

Town of Friday Harbor Watershed

Trout Lake Forest Assessment

10/21/2019
CROWNFIRE FOREST PLANNING, LLC.
Boyd Norton, Managing Forester



Forest Management Summary

Town of Friday Harbor

October 2019

Landowner: Town of Friday Harbor
C/O Duncan Wilson, Town Administrator
P.O. Box 219
Friday Harbor WA 98250

Location

SESE ¼; SWSW ¼ S12 T35N.R4W; NENW ¼ GL-1, GL2, SENW ¼, SW ¼, SWSE ¼ S18 T35N.; GL182, NWNE ¼, NENW ¼, SENE ¼ NESE ¼, S13T35NR4W. W.M.

A Forest management summary is intended to convey information and guidance to landowners. This summary is based on a site sample and orthophoto interpretation, to develop an overview of the ownership. Where appropriate, specific management recommendations have been made, at a stand/unit level. Recommendations are made using standard silvicultural practices, based on current forest conditions, which mimic natural disturbance.

All recommendations are for the landowner's information. The landowner is responsible to determine which practices are acceptable, the exact extent and the timing of individual practice recommendations. Decisions are based on the landowners' preference and overall objectives.

OVERVIEW OF THE PROPERTY

The Town of Friday Harbor owns approximately 590 acres consisting of mature forest and the town reservoir. No timber harvest has been conducted since the 1990's. The town has not harvested more than 2mmbf of timber in any calendar year. The town meets the definition of a Small Forest Landowner as designated by the Washington State Forest Practice Rules and Regulations. The town qualifies for Small Forest Landowner Programs and Forest Practice Applications.

Ownership is the Trout Lake Watershed on San Juan Island, in San Juan County, Washington State. The reservoir provides drinking water to the town. The ownership consists of approximately:

- 590 acres. Purchased in several transactions over the years, County records do not show the dates of each transaction. The original dam is circa 1920, which is still in place, has been breached. Replaced with a newer dam upstream to increase the capacity of the reservoir.
- +/- 523 acres forested.
- Reservoir +/- 67 acres.
- +/- 3 miles of improved forest road.
- +/- 0.6 miles of old forest road; brushed, drivable by 4x4 vehicles.

The ownership appears to have been harvested in the 1920's. The second growth stand is approximately 100 Yrs. old. The age class is consistent across the majority of the ownership. Several small areas of young forest exist, presumably on parcels that had some silvicultural practice prior to the town's purchase. Timber is in generally good health; there is approximately 38 acres in small concentrations, of disease normally found in old forest structure.

The west side of the lake shows signs of a forest type typical to dry site Douglas-fir stands. Large, wind swept, large limbed, widely spaced trees with low understory brush and savannah type grass. Scattered areas consist of steep slopes with open balds, typical to the islands, mainly to the north and west of the reservoir. These areas are vegetated by grasses, moss, old forest and second growth Douglas-fir. The east side of the lake is more common to western Washington with normal amounts of brush, salal and ocean spray in the understory.

Throughout the ownership scattered old Douglas-fir show signs of surviving old fires most likely from:

- Native American activity.
- Settlement.
- Slash burns after the original logging.
- Historic large fire occurrences were not researched for this report.

Scattered areas consist of steep slopes with open balds, typical to the islands mainly to the north and west of the reservoir. These areas are grasses, moss, old forest and second growth Douglas-fir. The ownership also consists of scattered patches of invasive species found throughout the Pacific Northwest.

Existing forest roads are in reasonably good conditions; several stream crossings through class F streams (streams meeting fish habitat conditions) do not meet State of Washington Forest Practice Rules and Regulations.

A small dilapidated standing log structure, and household debris, typical of a historic cabin site, is located just north of the mainline and west of the access gate.

FOREST HEALTH/WILDFIRE/INVASIVE SPECIES

Considering the age of the forest, there are few health issues. The stands have good crown to height ratio, 40% to 60%. Forty percent is considered the minimal needed for sustained growth and health. The areas of root and/or heart disease are not wide spread. Approximately 38 acres of concentrated health issues in seventeen areas were large enough to map. Laminated Root Rot is generally associated with older stands. There was no evidence of this disease. Probably in part to this ownership being predominantly second growth timber. Rather than 3rd or 4th growth, similar to commercial forest lands in western Washington. Drought has affected the mid-size western redcedar in areas of heavy concentrations along the riparian zones and in several of the lower, moist soil areas. This has been common in western Washington over the last 4 years.

