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Thurston County Agricultural Land Pocket Gopher Evaluation

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Summary

On December 10, 2012, the U.S. Fish and Wildlife Service (USFWS) proposed extending Endangered Species Act protection to four subspecies of Mazama pocket gopher (MPG) and their habitat(s). This action affects only the subspecies found in Pierce and Thurston Counties, Washington ; *Thomomys mazama glacialis*, *T.m. tumuli*, *T.m. pugetensis*, *T.m. yelmensis*.

The Mazama pocket gopher is a small mammal that occupies open prairie-like habitats in Washington and Oregon. The prairies of south Puget Sound and western Oregon are part of one of the rarest ecosystems in the United States. Dramatic changes have occurred on the landscape over the last 150 years, including a 90% to 95% reduction in the prairie ecosystem. In the south Puget Sound region, where most of western Washington's prairies historically occurred, less than 10 percent of the original prairie persists, and only 3 percent remains dominated by native vegetation. Since the mid-1800s much of Washington's Puget prairie habitat has been lost through conversion to human uses such as urban development or agriculture, or to invasive species or encroachment of woody plants resulting primarily from fire suppression.

On August 30, 2013 the USFWS announced that the final determination whether or not to list four subspecies of Mazama pocket gophers for protection under the Federal Endangered Species Act (ESA) would be delayed for up to six months. USFWS stated the extension for the final determination was to give the agency time to address concerns raised by the state and federal agencies, local municipalities and the agricultural community over the sufficiency or accuracy of existing data used in the original rule. Information received by USFWS during the public comment period suggested that Mazama pocket gophers are present in areas where agricultural practices are taking place. In order to assess merits of those comments, USFWS approached the Washington State Department of Agriculture (WSDA) to obtain additional information regarding Mazama pocket gopher presence and agricultural land uses. WSDA then partnered with biologists from the Washington State Department of Transportation (WSDOT) to conduct an evaluation of approximately 1200 acres or 8% of actively utilized agricultural land in Thurston County to determine whether or not Mazama pocket gopher's are present within the active footprint(s) of current agricultural activities.

The findings indicate that the Mazama pocket gopher is present on some of the parcels visited by the evaluation team, and either within or adjacent to areas where agricultural practices are actively occurring. Some parcels evaluated showed little or no use by Mazama pocket gophers.

Purpose and Goals of the Evaluation

The evaluation was conducted jointly by (WSDA) and (WSDOT) to determine if Mazama pocket gophers are present in areas where a variety of agricultural operations are currently conducted within potential gopher habitat. The evaluation did not attempt to collect specific population data or to create an unbiased estimate of the percentage of occupied habitat in Thurston County.

Historical occurrence data was limited to qualitative information gathered through interviews with landowners. Mazama pocket gopher presence was evaluated on parcels for which WSDA and WSDOT were granted access by landowners. Evaluations were conducted by visually inspecting the parcel(s) and noting the presence of both new and older mounds, distribution of mounds within the parcel and noting crop damage that could be attributed to gopher presence. Those portions of the parcel that were not walked by the evaluation team were visually inspected to determine if the agricultural activities within those portions were the same as or different from the areas that were walked. If activities, soils, and vegetation in a visually inspected portion were the same as in a walked portion, it was assumed that Mazama pocket gopher presence/absence would also be the same.

Mazama Pocket Gopher Site Selection Process

The site selection process for identifying potential pocket gopher presence was performed using Geographic Information System (GIS) tools to analyze the relationship between agriculture parcels and accompanying tillage practices, soil types, and historical Mazama pocket gopher distribution. These GIS layers were overlaid and sites were selected within the intersection of the data layers considered. The areas of intersection provided focus for the evaluation team; all areas visited were mapped as occurring on MPG soil types (see Figure Three), and within the expected range of the Mazama pocket gopher in Thurston County. It was assumed these focus areas would provide a representation of potential Mazama pocket gopher habitat in relationship to a variety of agriculture activities and soil types in a dispersed geographic area of Thurston County.

Specifically, three data layers were used to develop target areas for assessments, they were:

- WSDA statewide agricultural land use geodatabase (2013)¹

¹ WSDA's agricultural land use geodatabase has been developed using federal data quality standards. Data collected through WSDA's program is done so in accordance with U.S. Environmental Protection Agency approved QA/QC plan(s).

- SURRGO soil data layers developed by Natural Resource and Conservation Service (USDA)
- Current and historic pocket gopher location data obtained from the WA Department of Fish and Wildlife and USFWS

Following refinement of the initial focus area map, input from the WSDOT biologist(s) who participated in the evaluation was included to modify initial site locations selected based on current knowledge and best professional judgment. Sites were selected to provide a balanced representation of the variety of tillage practices potentially used within the selected focus areas. These practices were previously catalogued in the *Thurston County Agricultural Practices* report completed in October 2013 and attached as Appendix One. Final site selection was made when contact and cooperation with landowners had been achieved.

