Mazama Pocket Gopher Survey Report 2024

South Puget Sound, Washington

Washington Department of FISH & WILDLIFE

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Authors

Christa LeGrande, Erica Henry, and Ilai Keren, WDFW

Report acknowledgements

Conducting these surveys would not be possible without the participation and contribution of numerous individuals. Mazama pocket gopher survey data were collected by staff and volunteers from Washington Department of Fish and Wildlife. Funding to support data collection was provided by Washington Department of Fish and Wildlife. We thank land managers for providing access to occupied sites, including Olympia Airport, Sanderson Field, Green Diamond Timber Company, Mason County, Center for Natural Lands Management, Washington Department of Natural Resources, Thurston County, and WDFW's Scatter Creek Wildlife Area. A special thanks to the WDFW biologists and volunteers that participated in surveys: Michelle Tirhi, Emily Butler, Marissa Cent, Abby Sage, Julia Trautmann, Bryan Murphie, James Terry, Allison Leipold, and Eszter Munes. We also thank William Simper and Gretchen Blatz for curating the data and providing data entry tools that have made the process more efficient. Special thanks to Dr. Gail Olson for her model development, survey design, and research leadership.

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Cover photo by Christa LeGrande, WDFW. *Scatter Creek North Wildlife Area, occupied Mazama pocket gopher habitat.*

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Introduction

Washington Department of Fish and Wildlife (WDFW) annually conducts Mazama pocket gopher (*Thomomys mazama*; gopher) abundance surveys on sites with known gopher inhabitance that are potential reserves under the state and federal gopher recovery plans (Stinson 2020; USFWS 2022). Understanding the estimated abundance and distribution of pocket gophers can inform management actions to minimize negative impacts to the species and advance recovery targets and species and habitat objectives range wide. Transect-based mound surveys were conducted at several occupied sites starting in 2020 and continued through 2024 concurrent with recovery objectives to monitor abundance and trends at gopher reserve locations. This report covers results for sites surveyed for gopher abundance in 2024.

Methods

Site Selection

Survey sites included potential reserves or matrix land with known gopher occupancy, vegetation structure or management strategy suitable for mound detection, and sufficient size for establishing survey transects.

Abundance surveys require that there are enough gophers mounding at a site that they will be detected on transects and that vegetation conditions allow for 100% detection of mounds on transect lines. To ensure these conditions were met, sites were assessed prior to the survey season to confirm gopher presence, and that vegetation structure was appropriate for surveys. Sites significantly covered with dense vegetation either received management treatment prior to surveys (e.g., grazing, mowing) or were not surveyed in 2024. Areas less than approximately 10 acres were excluded from the survey list, as the required transect spacing at a minimum of 30 meters often precludes a sufficient number of mounds from being counted for the analysis. Further, the gopher recovery plans specify a size minimum of 10 acres for reserve complex satellites (Stinson 2020; USFWS 2022).

Field Surveys

WDFW established transects throughout each survey site. Sites were visited once during the appropriate survey window (September to November) at the onset of the rainy season. This seasonal timing ensures that surveys are restricted to the adult and dispersed young-of-the-year gopher population and a time of year when gophers are actively creating fresh (1-3 day old) mounds. Surveys could not be conducted in the rain and within 24-48 hours after a rain event. Correct recording of fresh mounds is essential for accurate gopher estimates.

Qualified surveyors were trained to distinguish gopher mounds from mole mounds and determine relative age of mounds under varying conditions. Using high-accuracy GPS units, surveyors walked a

straight line transect through occupied sites, visually searching for and recording locations of fresh mounds within 0.5 meters to each side of the transect line, while staying on the transect.

Methods for drawing unit boundaries and transects were unique for larger sites, given the site size (i.e., the entire site could not be completed in a day), access considerations (e.g., calling in to the air tower, restrictions on certain units due to training activities), and extensive road and runway/taxiway networks separating units and adjacent gopher territories. Most unit boundaries within sites were drawn accounting for road and runway/taxiway placement or changes in habitat type and management. Transects were oriented to maximize the transect length while also being representative of the overall unit landscape and habitat.

WDFW coordinated with site managers to arrange for best available survey dates, access coordination, and to ensure compliance with safety protocols and procedures.

Analysis

To estimate gopher abundance from mound location data, we used analytical methods that were developed, tested, and implemented by WDFW starting in 2014 (Olson 2017; Olson and Keren 2020). This methodology is based on the assumption that mounds that are close together belong to the same individual gopher, while mounds that are far apart are from different gophers. This assumption was tested and verified via intensive gopher trapping (Olson and Keren 2020). The analysis uses the pattern of distances between fresh mounds on transect-based mound surveys to "assign" each mound detected on a transect to individual gophers. The algorithm assumes 1) all mounds on and within 0.5 meters on either side of the transect line are detected, and 2) mounds are aged accurately.