Common forest diseases noted are:

- **Annosus.** Found throughout, Washington, causes severe root and butt decay and tree mortality. Because of the dry site conditions in the islands, stands of Douglas-fir can be severely damaged. Annosus is hard to control because the effects can be increased by ground based uneven-aged harvest methods.
- **Armillaria.** Found throughout Washington, causes severe root rot, butt decay, growth loss, and mortality. In northwestern Washington, Douglas-fir is readily killed. While it is mainly observed in young stands it is also found in mature forest stands.
- **Gray brown sap rot.** Widely distributed in Oregon and Washington. It causes decay in the outer ½" to 1". It plays an important role in the beginning of wood decay. It can cause considerable loss on dead trees scheduled for salvage. Two-and three-year-old conks can indicate up to a 4 inch diameter reduction to the scaling cylinder.
- **Schweinitzii root and butt rot.** Usually found on Douglas-fir. Also may be found on western redcedar, western hemlock, and grand in Oregon fir. The fungus causes severe root and butt decay of older trees. Wind breakage above the soil line is the most common indicator.
- **Red ring rot.** Found throughout the northwest. It causes it causes pocket rot in the heartwood. In western North America it is considered the most common and widespread heart rot organism. The impacts are most noticeable in older stands, in pure stands on steep slopes and shallow soils.

It is important to remember these pathogens are common to northwest forests. They are part of the forest ecosystem and play a role in recycling nutrients. The issue becomes one of not meeting the landowner's goals, deteriorating valuable wood products, slowly root grafting through a stand and can move onto neighboring

ownerships. As they deteriorate wood integrity, the decay process begins to give off stored carbon. In major outbreaks such as the bug kill in British Columbia, can actually reverse the carbon storing capacity of the forest and create a carbon sink.

See suggested recommendations in forest inventory, timber and wood products discussion.

Invasive Species.

Noted throughout the ownership is Himalayan blackberry, holly, tansy, and scotch broom.

Mitigation strategies:

Blackberry and Holly are controlled by:

- * Severing the stems and treating the stem and foliage with herbicide.

Tansy and Scotch Broom can be treated by:

- * Pulling,
- * Treating with herbicide prior to flowering.
- * Controlled biologically with the use of Cinnabar Moths. These moths will attack the flower and eventually the tansy will be eradicated
- * Scotch Broom is easily removed with the use of a Weed Wrench, some county weed boards and conservation districts have them to loan. They are simple to use and can easily remove most of the roots.

Broom is an invasive that needs to be controlled before flowering and seed disbursement. Seed will maintain viability for up to 70 years in Pacific Northwest soils.

County weed boards and conservation districts normally have recommendations tailored to the local area.

Wildfire.

Wildfire is one of the main concerns of the landowner. The main ownership is mature conifer with no ladder fuels, low brush and savannah grasses. Humidity seldom drops below 30 % in the basin. The east side of the basin is common in vegetation and soil moisture to western Washington. While not flammable, Salal contains waxes and resins which can carry the spread of fire. Normally the plants partially burn and the dead dry leaves and forest litter under the plants can carry a slow moving fire. These factors reduce, not eliminate, the concern for a fast moving stand replacing fire. We know there is a 300-500 year major fire occurrence in western Washington.

Most of the area fire threat would not benefit from silvicultural activities. There are several areas scattered along the balds and a portion along the north property line that could benefit from pruning, thinning and pile burning or chipping. A stand of sapling Douglas-fir, lodge pole pine and red alder exists northwest of the pump house, just inside the gate, that could benefit from a silvicultural treatment. Minimal access, egress and turn arounds for fire apparatus and personnel is a concern.

See additional suggested recommendations under wood products and road management

Wildfire mitigation/Recommendations:

These recommendations are offered as a starting point and may need to be changed over time with changing climate and weather patterns:

- o Having the area posted and reducing public access is probably the number one activity that will reduce the threat on this ownership.
- o Maintain improved roads by grading annually.
- o Remove over story vegetation along improved roads. Standards are ½ the crown width of dominate trees, beyond the ditch line, as well as any tree on cut slopes, diseased and/or leaning towards the roads.
- o Replace crossings to allow for appropriate grade width, for safe access.
- o Reestablish or improve turnouts along the main road. A high priority may be the road from the lake to the Dallas Mountain road

