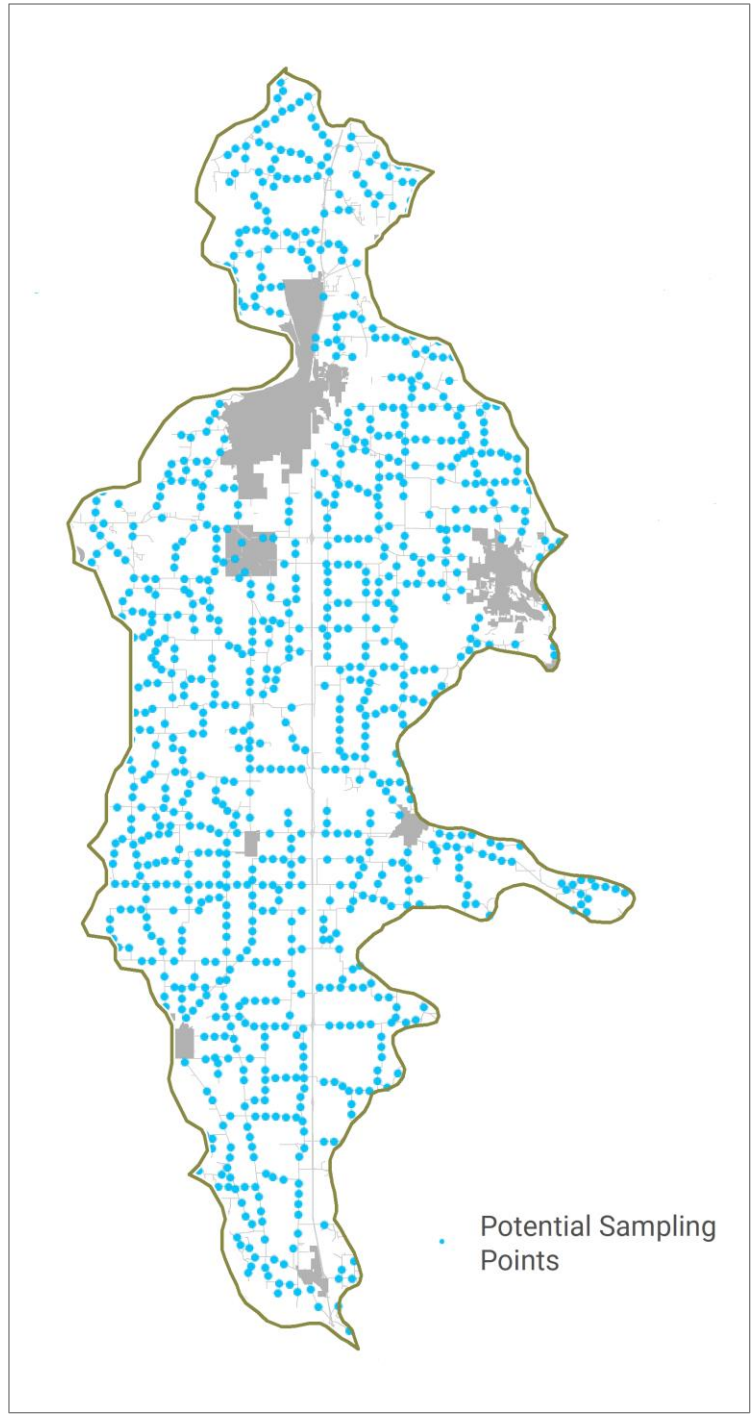
Creating a Spatially Balanced Sampling Frame