Results

Several sites in Thurston and Mason Counties were assessed for survey appropriateness and we used transect-based surveys to estimate gopher abundance at select sites in 2024, with discussion of each below. These sites and others in the South Puget Sound region had monitoring efforts using other methods prior to the implementation of this protocol, which are described in the Mazama Pocket Gopher Recovery Plan and Periodic Status Review (Stinson 2020).

Thurston County

Violet Prairie, Scatter Creek Wildlife Area and Easement sites: Both the WDFW and Thurston County owned parcels of Violet Prairie were surveyed using the abundance protocol. Only the west side of the WDFW unit was surveyed, however, as it had been grazed by cattle in 2024, which led to ideal mound detection conditions. The southeast and east side of the WDFW site was not surveyed, as the vegetation was too dense and tall for detecting fresh mounds; grazing is planned for these units in 2025. Fresh mounds were detected in the Thurston County units and the adjacent WDFW unit. Units with

limited forage, such as the old paddock footprints, had too few gopher mound detections to survey or analyze. *An abundance estimate was feasible at this site.*

Leitner Prairie Conservation Easements: Leitner Prairie Conservation Easements have Mazama pocket gopher occupancy on the two related units and fresh mounds were detected on transects in both units. Habitat management and condition made the entire site suitable for surveys. *An abundance estimate was feasible at this site*.

Deschutes Prairie Preserve: Only the northeast corner of the site was surveyed for gopher mounds, and fresh mounds were detected on most transects. The southern portion of the site southwest of the railroad tracks was not surveyed using this protocol as the vegetation was not conducive to detecting mounds (i.e., tall and thick vegetation made it difficult to see mounds present). An abundance estimate could not be made for the area surveyed given its low incidence of fresh mounds along transects.

Tenalquot Prairie Preserve: Fresh gopher mounds were detected on most transects throughout the site, with occurrences less frequent on the south side of the property. Much of this site is prairie habitat that is managed in part for gopher recovery objectives. Given the forested nature of the southeast side of Tenalquot and denser understory limiting mound detection, transects were cut off near the tree line and only run through the open prairie and understory habitats. *An abundance estimate was feasible at this site.*

Tumwater West Preserve: Fresh gopher mounds were detected throughout much of this site, except for areas to the very south and southeast with taller pasture and wetland grasses that either preclude gopher presence or made it difficult for surveyors to detect mounding activity. The farthest east transect was not surveyed, as it ran through unsuitable vegetation, including wetland vegetation in likely soil inclusions and large blackberry bushes. What appeared to be a light-intensity burn occurred on the northwest corner of the site, opening up visibility for observing mounds and allowing for green-up of forage. *An abundance estimate was feasible at this site.*

Deschutes Corridor Mitigation Site: This site was not surveyed using the abundance protocol, as on-transect gopher mound incidence and site-wide mound density was not sufficient to produce an estimate. The northern half of this site, where gopher mounds were detected, has received prairie restoration and habitat management actions. Extensive earthmoving has occurred on the southern half of the site, currently making it largely unsuitable for gopher occupancy.

DNR Forest Nursery and Seed Orchard: Gopher mounds were detected at the DNR Webster Forest Nursery and Meridian Seed Orchard sites, particularly along the periphery of units and along tree rows where forage readily grows. Abundance surveys were not conducted at these sites as they are partitioned into many different units of varying vegetation growth stages and are not conducive to transects meant to cover largely uniform habitats. Only the far west units and far north units of the Webster Forest Nursery were assessed for occupancy, as these areas both have limited farming practices.

Mason County

Sanderson Field, Port of Shelton: Fresh gopher mounds were detected on Sanderson Field and the surrounding Port of Shelton properties, and insufficient mound data were collected on transects for an abundance estimate. The northern part of Sanderson Field was hosting an event and thus surveyors were unable to survey all portions of the site.

Mason County (select parcels): Fresh gopher mounds were detected on the Mason County landfill and the adjacent property owned by Mason County to the west, though mound incidence was not sufficient to warrant an abundance survey. No mounds were observed on the filled landfill, and several were detected just to the west in the open grassland in minimal numbers. The adjacent Mason County property was logged in 2024 and thus much of the site was unsuitable for detecting mounds given the extensive slash and vegetation; however, fresh mounds were detected in the far northwest corner of the parcel, where native prairie plants were also seen.

Green Diamond Timber Company (select parcels): Several sites owned by Green Diamond Timber Company were surveyed and fresh gopher mounds were detected in adjacent open grasslands and areas logged less than 5-10 years ago. In particular, the powerline corridor bisecting the parcels surveyed to the northeast had extensive fresh gopher mounding. It is likely the corridor's management, to keep vegetation relatively sparse for wildfire control, facilitated the maintenance of prairie plants and openness of the landscape conducive to gopher occupancy. No abundance surveys were conducted at these properties as mound detection was low or site size or orientation made having transects infeasible.