- Improve larger areas similar to the parking area at the north end of the lake, increase the cleared distances at road intersections
 - Improve permanent communications infrastructure. A county repeater located to expand existing coverage to include the entire basin, a cell tower, or a mobile repeater that can be deployed to areas with no communications. Standard Wildfire orders require constant communications on the line and back to the command post.
 - Open, repair, remove overhead vegetation and map all old roads/trails that extend existing roads or provide access to areas currently not accessible. Roads should be reconstructed to allow for turnouts or safety zones for crews and equipment. Use recommendations from the local fire service or contact the local WA. DNR wildfire office for review and recommendations.
 - Use a brush cutter mounted on a tractor, excavator or bob cat type equipment to cut and remove vegetation for a distance of 12' on each side of the main roads. Also use this approach for creating a low fire break between the county road and around adjacent property lines
 - Look for opportunities to work with the Firewise development on Dallas Mountain and the Land Trust to establish shaded fire breaks and trails adjacent to common property lines.
 - Clear more area and improve the site at the dam to allow for tender filling. This can allow for fire apparatus to fill quickly. A Stand pipe with a dedicated pump might be one consideration. Or room for equipment to turn around and two porta tanks. Create a fill site at the north end of the lake, the Westside just south of the road to Dallas Mountain. If the portion of the ownership which crosses Dallas Mountain road is not developed as a communication site, clear it well enough for two porta- tanks and room for equipment to turn around.
 - Work with the land trust for access and developing a turnaround pump site at the end of the road above the NE property corner.
 - Purchase a trailer mounted 250-500 gallon water with a pressure pump and a hose supply for use during pile burning or under burning operations. See. WA DNR. Fire Tool requirements for outfitting the system.
 - Under burn or pile burn patches of mixed forest-mainly madrone to remove leaf and litter fall. Burn piles of slash associated with timber harvest and opening of forest roads and cut vegetation long the mainline
 - Consider using a ICS certified burn boss, with the appropriate manpower and equipment to pile burn, under burn, or broadcast burns.
 - All water District employees should be trained in basic wildfire suppression and safety.
 - Work with fire service and the airport to develop a plan and area for an incident rotor base, and a possible retardant batch plant.
- Establish pre-agreements with landowners, owning large fields in or near proximity to the basin. This action may benefit other incidents outside of the basin for:
- Rotor bases and batch plant locations
 - Incident Management Command Post and base camp,

WATER QUALITY/ RIPARIAN AND FISH HABITAT

Water quality and riparian function are not a concern. The forest is a mature stand of timber providing more than adequate shade, bank stability, large woody debris, and nutrient input. Native Fish habitat based on the State of Washington Forest Practice Rules and Regulations exists on three mapped streams. There are three unmapped streams, indicated on the enclosed maps, which may be considered fish habitat. According to the Water District the only fish are bass and crappie. Native species of trout or salmon do not exist in the lake and have not been seen in the stream leading from the reservoir to the salt water. Because the dam has been in place since the early 1900's the existence of salmonid species is extremely low. Habitat is in excellent condition, the conifer dominated stands in the basin are approximately 100 years old. The only harvest was the removal of blowdown after the 1990 storms There are some items that need addressing associated with the road system, which will be addressed in a later section of the report.

INVENTORY/TIMBER/WOOD PRODUCTS

The landowner has the option to apply all or some of the practices based on their goals and objectives. If no practices are applied, the forest will continue to develop through natural disturbance. Many watersheds are managed on the concept of maintaining forest health, stand variability, and succession using silvicultural methods. All recommendations are based on silvicultural concepts which mimic the natural process of forest development. These practices can be applied to move the stands closer to theoretical old forest habitats, stand species variability and varying wildlife habitats. Because of the current age and condition of the ownership management practices will not change the current overall wildfire potential. Prior to harvesting timber and silvicultural practices the land owner should consider:

- ✓ A timber cruise to establish value and grades. Timber should be considered for export, specialty wood, saw logs, poles and piling.
- ✓ Units should be designed by a consulting forester or the town working with a competent logger. Layout should facilitate road location and unit boundaries that can be used for future harvesting without major changes.
- ✓ Timber can be sold lump sum or by the board foot. Bids should be obtained from several logging companies and should always be by written contract. WSU Extension Forestry has some excellent recommendations for items to cover in a harvest contract.
- ✓ Prior to selling timber adjacent to property lines. The lines should be ran, staked and blazed by license surveyors. A signed agreement on the location with neighboring landowners is also a good idea.
- ✓ Uneven aged harvest should be by marked tree or very specific guidelines for size, species, spacing.
- ✓ Contracts should contain a clause for unacceptable damage to leave trees. Usually some percentage of damage is acceptable. Any above the agreed to limit should be reimbursed to the land owner at triple the stumpage value.
- ✓ Prior to starting any silvicultural operation the landowner should consider developing an Integrated Forest Stewardship Plan.
- ✓ Prior to beginning harvest active obtain an approved Long Term Forest Practice Application. The stewardship plan provides a road map for long term management; the long term application is good for 15 years and allows for flexibility to meet changing forest and market conditions.
- ✓ Permits will be required for any road improvement outside of the existing road prism, stream crossings, and timber harvest within/outside of the regulated riparian and shoreline zones. Some work within the riparian and shoreline zone may be applied for on a case by case basis...
- ✓ Contact the local WA. DNR Forest Practice Forester for determination of permit requirements.