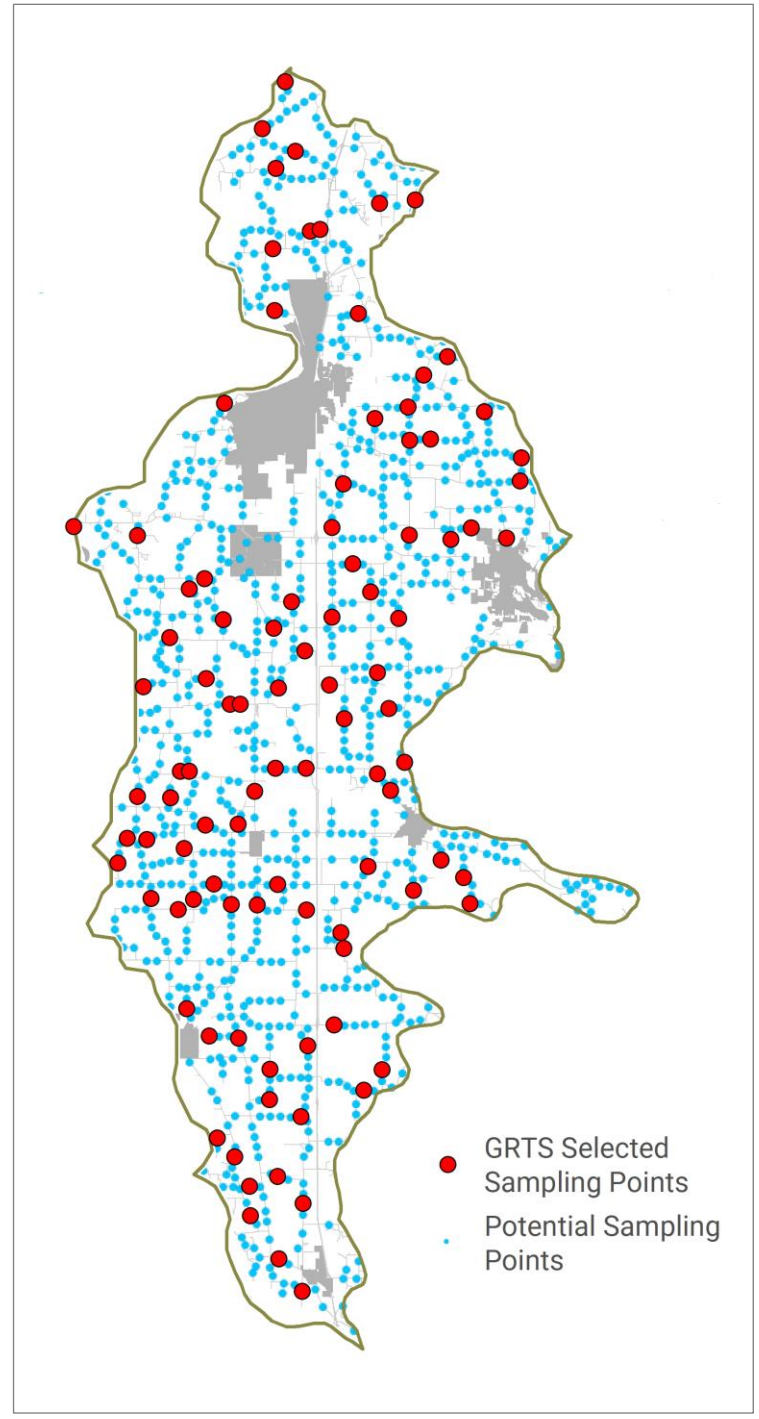
- Random samples are not appropriate for estimating aggregated populations[1]
- Larks have opinions about habitat! So we used ***unequal inclusion probabilities*** and selected sites ***proportionally based on the probability of habitat suitability***
- We used the **Generalized Random Tessellation Stratified (GRTS)** algorithm, which is available in the spsurvey package for RStudio