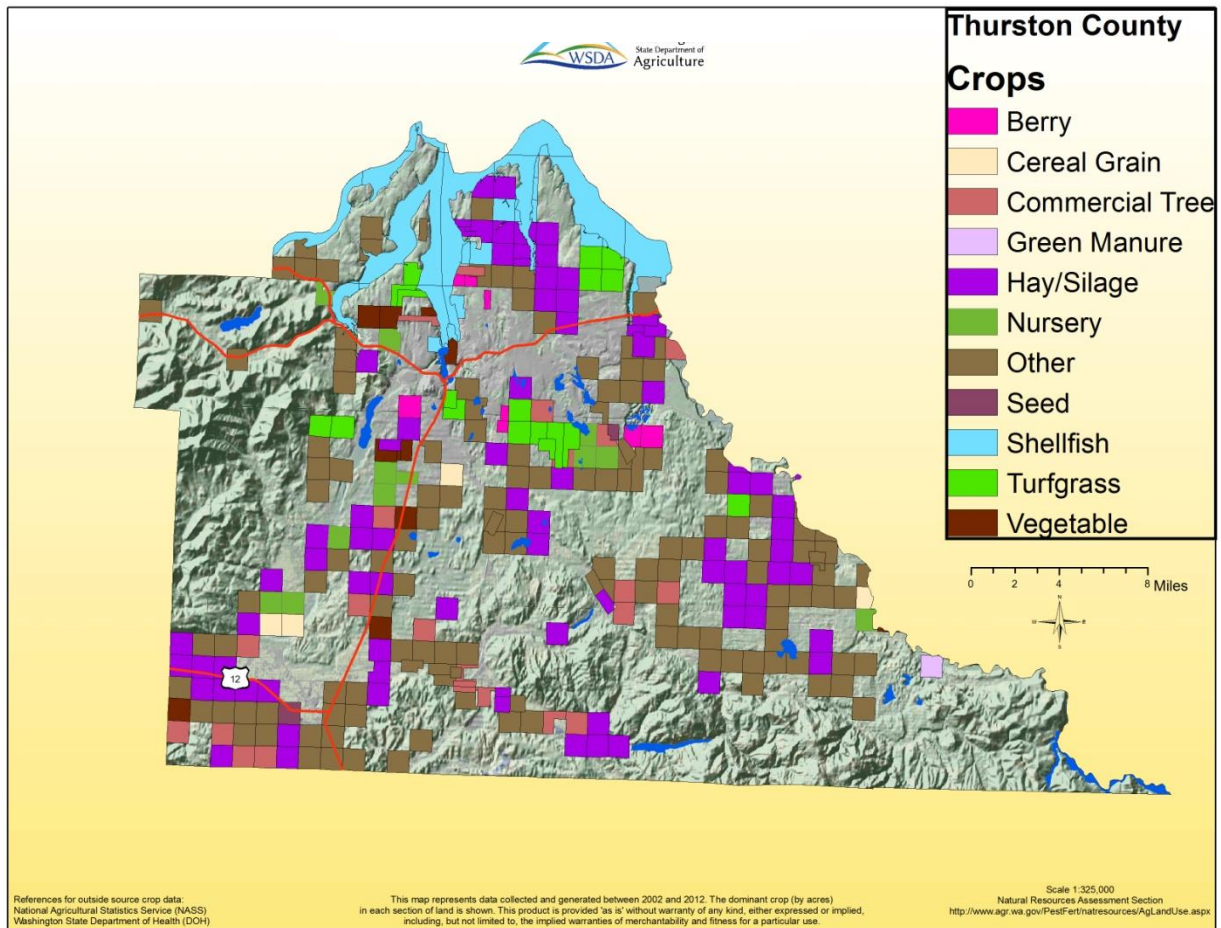


Figure 1. Agricultural land uses within Thurston County, Washington

Agricultural activities in this report represent a cross-section of those that currently exist in the central and southern areas of Thurston County, WA. These data were obtained from the 2013 WSDA crop geodatabase and include market crops (vegetable), grass hay, pumpkins, apples, pasture, Christmas trees, ornamental nursery, and a conifer seed orchard. Crop rotation and irrigation data were obtained from the WSDA agricultural land use mapping project (<http://agr.wa.gov/PestFert/natresources/AgLandUse.aspx>).