Using between-mound distances, we estimated the number of individual gophers encountered on transects and the total population size of gophers within each site's survey area. These numbers along with their associated 95% credible intervals are given in Table 1. Note that credible intervals for analyzed sub-units within the same site should not be aggregated.

Table 1. Pocket gopher abundance estimates site-wide ($\widehat{N}$) with associated 95% credible intervals (CRI) for sites surveyed in the South Puget Sound, WA. *Refer to "Discussion" for estimate considerations and limitations.*

Site Name	Survey Year	Subspecies	Area (acres) Surveyed	Estimate ($\widehat{N}$) with 95% CRI
Century Preserve Mitigation Site	2023	Olympia	43	N/A
Deschutes Corridor Mitigation Site	2024	Olympia	N/A	N/A
Olympia Airport, Port of Olympia	2023	Olympia	692	2,782 (2,376-3,434)
Tumwater West Preserve	2024	Olympia	63	328 (197-665)

Site Name	Survey Year	Subspecies	Area (acres) Surveyed	Estimate ($\widehat{N}$) with 95% CRI
Webster Forest Nursery	2024	Olympia	N/A	N/A
West Rocky Prairie	2020	Olympia, Tenino (?)	241	389 (263-639)
Wolfhaven Prairie Preserve	2020	Olympia, Yelm North, Tenino (?)	33	273 (230-380)
Meridian Seed Orchard	2024	Yelm North	N/A	N/A
Rocky Natural Area Preserve	2023	Tenino	36	N/A
Deschutes Prairie Preserve	2024	Yelm East	25	N/A
Tenalquot Prairie Preserve	2024	Yelm East	110	313 (180-562)
Leitner Prairie Conservation Easements	2024	Yelm South	36	143 (85-313)
Scatter Creek North	2020	Yelm South	314	1,620 (1,392-1,887)
Scatter Creek South	2020	Yelm South	324	1,261 (1,000-1,640)
Violet Prairie Wildlife Area and Easements	2021	Yelm South	85	550 (430-733)*
Violet Prairie Wildlife Area and Easements	2024	Yelm South	143	500 (324-978)*
Wildridge Conservation Easement	2020	Yelm South	52	275 (201-399)
McKenna Meadows Conservation Easement	2023	Roy	6	N/A
Green Diamond Timber Co., Misc. Parcels	2024	Shelton	N/A	N/A
Mason County, Misc. Parcels	2024	Shelton	N/A	N/A
Sanderson Field, Port of Shelton	2024	Shelton	510	N/A

*Only the southeast and east units of Violet Prairie Wildlife Area were surveyed in 2021 and only the west units were surveyed in 2024.

Sufficient mounds for analysis were detected at Violet Prairie Wildlife Area and adjacent units, Tumwater West Preserve, Tenalquot Prairie Preserve, and Leitner Conservation Easements (see Appendix for site maps with fresh mound detections). Surveys at all other 2024 sites did not yield sufficient detection of fresh gopher mounds for analysis.

Discussion

Abundance estimates and credible intervals listed for individual sites and units are only valid in the context of observed patterns across the entire site within that season and do not represent a comprehensive view of the site- or unit-specific pocket gopher distribution, behavior, or site habitat quality. Given this, updated protocol-level surveys should be conducted by trained personnel no more than a year prior to activities that may cause take or impact suitable habitat. These surveys and estimates do not replace or confer an incidental take permit, assessment of habitat quality, replacement of county or city permit procedures, authorization of trapping, handling, or collection, or model occupancy within a unit or across a site. Further, fresh mounds detected on transects does not equate to the number of gophers on transects, thus point data on survey maps should not be used out of context of this protocol and model.

Non-detection of gopher mounds within a unit or site does not indicate absence, rather that fresh gopher mounds were not detected by a surveyor on the transect walked.

Recovery Progress

The state and federal recovery plans for the Mazama pocket gopher (Stinson 2020; USFWS 2022) outline the recovery goals for each relevant subspecies, including the needed number and size of sites in conservation status for the purpose of gopher recovery within their relevant geographic region, a minimum population size, the standard of habitat quality at those sites, and requirements for soil structure and type. The goal of these recovery plans is to “secure and maintain self-sustaining representative populations of all the distinct genetic groups of the Mazama pocket gophers within the current Washington range” (Stinson 2020). Sites being managed and that are in conservation status for gopher recovery may be considered a “reserve” core, satellite, or matrix. The abundance protocol is meant to estimate the abundance of gophers at reserve sites to track their status, trends, and recovery progress.

Sites in the Context of Recovery

All sites considered Mazama pocket gopher reserves and maintained for gopher recovery should be managed for gopher persistence in perpetuity. Medium- to high-quality habitat should be achieved at each of these sites and maintained in conjunction with the reserve criteria. Sites not in conservation status remain important for their persistence of gopher genetics and as corridors between sites that are or could be in conservation status.