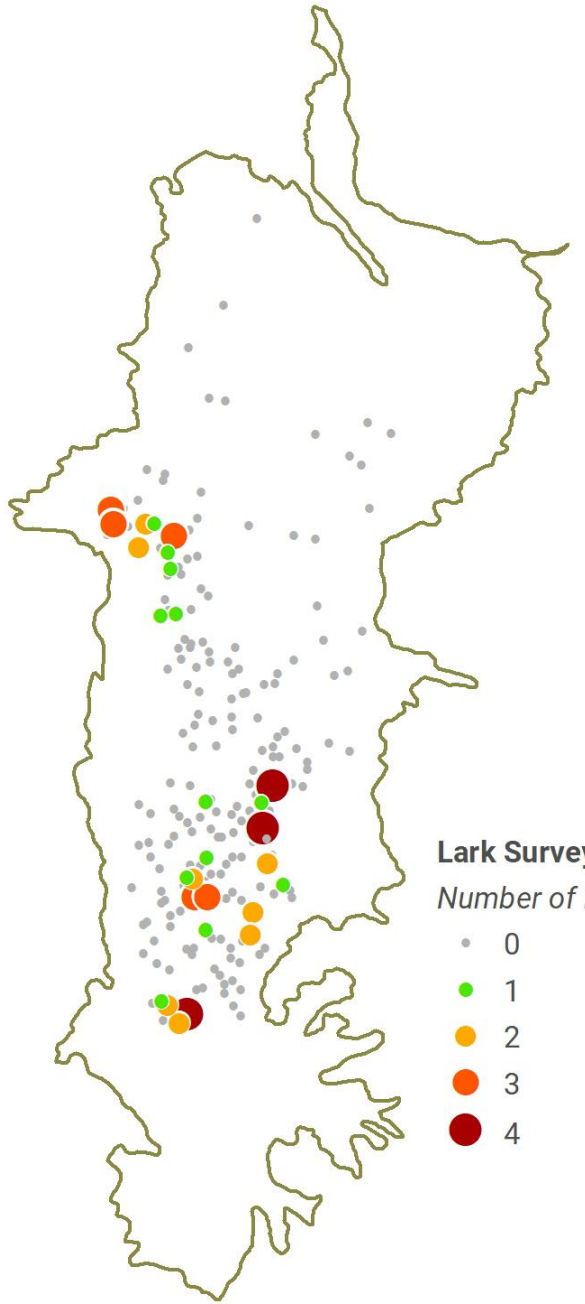
[1]See, for example, Perret et al, *Spatially balanced sampling methods are always more precise than random ones for estimating the size of aggregated populations*