Evaluation Process

The evaluation of parcels for which WSDA and WSDOT were allowed access differed slightly depending upon the size of the parcel visited. Small acreage sites (under 10 acres) were



Photo 1. Mazama Pocket Gopher mound note the fan-shaped, or irregular piles with the entry hole off to one side. Source : WA Dept of Fish and Wildlife

evaluated by physically walking 100% of the property and noting Mazama pocket gopher presence. Larger acreages were 100% visually inspected but varied in the percentage of the property physically walked depending on whether the evaluation goal (see Table One) was achieved in determining level and distribution of mounds attributed to Mazama pocket gophers. In each case, biologists conducted close, physical inspections of Mazama pocket gopher

mounds, evaluated the areas for plant damage attributable to pocket gophers, and examined near-surface tunnel structure. When presence was indicated

detailed inspection of mounds was conducted by the biologists to determine whether or not the mounds were attributable to Mazama pocket gophers or to moles. It should be noted that the participants in this evaluation were limited to those parcels for which landowners were willing to allow state staff access. This reduced the acreage to a subset of parcels within the larger potential habitat area.

A total of seven sites were evaluated for the presence of Mazama pocket gophers, totaling 1189 acres. In conducting the evaluations, there was no attempt to establish predetermined grids or linear parallel transects. This was deemed unnecessary to fulfill the objectives of the evaluation which was focused on the determination of Mazama pocket gopher presence, the distribution of mounds attributable to Mazama pocket gophers, and the type and consistency of the agricultural practices existing within the selected sites. The evaluation represented approximately 8% of the 15,369 acres of agriculture located in the geographic region where data indicated a likelihood of Mazama pocket gopher presence within the known range of the Mazama pocket gopher.

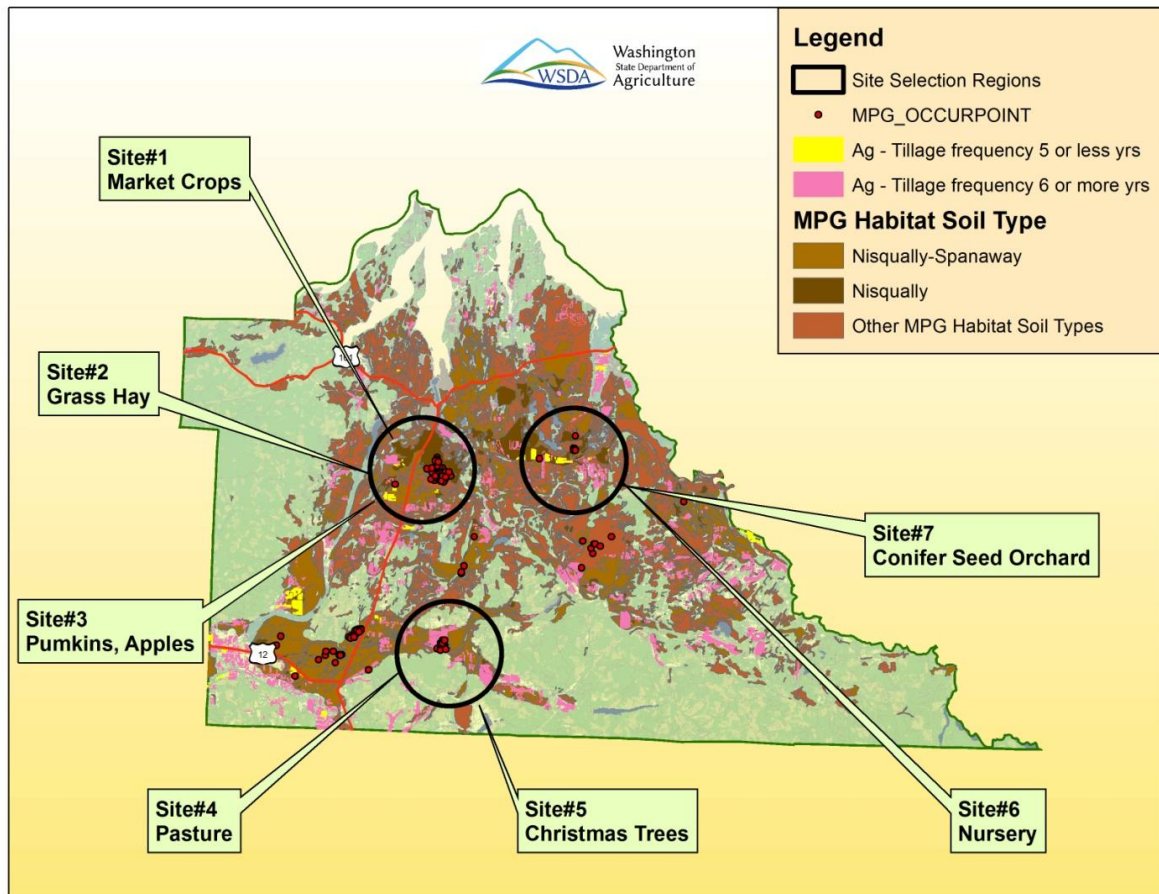


Figure 3. Mazama Pocket Gopher (MPG) Habitat Selection Sites

Agricultural Practices and Mazama Pocket Gopher Evaluation Results

The evaluations were conducted during the period October 4 through October 8, 2013. Seven different sites within three geographic circles in Thurston County (Figure Three) were reviewed for presence and distribution of Mazama pocket gophers with agricultural commodities and practices. The following presence and distribution criteria were used:

Table 1: Presence Criteria

Presence Classification	Criteria
No mounds present	0 mounds / no evidence
Mounds Present	1-5 mounds per acre
Mounds Abundant	>5 mounds per acre

Landowners were interviewed to determine both current and historical agricultural practices specific to the site. Historic practices generally mirror those currently in existence. The

exceptions are Site #1 and #3 where the differences are limited to the crops grown not the agricultural practice used. Presence was confirmed using mounds that met Mazama pocket gopher specifications and characteristics.