Forest inventory and sampling shows the stands within the basin to be relatively consistent across the ownership. Where accessible areas of stands 1, 2 and 5 should begin treatment with an un-even age silvicultural treatment in the next 3 years and completed by 2027 or earlier based on changing stand conditions. Uneven-aged treatments apply the process of commercial thinning to improve stand health, decrease competition for limited resources and increase growth rates. Thinning is accomplished from below removing suppressed, intermediate and codominant trees. Along with variable density thinning the process creates openings allowing for patches of varying species and wildlife habitat. Variable density thinning can provide opportunities for planting shade and non-shade tolerant species. This increases diversity and resilience. For reporting purposes the ownership is divided 5 stands:

- **Stand 1:** Runs the east side of the lake from the southern boundary to approximately the northeast corner of the ownership, approximately 156 acres.
- **Stand 2:** Runs from the southern boundary along the west side of the lake around the north end and to a point intersecting stand 1. This separation is based on stocking and understory vegetation. Within each unit are several small inclusions of younger trees, hardwoods and balds, approximately 258 acres.

- **Stand 3:** Is scattered areas of disease large enough to map. These stands account for 36 acres within the ownership.
- **Stand 4:** is approximately 25 years in age and approximately 10 acres.
- **Stand 5:** 200' riparian zone from the high water mark and the bank full width of the type F waters, approximately 63 acres.

Stand 1: Is a mature forest with fairly heavy understory of ocean spray, salal, and salmonberry. The dominate species is Douglas-fir approximately 100 years in age, with small patches and scattered subspecies throughout the stand. The stand consists of:

<i>Species</i>	<i>DBH Range</i>	<i>Ave. DBH*</i>	<i>STA Range</i>	<i>Ave. STA*</i>
Douglas-fir	4-36	13	50-260	105
western redcedar	12-22	13	10-80	45
red alder	6-14	11	10-50	40
madrone	2-22	8	10-150	50
lodgepole pine	8-22	18	40	10

* *Diameter at Brest Height- 4.5' above the ground, recorded in inches.*

* *Stems Per Acre*

* *Crown to height ratio. % of live crown.*

The dominate species throughout the stand is Douglass-fir followed by western redcedar. Red alder, madrone and lodgepole pine are in scattered concentrations which are not manageable on their own, unless the landowner desires to actively manage the stand at the sub-stand level. Normally these stands are managed as inclusions with applied appropriate silvicultural prescriptions. Money generated from the harvest can be used to improve sapling stands, roads and reforestation where needed.

Douglas-fir stands averaging 13"DBH should have 151 to 109 trees per acre, and a crown ratio of no less than 40%. One sample found 260 trees per acre and 12" DBH and 260 trees per acre. This would represent a stand less than 10 acres in size. Which is well within the range of managing as the larger stands are addressed. The stand as a whole is within manageable standards.

Recommendations for consideration:

- Within the next 3 years this 156 acres of mature forest should be treated with an uneven-aged harvest consisting of patch cuts and commercial thinning.
- Maintain old growth trees, left from original disturbance, as legacy trees and wildlife habitat.
- Reducing the average density to 109 trees per acre. Some areas will have no to a few trees removed, others will have a fairly heavy harvest.
- Focus on reducing patches of disease and planting species which are more tolerant to a specific pathogen. This practice is referred to as variable density thinning and creates a mosaic of stand conditions across a landscape. Leave dead and dying trees, where safe, to maintain and create future cavity nesting habitat.
- Some species are vulnerable to the same pathogens affecting Douglas-fir. Douglas-fir is one of western Washington's most drought tolerant species. As the climate changes, converting from Douglas-fir to an alternate species, resilient to climate change and similar pathogens becomes problematic. Unit design should be based on disease and pest infestations, markets and income required. After the first entry additional harvests would be conducted to remove blowdown as needed.
- Develop future management units based on access, slope and topography using uneven-aged harvest methods. For continued intermittent harvest beginning after the entire ownership has been treated. An eventual target of 48 dominate trees per acre is recommended.

- Or, once the entire ownership has been treated. Future management units averaging 22 acres could be even-age harvested every 5 years to establish rotational stand development creating a multistory and multispecies stand.
- Minimize new road construction by developing existing roads
- If not in existence create a municipal code or management account for timber receipts to be used only within the watershed.

Stand 2. Is approximately a 258 acre mature forest with fairly low brush species and light savannah type grasses in the under story. Under story is typical of mature forests with deep soils; fern, nettle, canary grass salmonberry in the lower elevations and shallow soils in the higher elevation with, wild rose, scattered ocean spray, moss and residual scattered old forest Douglas-fir . The stand consists of Dominate Douglas-fir approximately 100 years in age, with small patches and scattered subspecies throughout the stand. Western redcedar and western hemlock exist on wetter sites in draws on the south end of the stand

<i>Species</i>	<i>DBH Range</i>	<i>Ave. DBH*</i>	<i>STA R.range</i>	<i>Ave. STA*</i>
Douglas-fir	2-42	16	10-190	124
western redcedar	10-30	18	10-130	70
red alder	8-14	11	30-50	40
madrone	2-22	8	10-150	48

The dominate species throughout the stand is Douglass-fir followed by western redcedar in wet areas, alder,& madrone are in scattered concentrations which are not manageable on their own, unless the landowner desires to actively manage these areas as separate units. Normally these stands are managed as inclusions with applied appropriate silvicultural prescriptions. Money generated from the harvest can be used to improve sapling stands, roads and reforestation where needed.