As WDFW and partners continue utilizing this protocol at different sites, which invariably are different sizes, have different management history, soil quality and composition, vegetation quality and composition, and gopher occupancy, among other characteristics, more information is obtained about how these sites will play a role in the recovery of Mazama pocket gopher. Sites in the context of recovery will be further detailed in a forthcoming Mazama Pocket Gopher Monitoring Plan.

Subspecies Reserve and Recovery Status

Shelton: The Shelton pocket gopher is state listed and not federally listed. The recovery goal for this subspecies is two reserves in the Scotts Prairie recovery area, each with at least 1,000 gophers over a more than 20-year period. The status of sites designated for this subspecies' conservation is still being determined. There are several sites and corridors that act as general matrix land, maintaining the subspecies' connectivity and genetics.

Yelm North: The North clade of the Yelm pocket gopher subspecies is both state and federally listed. The recovery goal for this subspecies is two reserves in the Chambers Prairie recovery area, each with at least 1,000 gophers over a more than 20-year period. There is currently one occupied 11-acre easement site in conservation status. The Washington DNR Meridian Seed Orchard is within this recovery area and acts as general matrix land, maintaining the subspecies' connectivity and genetics, though it is not managed for gopher recovery.

Yelm East: The East clade of the Yelm pocket gopher subspecies is both state and federally listed. The recovery goal for this subspecies is two reserves in the Tenalquot-Yelm Prairie area, each with at least 1,000 gophers over a more than 20-year period. There are two sites within this subspecies clade recovery area that are in conservation status and managed in-part for gopher recovery objectives – Tenalquot Prairie Preserve and Deschutes Prairie Preserve – as well as other unnamed easement sites. Further acquisition of sites in conservation status and subsequent habitat assessment and/or enhancement is needed to meet minimum site size and population requirements for a Yelm East reserve system.

Yelm South: The South clade of the Yelm pocket gopher subspecies is both state and federally listed. The recovery goal for this subspecies is three reserves in the Mound-Frost Prairie, with at least one reserve on each side of I-5, each with at least 1,000 gophers over a more than 20-year period. Scatter Creek Wildlife Area North and South, located west of I-5, have estimated gopher populations over 1,000 and are managed in-part for the purpose of gopher recovery. The Violet Prairie Wildlife Area and Easement Site, located on the east side of I-5, are managed in-part for the purpose of gopher recovery and require follow-up abundance surveys to determine an updated full-site population estimate. In addition, Leitner Prairie Preserve and other unnamed easement sites have gopher occupancy and are managed for gopher recovery objectives. There are other mitigation sites within this Reserve Priority Area that require abundance surveys. Assessment of minimum population and habitat quality is needed for a Yelm South reserve system.

Olympia: The Olympia pocket gopher is state and federally listed. The recovery goal for this subspecies is three reserves in the Bush Prairie recovery area, with at least one reserve on each side of I-5, each with at least 1,000 gophers over a more than 20-year period. Several sites in this recovery area are in conservation status and are managed for gopher recovery, including the Tumwater West Preserve on the west side of I-5. Existing sites in conservation status are not connected by matrix land or meet the minimum acreage requirements for a complete reserve core or satellite complex. The Olympia Airport and Port of Olympia properties remain the largest accessible and occupied Olympia pocket gopher sites, though they cannot be considered reserves given they are not managed for gopher recovery. Nonetheless, they are important for maintaining the subspecies' connectivity and genetics. The Washington DNR Webster Forest Nursery is within this recovery area and acts as general matrix land, though it is not managed for gopher recovery. Further acquisition of suitable sites for recovery progress, and management of existing sites to expand existing population numbers, is required to progress towards recovery goals.

Tenino: The Tenino pocket gopher is state and federally listed. The recovery goal for this subspecies is two reserves in the Rocky Prairie recovery area, each with at least 1,000 gophers over a more than 20-year period. Several sites in conservation status are within this recovery area, however, the status of the gophers at these locations needs to be further evaluated. Rocky NAP, owned and managed by DNR, has had consistently tenuous gopher occupancy, and as of the 2023 surveys, fresh mounds were not detected on the site. West Rocky Prairie and Wolf Haven Prairie have gopher occupancy, but genetics tests are needed to verify each site's subspecies designation.

Roy: The Roy pocket gopher is state and federally listed. The recovery goal for this subspecies is three reserves in the 91st Division Prairie recovery area, each with at least 1,000 gophers over a more than 20-year period. Recovery goals are intended to be largely met within the subspecies' core range on Joint Base Lewis-McChord (JBLM); however, they will be managed in accordance with JBLM's Biological Opinion and not in the strict sense of off-base reserves described in the recovery plans. Reserve designation for this subspecies has yet to be determined. Off-base, the 6-acre McKenna Meadows Conservation Easement site and another unnamed site are protected and managed in perpetuity for Roy pocket gopher.