Table 2: Summary of Study Findings

Study Site	Acreage	Agriculture	Agricultural Practices and soil disturbance depth	Gopher Mound Presence
Site #1	1 Acre, 3 Acres	Market Crop Production, Grazed Pasture	Spring Tillage (annual 8-12")	Present in market crop area: No presence in pasture area
Site #2	245 Acres	Grass Hay	Mowing and Harvesting 5-6 times per year (no soil disturbance)	Abundant
Site #3	2 Acres, 3 Acres	Pumpkins, garlic, Apples	Tillage (pumpkin area only), Irrigation	Abundant on periphery of pumpkins; No presence in center of site, in garlic rows, or apple orchard
Site #4	507 Acres	Pasture, Grazing	No-till drilling, mowing	Present
Site #5	137 Acres	Christmas Tree	Stump removal (10 yrs), use of herbicides and insecticides	No Presence
Site #6	202 Acres	Nursery	Sub soiling, tillage, herbicides for weed control	Abundant
Site #7	92 Acres	Conifer Seed Orchard	Mowing between rows, Tilling once/15-30 yrs	Abundant
	1,189 Acres			

Pocket Gopher Evaluation Sites – Description and Findings

Site #1: Agricultural Activity - Market Crop and Pasture

The evaluation results at Site #1 indicated a presence of Mazama pocket gopher mounds within the actively tilled market crop area and no presence within the pasture area(s).

A portion of this site is a small market crop operation including greenhouses, vegetables, and raspberries (1 acre). Agricultural practices (see Appendix One for further Thurston County agricultural practices information) include tillage with a rototiller in the spring and mechanical weeding using a wheel hoe or by hand from summer through fall. Irrigation is conducted via drip tape irrigation. Physical barriers are in place to protect market vegetables from Mazama pocket gopher damage. The landowner provided the evaluation team a tour of the property and provided

detailed descriptions of the pocket gopher activity observed over five years of property ownership. The landowners provided a tour of the greenhouse operation areas enclosed in arched frames and covered (referred to as “tunnels”) where a variety of vegetables were grown, many rooted within a “trough” of fine mesh chicken wire buried in the ground to protect them from pocket gopher damage. The chicken wire extended above the ground, on each side of the row of plants, for about 6 inches to prevent animals from getting in from above the ground. It was observed in many instances there was a raised surface to the ground paralleling the chicken wire on the outside.

Mole mounds were common on much of the market crop operation outside of the greenhouse tunnels. Two *Mazama* pocket gopher mounds were positively identified in rows of vegetables located outside of greenhouse “tunnels”. The first mound surrounded the base of a bean plant and the second surrounded the stalk of a raspberry plant.

Two pasture areas (3 acres) surrounding the market crop site were evaluated for *Mazama* gopher presence; one area had pastured cows on it a year ago and another had cows removed within the previous month. This grazed area is owned by the same landowner and is not tilled. Biologists were unable to identify any pocket gopher mounds in these pasture areas, only mole mounds were identified.

Site #2: Agricultural Activity – Cultivation of Hay

The evaluation of Site #2 indicated a presence of *Mazama* pocket gopher mounds throughout the 245 acre parcel. The presence was characterized as abundant.

The site is a grass hay field that has been in hay production for at least ten years. Agricultural practices include mowing and harvesting five to six times per year. Hay harvested from the field is baled and stored for use later in the year. Manure is spread three times per year during the spring lasting until early fall. Sprinkler irrigation occurs from May through September using hand set sprinklers.



Photo 2. WSDOT Biologist investigating a pocket gopher mound at Site #2.

Biologists walked approximately 25% of the site and had no difficulty locating and identifying fresh gopher mounds in the area where grass hay is grown and harvested several hundred feet from the field border. Gopher mounds extend through the actively managed grass hay field

End note: It was clear there were many underground tunnels in tilled market crop areas with no apparent surface mounds. The soil in these areas was soft, well-aerated and exceedingly friable loam. In the opinion of staff biologists it's likely the gophers do not need to push soil out of their burrows due to the ease of compaction which allow for burrowing without the need to expel soil. This example of one type of variability in mound formation clearly presents challenges to using any kind of mound survey technique to attempt to accurately establish relative abundance of gophers.

including gopher mounds located within 1 meter of the unpaved road that provides primary access to the hayfield. In addition to fresh mounds, a number of old mounds attributed to *Mazama* pocket gophers were observed throughout the parcel. The rest of the hay field was visually inspected to determine and verify the consistency of land use practices on this site.