Douglas-fir stands averaging 16"DBH should have 109 to 87 trees per acre, and a crown ratio of no less than 40%. .The stand is approaching the average crown ratio of 40%. This is the minimal for optimal growth and health. The stand as a whole is still within manageable standards.

Management recommendations for consideration:

- Within the next 3 years, begin treatment with an uneven-aged harvest consisting of patch cuts along with the thinning.
- Maintain old growth trees, generally associated with bald areas and thinner soils on hill slopes south of the Access road to Dallas Mountain and the far NE corner of the ownership, These trees are great wildlife trees and represent the legacy of the old forest.
- Reduce the average density to 109-87 trees per acre. Some areas will have no to a few trees removed, others will have a fairly heavy harvest.
- Focus on reducing patches of disease and planting species which are more tolerant to a specific pathogen. These scattered patches are generally less than 0.5 acres in size. This practice is referred to as variable density thinning and creates a mosaic of stand conditions across a landscape. Leave dead and dying trees, where safe, to maintain and create future cavity habitat.
- As the climate changes, converting from Douglas-fir to a particular species resilient to pathogens infecting Douglas-fir becomes problematic. Douglas-fir is one of western Washington's most drought tolerant species.
- Unit design should be based on disease and pest infestations, markets and income required. After the first entry additional harvests would be conducted to remove blowdown.
- Develop future management units based on access, slope and topography using uneven-aged harvest methods. For continued intermittent harvest beginning after the entire ownership has been treated.

- This stand contains patches of mixed madrone and Douglas fir, mainly in the area north of the lake and adjacent to the east side of the mainline. These stands can be thinned to remove madrone that is overgrowing and competing with the Douglas-fir. Thinning slash can be chipped where access allows and piled and burned to reduce fire danger. If the choice is to not apply a silvicultural prescription it is a recommendation to under burn these stands.
- Or after the entire ownership is treated. Future management units averaging 22 acres can be harvested as shelter wood stands leaving 9 dominate trees per acre and reforested with commercial seedlings.
- Or, once the entire ownership has been treated. Future management units averaging 22 acres could be even-age harvested every 5 years to establish rotational stand development creating a multistory and multispecies stand.
- Or, once the entire ownership has been treated. Future management units averaging 22 acres could be even-age harvested every 5 years to establish rotational stand development creating a multistory and multispecies stand.
- Or, after the entire ownership is treated, stands in the rock outcrops south of the access road to Dallas Mountain. Management units averaging 22 acres can be harvested as shelter wood stands leaving 9 dominate trees per acre, logging debris burned and not reforested. This practice may create a savannah type forest consistent with the original old forest ecosystem. An FPA Alternate Plan will be needed for this type of project.
- Minimize new road construction by developing existing roads.

Stand 3. Same timber type as stand 1 and 2. The largest continuous unit of this stand is within stand 1. Mapped areas of this stand type are designated on the map, scattered throughout the ownership. A plan to remove as much of this unit as practical should be developed in the next 2 years to limit economic loss.

Management recommendations for consideration:

- Within the next 3 years complete an even-aged harvest of the affected area and a two tree width buffer of healthy trees. This should slow the spread of the pathogens.
- Site prep prior to reforestation should be done as soon as possible. This includes burning piled logging slash and treating the brush species either by hand or ground application of herbicide.
- Reforestation needs to occur the first planting season after harvest is completed. Seedlings per acre should be 300-400 per acre of species other than Douglas fir. Choices are
 - Lodgepole Pine (*P. contorta* var. *latifolia*) this variation is not shore pine.
 - Ponderosa Pine
 - Gary Oak
 - Pacific Madrone
 - Red Alder
 - Sequoia off site species that may do well as climate changes
 - Port Orford Cedar off site species that may do well as climate changes
 - Offsite conifer species should be mixed with common conifers of western Washington
 - Douglas fir can be planted at a minimum of 400 per acre. Thinned to 220 per acre at age 30, thinned to 100 per acre at age 50 and harvested in an even-aged harvest at age 70.
 - Reforestation can be with a mix of species above. Except hardwood species should not be mixed with conifer.
 - Plantation maintenance will be needed for the first 6 years to remove competing vegetation or until the preferred species are free to grow without competition.

Stand 4: Stand 4 is approximately 10 acres, a sub stand within stand 1. It is an area that had been cleared approximately 25 years ago. It consists of sapling Douglas-fir, lodgepole pine and red alder. The stand has an average diameter of 4" and 350 trees per acre.