Conclusion

Mazama pocket gopher transect surveys will occur on an annual basis, with current and anticipated reserve sites surveyed every 2-3 years per recovery plan objectives (Stinson 2020; USFWS 2022). Associated analyses estimating abundance at these sites will inform recovery progress and trends. Other sites not included in the reserve system may be surveyed on a case-by-case basis; these sites remain important for gopher persistence and movement.

WDFW is drafting a Mazama Pocket Gopher Monitoring Plan to complement the state and federal recovery plan objectives of establishing pocket gopher reserves. Reserve establishment and monitoring of gopher populations at reserve sites is a high priority for pocket gopher recovery.

Literature cited

Olson, G.S. 2017. Development of standard survey methods for mazama pocket gophers. Final Report to ACUB. Washington Department of Fish and Wildlife, Olympia, WA.

Olson, G., and I. Keren. 2020. Validating a method for estimating mazama pocket gopher abundance from mound surveys. Final report to U.S. Fish and Wildlife Service. Washington Department of Fish and Wildlife, Olympia, WA.

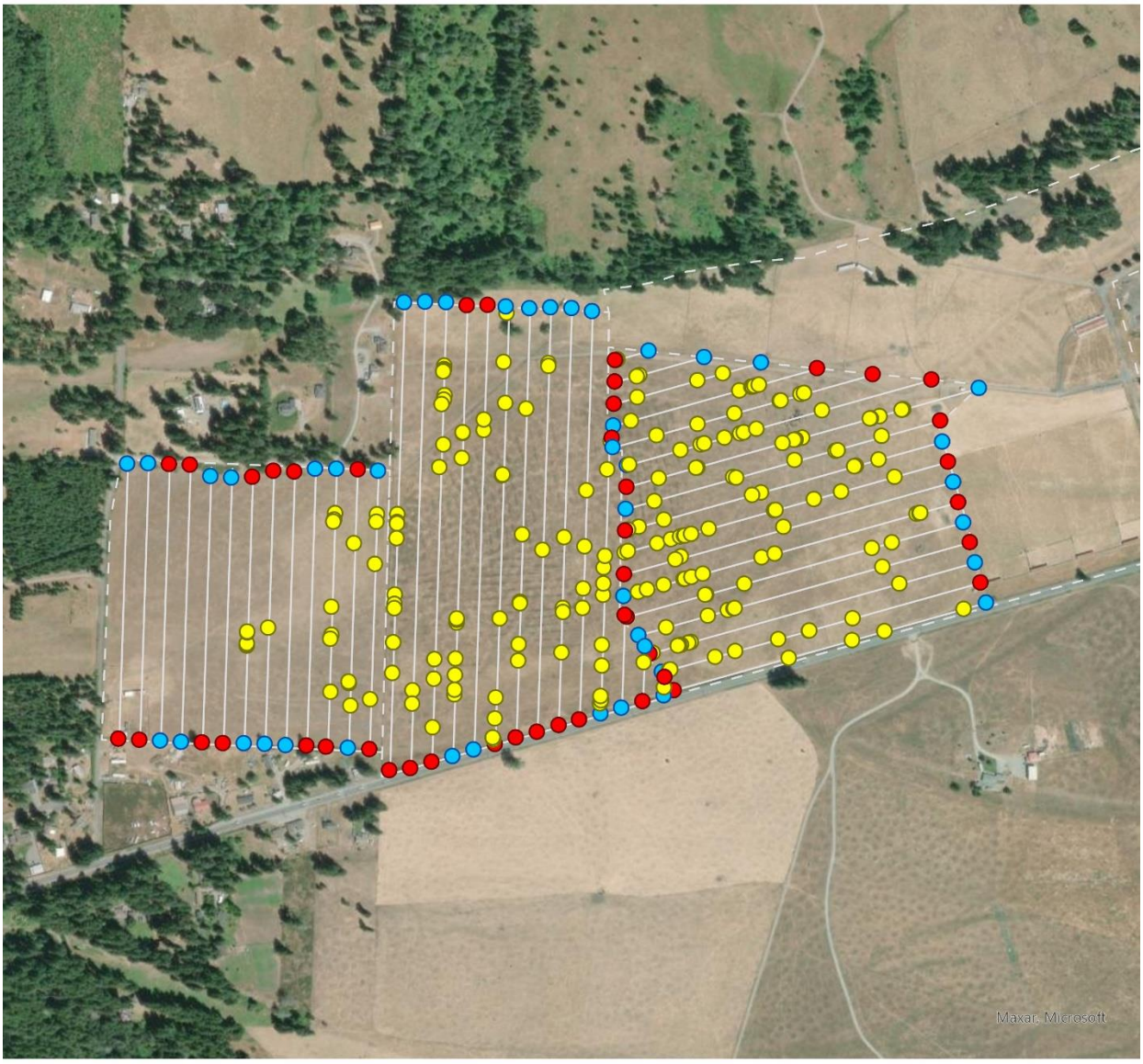
Stinson, D. 2020. Mazama pocket gopher recovery plan and periodic status review. Washington Department of Fish and Wildlife, Olympia, WA.