Site #3: Agricultural Activity- Market Crops

The evaluation of Site #3 indicated a presence and abundance of *Mazama* pocket gopher mounds; however this presence was confined to the peripheral areas of the 5 acre parcel. The primary crop grown on Site #3 is pumpkins but also contained some garlic (total of 3 acres), a few apple trees (2 acres) and a mowed area. This site has been in pumpkins or market crops for at least three years. Agricultural practices include shallow depth tillage and sprinkler irrigation.



Photo 3. WSDOT Biologist Kelly McAllister documenting the presence of pocket gopher mounds on Site #3.

Site #3 is adjacent to Site #2 and is owned by the same landowner. One fresh *Mazama* pocket gopher mound was found on the



Photo 4. Gopher mound complex identified on Site #3 by WSDOT Biologist Hans Prudom.

fringe of the pumpkin patch at the edge of the field. A complex of fresh *Mazama* pocket gopher mounds were found in an area of mowed grass (see photograph four). No mounds were found in the middle of the pumpkin field, in the garlic rows, or among the apple trees.

Site #4: Agricultural Activity – Pasture with Accompanying Livestock Grazing

Site #4 is classified as pasture and encompasses 507 acres. *Mazama* pocket gopher mounds were identified at this site and extended well into the pasture area. Agricultural practices include year-around cattle grazing, cross-fencing (fences installed inside a perimeter fence to divide a grazing area into two or more separate paddocks), no-till drilling (every two years if needed in certain areas), mowing for weed control and spot-spraying of weeds with herbicides. This location has been a pasture for more than ten years with some areas hayed prior to that.

Evaluation participants interviewed the landowner and were given advice regarding where to locate evidence of pocket gophers as well as general information about pasture management practices and soil conditions. All three categories of gopher habitat soils (see the Legend in Figure Three) occur within the evaluated area. The landowner maintains extensive pasture for cows, divided by cross-fences to manage the seasonality and intensity of grazing.

Approximately 25% of this site was evaluated, to determine a consistent land use pattern of rotational grazing. A majority of the area had recently been grazed. However at the time of the evaluation cattle were not present. A significant number of weathered mounds were present. These mounds were not definitively identifiable as gopher mounds but appeared to have the irregular shape typical of Mazama pocket gopher mounds. Additional fresh mounds were positively identified as Mazama pocket gopher mounds at a number of locations several hundred feet from the edge of the field.



Photo 5. WSDOT Biologists inspecting areas of the pasture where cattle were currently pastured and identified a fresh gopher mound at Site #4.



Photo 6. WSDOT Biologist documenting the presence of a fresh pocket gopher mound 1 meter from a fence line at Site #4.

Site #5: Agricultural Activity – Christmas Tree Farm/Managed Prairie

Site #5 is the location of a large Christmas tree farm (137 acres) that has been in operation for over ten years. No pocket gopher mounds or other evidence were observed in the areas of the farm that were evaluated. Agricultural practices on this site include stump removal once every 10 years occurring randomly throughout the site, herbicide application once in the spring and two annual insecticide applications between spring and fall. Pesticide use on this site has kept much of the vegetation at a minimum between rows. There were some sparse weeds and grasses that grew sporadically throughout the site.

Approximately 95% of this site was physically walked; the rest was viewed from a distance to determine that agricultural land use practices are consistent throughout. Evaluation participants reviewed the Christmas tree growing area inspecting between the rows of trees. No evidence of pocket gopher mounds was present. Evaluation participants failed to observe any fresh or weathered mounds that could be attributable to either moles or pocket gophers. Lying between the two Christmas tree fields was an open prairie that was also evaluated (acreage not calculated). This prairie contained grasses and weeds. It is managed by The Nature Conservancy not the landowner of the Christmas tree farm. No presence of pocket gophers was identified either within the prairie or at the parcel margins.

Site #6: Agricultural Activity – Commercial Nursery

Site #6 is utilized as a commercial ornamental plant nursery (202 acres). Mazama pocket gopher mounds were present and abundant. Agricultural practices include subsoiling², tillage with a rototiller, mechanical weed control using a cultivator between rows, sprinkler irrigation, and pre-emergent herbicides from spring to fall. Depths and timing for tillage activities can be found



Photo 7. Identified pocket gopher mound between rows of Sugar Maples

in Appendix One (Nursery).

Approximately 50% of this property was walked by staff.

The rest of the property was viewed to determine it had consistent land use practices.