Management recommendations:

The stand needs to be pre-commercially thinned (thinned to waste) to a spacing of 220 TPA or an average spacing of 14'x14'

- Remove all hardwood, sever below the lowest live limb, within 8 feet of a conifer tree
- Remove lodgepole pine within 6' of any Douglas-Fir
- Do not remove any tree over 8" DBH.
- Thin hardwood patches leaving the straightest red alder with the largest crowns.
- Spacing will look erratic at first, but will improve as the crop trees increase crowns.
- Slash should be removed within 50' of the road either by scattering within the stand or chipping.

Stand 5: This stand is the 200' riparian/ Shoreline management zone around the lake and the 110' riparian zone associated with the type F streams.

The Shoreline rules allow for harvesting within the 200' regulated zone. The Limit is 30% of the stems within any 10 year period. Permits are generally required by local regulatory authorities. With this zone is a overlap of Forest Practice Rules (FP) for regulating timber harvest. The FP riparian zone management rules in the basin range from 110' to 140'. They are made up of three zones. The core zone is a 50' wide zone where no harvest is allowed. The inner zone ranges from 43' to 55' for site class III soils and 47' to 35' for site class IV soils. The outer zone is a variable retention of 20 trees for every acre of riparian zone, the width for site class III is 23' to 33' and 37' to 27' site class IV. The rules allow for several options or the development of an alternate plan. Alternate plans need to be approved by the DNR and must show overall protection of riparian function.

Species	DBH Range	Ave. DBH*	STA Range	Ave. STA*	Hgt./% Crown
Douglas-fir	2-36	20	10-120	80	46
western redcedar	2-22	18	40-130	60	60
grand fir	2-58	N/A	N/A	20	N/A
madrone	2-14	8	10-150	50	N/A
red alder	4-14	12	N/A	50	N/A

Red alder, and madrone are in small patches and scattered through the stand. Grand fir is noted in one plot at the north end of the stand, seedlings were noted scattered through this area.

WILDLIFE

The wildlife species in the basin is not representative of species in western Washington. The islands do not have resident elk, black bear, or cougar. Fox were brought in by the early settlers and are still present.

Wildlife habitat is reasonably good and consistent with old forest habitats The habitat varies from open grass and shrub to shrub step rock out crops, heavy/dense conifer in the riparian areas and wetter draws on the west side of the property. The scattered old Douglas-fir shows wind damaged tops and large limbs. This is a great habitat for eagles, owls, woodpeckers and squirrels. Deer habitat needs are met throughout the stand/ young seedlings are heavily browsed throughout the ownership. Suggesting the lack of hunting has let the deer population increase.

Management recommendations for consideration

- Leave 8 dead and dying trees per acre for cavity nesting wildlife.
- Few snags and trees with cavities exist across the ownership. Create snags by girdling (removing the bark on all sides of the trees within the riparian zones and some of the areas where timber harvest is not practical. The trees can be topped leaving several live whorls of limbs. Then creating two girdled areas two feet in length and two feet apart where the bole is larger than 12" in diameter and over 30' from the ground. Some arborists are able to create snags and cavities which replicate natural snags and cavities.
- Work with the land trust to provide jointly sponsored fee access deer hunting opportunities.

- When logging or thinning stands create approximately one wild life pile per acre. Piles can be roughly 6' in diameter and 4 feet high. Lay larger debris on the bottom and cross lay smaller debris as the pile increases in height than cover with small material. This style of constructed habitat allows for nesting and hiding cover to a large group of small mammals and birds.
- Add wood duck, owl and small and large cavity nesting species boxes. This fills some of the void in habitat until the second growth forest develops natural cavities.

PROPERTY ACCESS/ ROADS AND TRAILS

There are several items which should be addressed. The Washington State Forest Practice Board Manual has specific recommendations and design standards for maintaining forest roads. It makes an excellent reference for the items discussed above. The board manual can be found at.

https://www.dnr.wa.gov/publications/fp_board_manual_section03.pdf?y7gmi.

Forest road maintenance obligations are found in The Forest Practice rules and Regulations WAC 222-24.

All forest land owners are required to maintain roads to prevent impacts to water quality and fish habitat.

Management observations/recommendations:

- 1) Mainline roads are in reasonably good condition. They do show wear in the wheel tracks, developing channeling of storm water. Berms exist along most ditches resulting in keeping storm water on the roads, which leads to increased washing or road surface fines.
- 2) All roads need to be graded to allow storm water to leave the road surface.
 - a) Remove berms along both sides of the main roads
 - b) Outslope or crown the roads as needed to direct storm water into the ditches or off of the road surface.
 - c) Cross drain culverts should be a minimum of 15" in diameter, and drain to the forest floor.
 - d) Culverts in seasonal streams should be a minimum of 18".
- 3) The access from the county road climbs past the two access roads to the pump station. There is a need for reconstruction and maintenance in this section.
 - a) Main road needs grading and ditching to allow storm water to enter the ditches.
 - b) The two culverts should be a minimum of 15" in diameter
 - c) The two culverts are not placed to allow for adequate drainage. The lower culvert needs to be moved uphill about 6'. The pump station access needs to be adjusted to allow for runoff to enter the inlet from the upper shoulder. The lower shoulder needs to be ditched to allow runoff to enter the ditch below the outlet of the culvert. The ditches need to be armored with shot rock to create catch basins and armor the main road shoulder.
- 4) A portion of the main road, where it follows the right bank of the cove becomes lower than the high water line when the reservoir is full. This area does not allow for moving the road without major road construction. The long term preferred fix is to move the road to the east, raising the grade and tying it into the existing road from the south to the north. Temporary fixes should be designed by a road engineer. There are several options provided to assist with determining a temporary fix.
 - a) The road has existed in this condition for a long time and does not show much damage from the high water. Leave the road as is and do not use unless an emergency at the upper end of the reservoir exists.
 - b) Raise the grade with shot rock.
 - i) The surface or the existing road will probably need to be ripped to allow for the added rock to form a tight seal with the existing surfacing.
 - ii) Raise the grade a minimum of 24". Compact the surfacing in 8" lifts with a vibrating drum roller.
 - iii) Install a 15" curb to allow for any ditch water from the eastside of the road to drain to the reservoir.
 - c) Use ecology blocks to form a check dam along the bank and road prism.
 - i) Sink the blocks 12" into the reservoir bank and adjacent to the road prism.

- ii) Backfill the ecology blocks with unscreened 2" shot rock raising the entire road grade to within 6" of top of the ecology blocks. Compact the surfacing in 8" lifts with a vibrating drum roller.
 - iii) Cap with unscreened ¾ minus crush.
- 5) There is one seasonal stream and two perennial streams at the northern end of the lake.
 - a) The seasonal stream is just south of the developed parking area on the east bank. This culvert is undersized. The cmp should be at least 30" in diameter, buried 20% and aligned in the drainage to remove the current drop/plunge pool.
 - b) Both perennial streams are type F (fish habitat) streams. The crossings do not meet current State Forest Practice Regulations. The road is narrow at these locations. The crossings need to be redesigned and replaced. The conservation district and the local NRCS office may have recommendations for engineers that can assist in the redesign to meet current standards. Any engineer used should be familiar with the FP road standards for fish passable structures. Pre-cast bridges may be a better solution than culverts.
 - i) The State has a program to assist small forest landowners with the costs of fish passable stream crossings. While the program was not designed for municipal entities, the wording of the WAC and the agency allow municipal entities, with forest roads to apply. Monies are applied on the worst first basis, with the highest benefit to salmonid species and habitat. This standard may place the town towards the bottom of the list. This is still a benefit in that it reduces the requirement for the landowner to repair or replace the crossings with current timber harvest activities.
 - (a) Apply for the Family Forest Fish Passage Program for all crossings in streams meeting the Type F designation. The application is available on line at <https://www.dnr.wa.gov/fffpp>.
- 6) From the end of the maintained road an old grade runs south along the reservoir shoreline. This road has three stream crossings which may qualify as Type F habitat. These stream crossings may also qualify for the Family forest Fish Passage Program.
 - a) Contact a fisheries biologist familiar with the FP Rule designations for stream typing. Have all steams, not indicated on maps, reviewed to establish proper stream typing. The local Forest Practice Forester may also be of assistance.
- 7) A portion of the mainline extends from the lake westerly to Dallas Mountain road this road has several steep areas with no cross drains or drivable water bars. Grading and shaping ditch lines is needed on this section. Prior to grading the road should be reviewed for areas that are channeling water. Once the area is graded at least two 15" cross drains or drivable water dips should be established and maintained to prevent further erosion..
- 8) During the stand surveys old logging roads and major skid roads were noted. These can be used for future access for timber management and wildfire suppression/control. While there are no guarantees the below activities will reduce or stop the spread of wildfire, these activities at least provide a working area and access for crews.
 - a) Locate and map all existing roads and skid trails.
 - i) Brush and clear all to act as a fire break.
 - (1) The grades should be opened by removing all trees/brush growing on the running surface.
 - (2) Brush all low growing vegetation and overhead vegetation for a distance of 6' on either side.
 - (3) Regrade to allow for Type 6 engines and all-wheel drive vehicle access.
 - (4) Revegetate exposed soils with a wildlife seed mix.

Permits will be required for any road improvement outside of the existing road prism or at live stream crossings.

Cultural Resources and/or Historical Sites

The area was presumably used by Native American Tribes prior to settlement. The area was also used by the first European settlers. A cabin structure and debris suggests the site is a historic structure under state and federal guidelines. DAHP's archeological and historical data may be proprietary depending upon its nature; if data is

proprietary, it must be identified as such and discretion should be used if placing data within the plan – site specific/location data should be kept on separate documentation marked ‘Proprietary – for landowner only’.