U.S. Fish and Wildlife Service [USFWS]. 2022. Recovery plan for four subspecies of Mazama pocket gopher. U.S. Fish and Wildlife Service, Portland, OR. xi +33 pp.+ appendices.

Appendix

The following figures show associated maps of sites surveyed for Mazama pocket gopher using transect-based surveys in 2024. Not all sites visited in 2024 have associated maps and transects, as their gopher mound detection on-transect was not sufficient to survey using this protocol. Boundaries for survey units do not necessarily correspond to the legal parcel boundary; boundaries are set within suitable habitat for gophers and surveyable habitat for surveyors. Yellow points indicate a fresh (1-3 day old) gopher mound detected on the surveyed transect, blue points indicate a transect start point, and red points indicate a transect end point.

Mazama Pocket Gopher Abundance Survey
Violet Prairie Wildlife Area and Mitigation Site - 2024



Begin Point
End Point
MPG Fresh Mound
Transects
Survey Area Boundary
N
0 50 100 200 Meters

Non-detection of gopher mounds within a unit or site does not indicate absence, rather that fresh gopher mounds were not detected by a surveyor on the transect walked. Further, fresh mounds detected on transects does not equate to the number of gophers on transects, thus point data on survey maps should not be used out of context of the abundance protocol and model.

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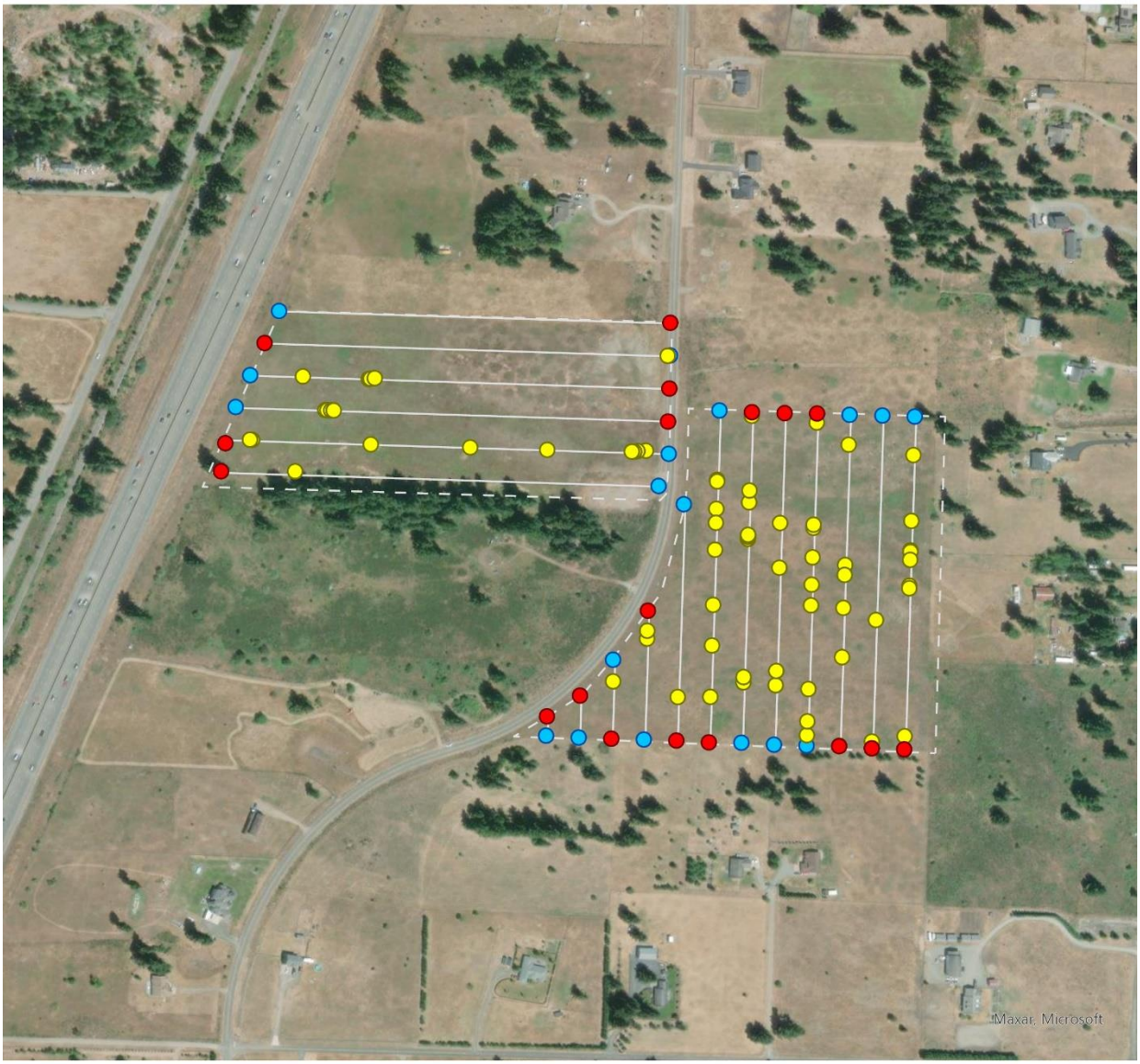
Mazama Pocket Gopher Abundance Survey
Leitner Prairie Conservation Easements - 2024