Nursery management staff guided evaluation participants to the areas in the field several hundred feet from the edge where severe damage to nursery stock was occurring. Within rows of Norway and Sugar Maples dead plants were observed with their roots completely missing. There was evidence the roots had been severed by what appeared to be rodent teeth. In many places well defined pocket gopher mounds were not recognizable but the soil was obviously raised up around the plants, obscuring substantial portions of their lower stalks. Biologists probing the ground in these areas obtained evidence of underground runways, ranging between 2 to 4 inches below the surface. Fresh pocket gopher mounds were identified in areas of the nursery, especially in rows of Sugar maples. Rows of Burning Bush and Barberry also had extensive gopher runways and soil upheaval. These mounds were observed well within the boundaries of the parcel (100 feet +).

Site #7: Agricultural Activity – Conifer Seed Orchard

This parcel (92 acres) has been managed as a conifer seed orchard for over thirty years. Mazama pocket gopher mounds were present and abundant. This property is devoted to the propagation of conifer seeds for reforestation. Agricultural practices include mowing, sprinkler irrigation, and to a lesser extent subsoiling once every 15 to 30 years at the time of planting and only along tree rows. Mowing is performed between rows regularly from spring to fall. Irrigation is applied during the summer. Frequency of irrigation depends on age of tree and type of growing or pruning on the given block (less water on mature trees) and in all cases enough to keep the tree alive with good cone production.

² *Subsoiling is a practice where an implement is used to loosen and break up soil at depths below the level of a traditional disk harrow or rototiller.*

Approximately 5% of the site was walked and the east side of the field was viewed, interviews from staff were conducted to determine the consistent land use throughout is conifer seed production.



Photo 8. Identification of pocket gopher mounds between rows of small conifers

This property has a very long history of seed production operation and presence of Mazama pocket gophers. However, gopher damage has and continues to pose a challenge to the land owners. The damage is fairly limited, involving perhaps a dozen trees per year. Orchard staff do not presently employ any gopher control measures.

Evaluation participants learned the presence of pocket gophers on this property was the impetus for a recent meeting between Executive management staff of the WA Department of Natural Resources and the U.S. Fish and Wildlife Service. In addition, Washington Department of Fish and Wildlife staff recently trapped five gophers on

the property as part of a genetic sampling project.

Pocket gopher mounds were readily observable upon examination of the areas between the rows where small conifers were being raised for reforestation projects.

Mazama Pocket Gopher Site Evaluation Conclusion:

The evaluation was conducted to determine pocket gophers presence and distribution within areas of current agricultural practices. A total of 1189 acres of various types of agricultural activities in seven different sites of Thurston County were evaluated. There are a total of 15,369 acres of agriculture located within the geographic range of the Mazama pocket gopher in Thurston County. Those areas are south of Interstate 5 and east of the Black River. The evaluation encompassed approximately 8% of the agricultural land occurring within the area identified as potential pocket gopher habitat. All or portion of six of the seven sites evaluated were determined to have pocket gopher mounds present either within areas being managed, or immediately adjacent to current agricultural practices ranging from grazing to annual tillage.

Based upon the finding of this evaluation, within our previously defined focus areas, there is evidence that Mazama pocket gophers are present within or adjacent to many of the areas where agricultural activities are currently being conducted in central to south Thurston County.

Site #5 (Christmas tree farm) was the only site that had no pocket gopher presence (0 mounds / no evidence). We hypothesize that the lack of pocket gopher presence could be attributed to the use of pesticides employed as part of the practices on this parcel. It is possible that populations of

burrowing rodents may be indirectly impacted if pesticides use greatly limits the availability of food sources. In contrast, pesticides have also been widely used in Site #6 (Ornamental Nursery), but evidence suggests that this nursery stock is a good food source and gophers at that site are abundant.

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Appendix One

Thurston County Agricultural Practices Inventory

Thurston County Agricultural Practices

*By Thurston Conservation District and Washington State Department of
Agriculture*

Introduction

The purpose of this document is to provide basic information on agricultural practices for the major crops in Thurston County to local, state, and federal agencies so informed dialog and decisions can occur between the various agencies and local growers. This is especially useful when agencies are analyzing overlap between agricultural land use, species presence, and priority habitat. The top ten crops (by acres) grown in the Thurston County are included in this document and include maintenance practices and land use activities. Although shellfish is the dominant crop according to total acreage, it is not included in this document. The local agricultural information for this document was obtained jointly from the Thurston Conservation District (Thurston CD) and Washington State Department of Agriculture (WSDA). The Thurston CD has invaluable experience working one-on-one with local growers and is very knowledgeable on county agricultural management practices. The agricultural practices in this document are accompanied by photo examples and are for educational purposes only and don't acknowledge or recommend a particular brand of equipment. WSDA has been mapping agriculture in Thurston County for over ten years and has the location of crops well documented. The following WSDA map shows where agriculture is located in the county, with the dominant crop in each section of land symbolized. To access WSDA data, go to <http://agr.wa.gov/PestFert/NatResources/AgLandUse.aspx>.