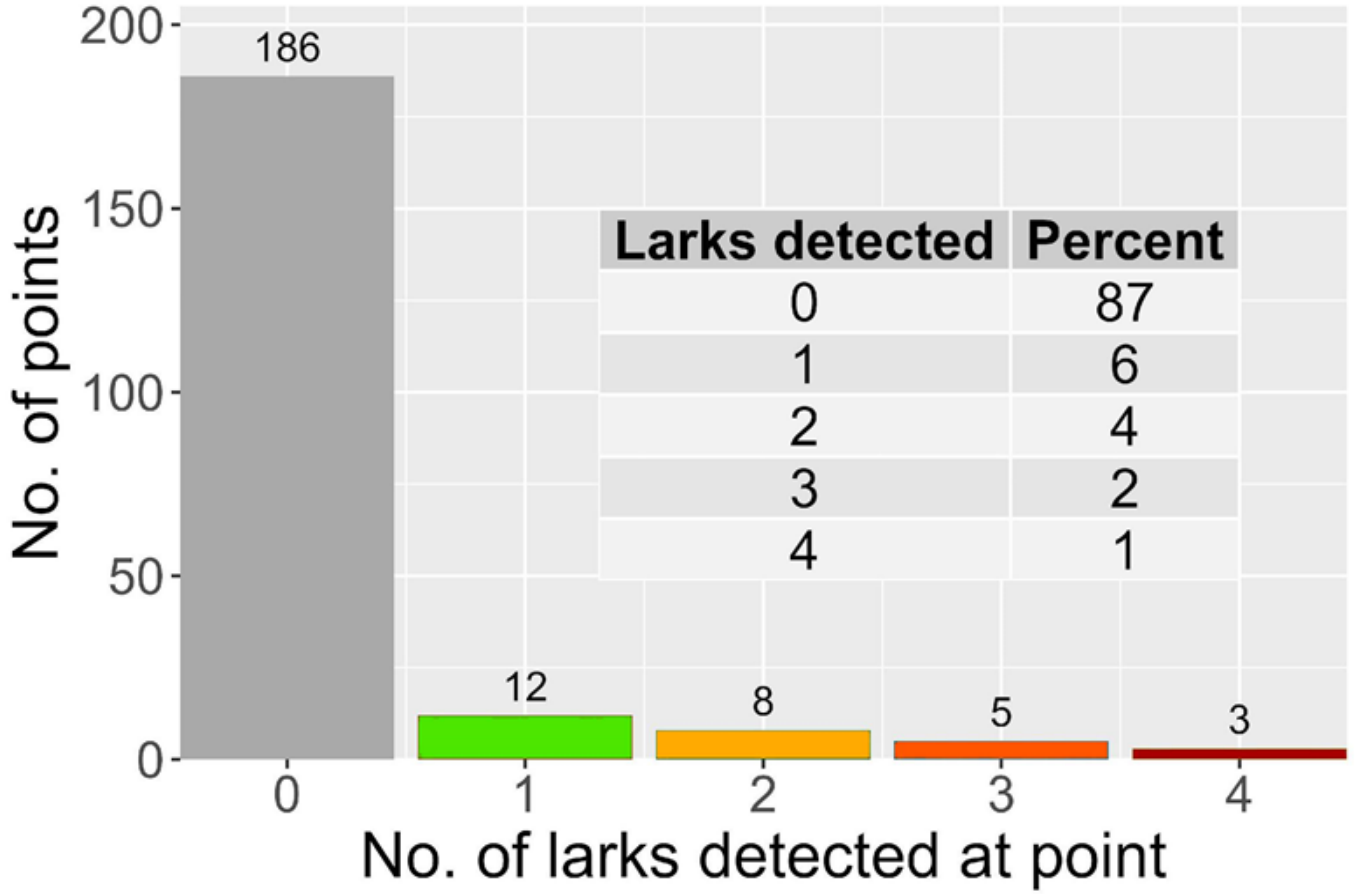



Potential Sampling Points


GRTS Selected Sampling Points
Potential Sampling Points

Larks were detected at 28 points (13%) - 55 individuals





Larks detected	Percent
0	87
1	6
2	4
3	2
4	1

How Many Sampling Locations are Required?

- Based on previously completed analyses of vegetation change in Chelan and other VSP counties, **true loss** in the agricultural land use/riparian intersect is rare, ~1% within a 2 year period
- This aligns with Congalton & Green's[2] rule of thumb:

> ***"under normal circumstances, it would be unusual for more than 10% of a given area to change in a 5-10 year period. More likely, the change would be closer to 5%"***

- To have a reasonable chance of detecting at least one instance of change within a set of fixed points would require a minimum of **100 locations**
- One potential use of unequal inclusion probabilities in the context of VSP is to weight the likelihood of a site being selected by the amount of riparian area and/or existing riparian vegetation within the parcel at the time of site selection

[2]Congalton, R.G., & Green, K. (2019). *Assessing the Accuracy of Remotely Sensed Data: Principles and Practices, Second Edition (3rd ed.)*. CRC Press. https://doi.org/10.1201/9780429052729

Other Critical Area Monitoring Questions/Data

- **Vegetation Monitoring**
  - Do we want to choose plot location(s) to capture pollinator habitat in addition to shrub-steppe, riparian, and wetland vegetation?
  - Monitoring change? Define "maintain" or "better" – change isn't always an impact.
    - Subsample of plots could be used to document change. These plots would be located at farms with farm plans or restoration stewardship plans.
    - Could use a rapid functional assessment to document change when sampling at stable cover plot sites – suggest DNR EIA protocol
  - Noxious weed – opportunistic surveys

Field Protocol

Vegetation monitoring

- 6 permanent photo points per watershed
- 59 percent cover plots (10% of 590 training points used to validate spatial analysis); # of these should be "stable" (i.e., they are visited yearly)
- Use wetland delineation methodology to estimate percent cover (Corps 1987,2010)

Wetland Hydrology Monitoring

- Use wetland delineation methodology (Corps 1987,2010)
- Use only when spatial analysis indicates change? Since we can't compare to 2011, do we want to start a baseline at specific wetlands of importance/concern?

Water Quality Monitoring

- 2nd tier sampling effort
- Use only when spatial analysis indicated change
- Monitoring stations located to document potential changes from ag related activities, only