Begin Point
End Point
MPG Fresh Mound
Transects
Survey Area Boundary

N

0 50 100 200 Meters

Non-detection of gopher mounds within a unit or site does not indicate absence, rather that fresh gopher mounds were not detected by a surveyor on the transect walked. Further, fresh mounds detected on transects does not equate to the number of gophers on transects, thus point data on survey maps should not be used out of context of the abundance protocol and model.

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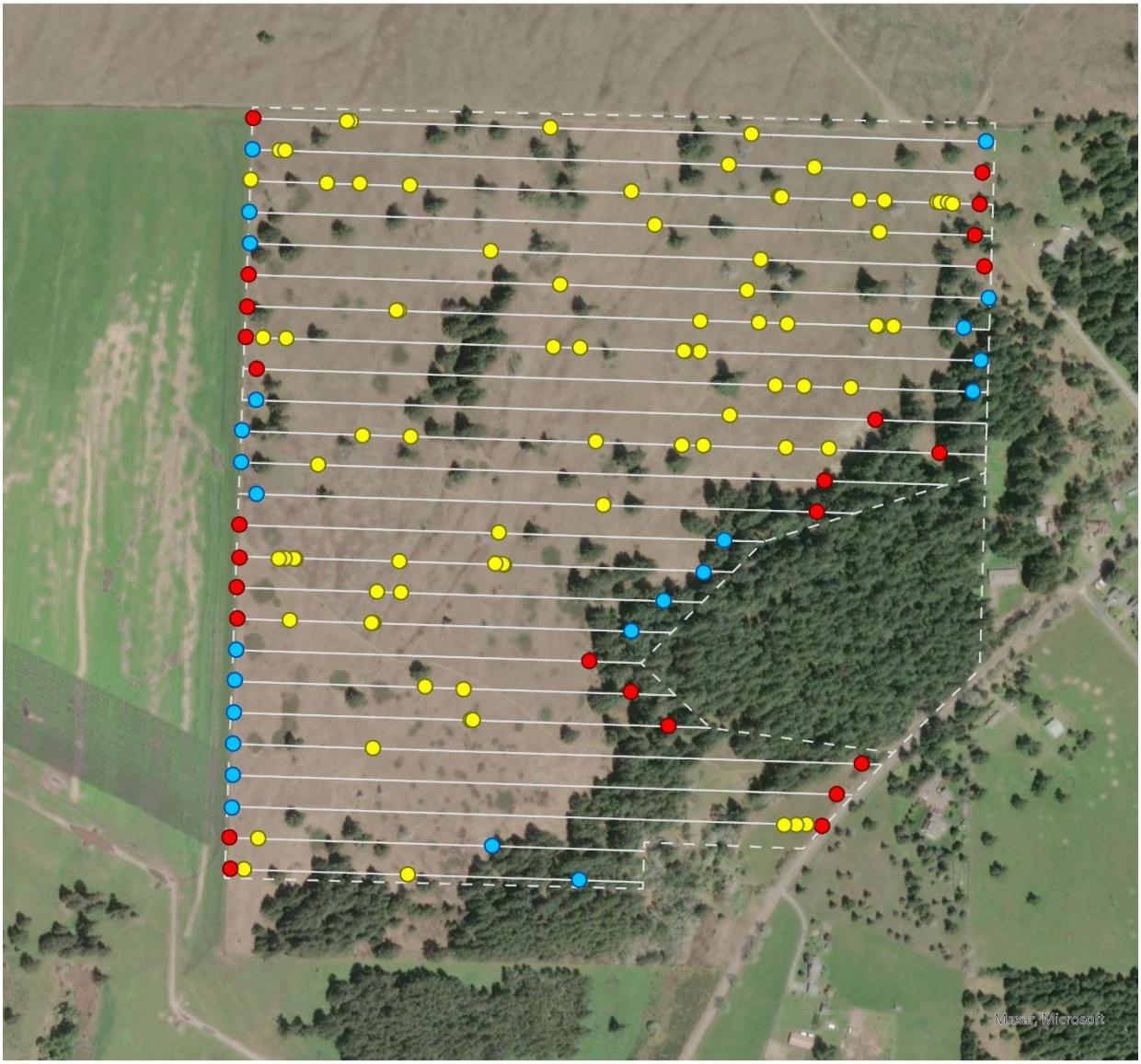
Mazama Pocket Gopher Abundance Survey
Tenalquot Prairie Preserve - 2024



Begin Point
End Point
MPG Fresh Mound
Transects
Survey Area Boundary

N

0 50 100 200 Meters

Non-detection of gopher mounds within a unit or site does not indicate absence, rather that fresh gopher mounds were not detected by a surveyor on the transect walked. Further, fresh mounds detected on transects does not equate to the number of gophers on transects, thus point data on survey maps should not be used out of context of the abundance protocol and model.