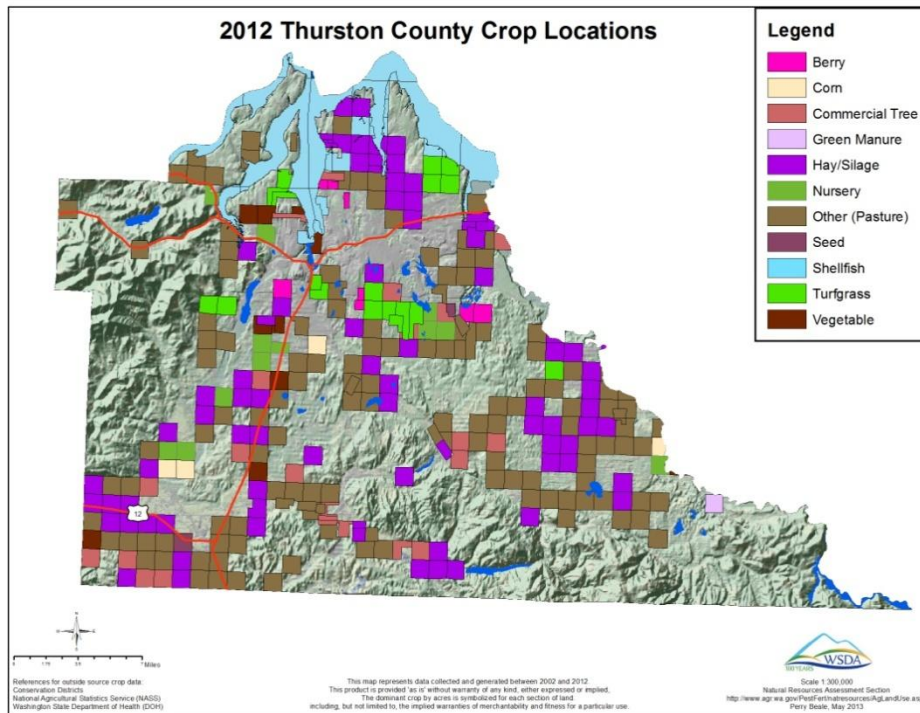


Figure 1. 2012 Thurston County Crop Locations (WSDA, 2012)

Pasture (10,000+ acres)

Pasture is the land use category that accounts for the largest acreage in Thurston County. This is land grazed by livestock at some point. Sometimes this land is also hayed.

Tillage: Pastures are tilled infrequently to reseed, averaging once every 15 years. Tillage is done in the fall and occasionally in the spring, usually with a moldboard plow and/or disk (Photo 1). After plowing, the ground is disked to further break up the soil (Photo 2).



Photo 1.



Photo 1.

Tillage depth averages around 8 inches, but can be as deep as 12 inches. Newly seeded pastures are seeded often in September in order to have the winter rains to germinate, but

may also be done in the spring. Establishment before the heat of summer is critical for survival.

Maintenance: (1) Fertilization is common, with manure or commercial fertilizer. The application of manure (also referred to as nutrient management), occurs from late spring to early fall. Manure can be applied either as a solid (such as compost) or as a liquid and pumped onto the field with a specialized tanker truck or trailer or through a big gun. (2) Weed control is usually accomplished from spring to fall by mowing (Photo 3), with broadleaf herbicides being used less frequently.



Photo 2.

(3) Harrowing is often done from spring through fall. A harrow is a tined implement that breaks up and spreads the manure clumps but disturbs only the surface of the soil. (4) Grazing by livestock may be year-around.

Irrigation: Very little irrigation occurs on pastures, (<1% according to WSDA data). When fields are irrigated it is usually via a sprinkler system. This could include a hand line, wheel line or “big gun” (a single large-flow sprinkler head that is mounted on a movable frame (Photo 4).



Photo 3.

Grass Hay (approx. 6000 acres)

Grass hay is a forage crop that is harvested for hay, haylage or silage for livestock feed.

Tillage: Grass hay land is tilled infrequently, averaging once every 10 – 15 years. Tillage practices, equipment, and timing are similar to pastures. A nurse crop such as oats is planted with a new grass seeding approximately 50% of the time. The nurse crop helps protect the new grass, reduces weed pressure, and provides additional forage for harvest.

Maintenance: (1) Fertilization commonly occurs from mid-February to early fall with manure or commercial fertilizer. (2) Weed control is common with broadleaf pesticides.

Harvest: A sickle-bar mower (Photo 5) or disk mower (Photo 6) is used to harvest the forage once to several times per year from late spring through late summer. A common term for a single harvest of forage is cutting.



Photo 5.



Photo 6.

After the grass is mowed, it is teddered (which fluffs the hay to help with drying). It is later raked into rows to allow the grass to dry properly (Photo 7) and to prepare for the final stage of harvest. It will either be harvested as silage or baled for hay or haylage. Silage contains more moisture so harvest is usually in early May or June when weather is not as good. Silage is often stored in covered piles to allow fermentation. Harvesting hay or haylage may be from May through August. With haylage, the bales (usually round) are wrapped in plastic to allow fermentation (Photo 8). If harvested for hay it is baled as round or square bales (Photo 9). If hay is baled too wet and then stacked, heat will build and spontaneous combustions may occur with a threat for fire.