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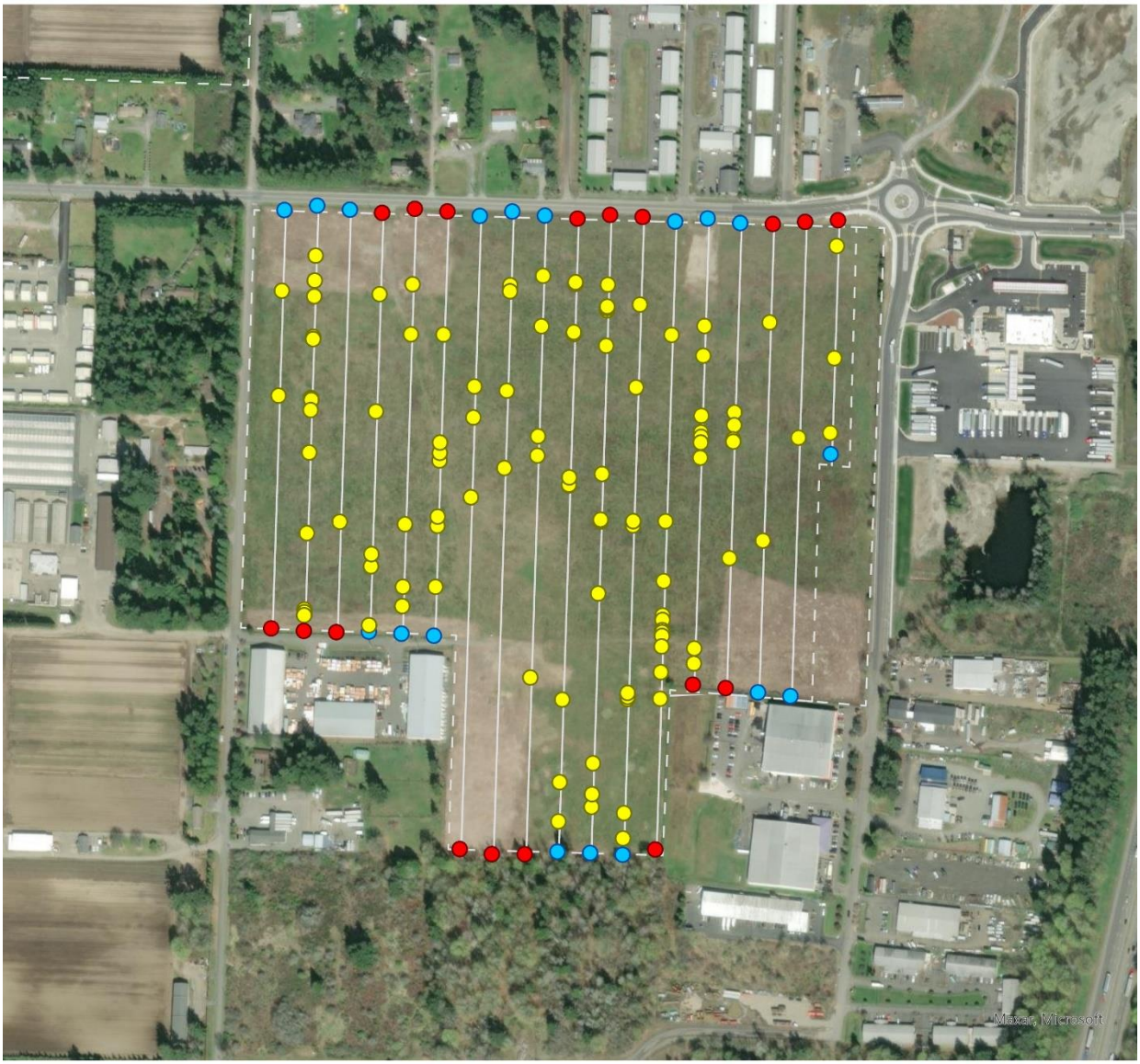
Mazama Pocket Gopher Abundance Survey
Tumwater West Preserve - 2024



Begin Point
End Point
MPG Fresh Mound
Transects
Survey Area Boundary
N
0 50 100 200 Meters

Non-detection of gopher mounds within a unit or site does not indicate absence, rather that fresh gopher mounds were not detected by a surveyor on the transect walked. Further, fresh mounds detected on transects does not equate to the number of gophers on transects, thus point data on survey maps should not be used out of context of the abundance protocol and model.

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