Photo 7.



Photo 8.



Photo 9.

Irrigation: According to WSDA data, approximately 20% of the grass hay is irrigated from May - September. Sprinklers, big gun, and wheel lines (Photo 10) are used. Irrigation increases the number of cuttings to three or four per year. Irrigation also increases fertilizer requirements.



Photo 10.

Golf Course (Approx. 1000 acres)

Golf courses are included in this document due to the number of acres and the nature of this commodity having limited tolerance for pest damage.

Maintenance: Fertilization, mowing, and pesticide use is done on a regular basis from spring through the fall. Common pests include disease, weeds, and moles.

Irrigation: May through September.

Christmas Trees (800+ acres)

Christmas trees are considered an agricultural crop in Thurston County.

Tillage: Rare and only at establishment (every 8-10 years).

Maintenance: Disease, insect, and weed pressure require pesticide use from March throughout the fall. Shearing occurs in the late summer or fall (Photo 11). Some mowing also occurs between rows, where less chemicals are used.



Photo 11.

Harvest: Christmas trees are harvested every 7-10 years either commercially or U-cut from November to Christmas.

Nursery, Silviculture (approx. 500 acres)

Silviculture nursery crops include those primarily grown for commercial forestry plantings (Photo 12).



Photo 12.

Tillage: Tilled every 1-2 years using moldboard plow and disk.

Maintenance: Regular use of commercial fertilizer and pesticides, including fumigation.

Irrigation: Sprinkler irrigation from May – September.

Fallow (400+ acres)

Fallow refers to idle agricultural land which is either short-term or long-term, and may be tilled or not.

Tilled Fallow: This is considered temporary fallow and will go back into production soon, typically within a year. Tillage is done for weed control and is usually with a moldboard plow and/or disk.

Non-tilled Fallow: Although generally unmanaged, occasionally this land may be hayed. Non-tilled fallow also includes land that is only mowed for aesthetics or weed control and not hayed. Mowing occurs on this fallow ground from spring to summer.

Either one may also have herbicides applied for weed control.

Sod Farm (approx. 400 acres)

Sod farming involves growing turfgrass that is harvested (known as sod) for home or commercial lawns. Sod is harvested once or twice a year and involves a harvester that cuts and separates the sod roots from the soil.

Tillage: Intensively tilled as compaction occurs during regular maintenance and harvest. Tillage is from March through November and includes plowing, disking, subsoiling (Photo 13), rotary harrow (Photo 14), packing, and leveling. A subsoiler may till 1 ½ to 2 feet deep.



Photo 13.



Photo 14.

Maintenance: A primary objective of turf production is to promote growth, so commercial fertilizer is used frequently and intensively from March through October. Herbicides are used during the entire growing season and are primarily applied to newly seeded fields and those close to harvest. Insecticides are used if pests such as crane fly exist. Fumigants are sometimes applied to control grassy weeds.

Field Corn - (300+ acres)

Field corn is grown for silage in Thurston County and is typically the primary crop, with occasional double croppings of triticale. The second crop is typically planted in the fall (after corn harvest) and harvested for silage in May or June. The field corn can be “Round-Up Ready” which means the non-selective pesticide glyphosate can be applied to control weeds after the crop has emerged without damage to the crop.

Tillage: Occurs twice a year, once in the fall and once in the spring prior to planting of each crop. A chisel plow is used first (Photo 15), then disked. Chisel plows can till deeper than a moldboard plow, 1 - 1 ½ feet deep.



Photo 15.

Maintenance: (1) Fertilized typically with manure. (2) Glyphosate (e.g. Round-Up) is applied for weed control to corn in May or June.

Irrigation: Big gun and center pivot irrigation from May through September.

Market Crops (400+ acres)

Market crops are primarily vegetable crops grown for the fresh market – farmer’s markets, Community Supported Agriculture (CSA’s), etc. These farms are also known as truck farms and are mostly organic produce in Thurston County.

Tillage: Tillage occurs annually from March through October primarily using rototillers (Photo 16). Tillage depth for rototillers is approximately 6-8 inches. Plows and disks are used for tilling new ground.



Photo 16.

Maintenance: (1) Fertilization is primarily with manure or compost and must be applied according to organic rules. (2) Weed control is mechanical through tillage or hoe. (3) A small percentage of these farms also run free range chickens on fallow ground prior to planting market crops.

Nursery, Ornamental (approx. 250 acres)

Ornamental nurseries include shrubs, trees, annual and perennial plants for landscapes.

Tillage: Tillage occurs every one to three years with a moldboard plow, disk, or rototiller.

Maintenance: Managed similar to silviculture nursery.

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