Management recommendations to consider

- Contact DAHP for any records of cultural or historic use.
- A formal review, to identify these resources, should be conducted by a licensed archeologist prior to any timber management in the area.

Forest Management Time Table

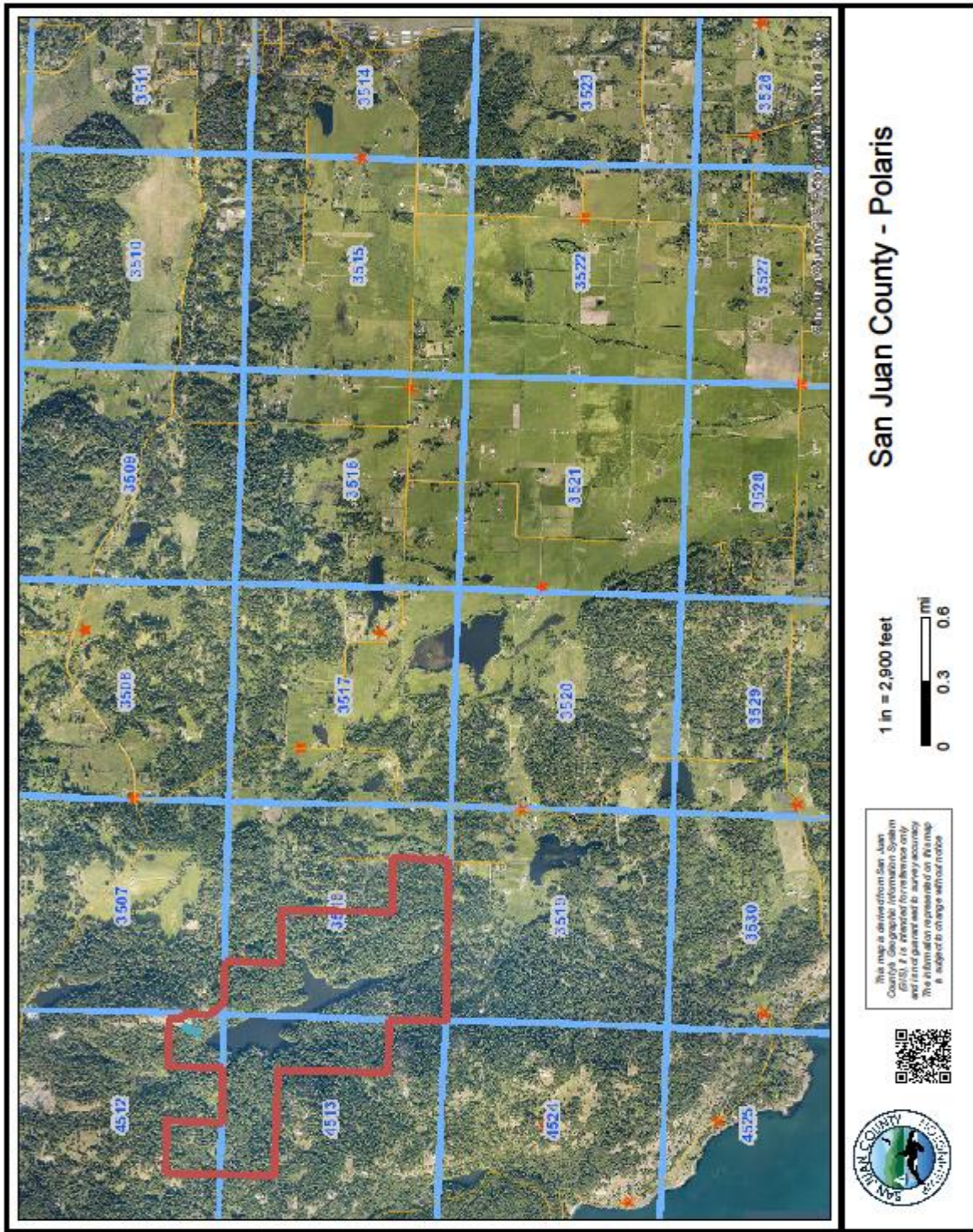
The following time table is prioritized based on type of activity. Separate priorities are provided by type.

<i>Priority</i>	<i>Activity</i>	<i>Type of activity</i>	<i>Date completed</i>
1	Locate and map all roads/trails	fire	
2	Open all non-mainline roads, add surfacing where needed	fire	
3	Brush all mainline roads	fire	
4	Establish tender fill site at dam	fire	
4	Establish tender fill site at N end of reservoir	fire	
4	Establish Tender/porta-tank fill site end of old grade, west side of reservoir	fire	
1	Contact DAHP for cultural and archeological reports	administrative	
1	Prior to timber management, review cabin site with licensed archeologist	Timber harvest	
1	Establish, mark and blaze all property lines	administrative	
1	Have all streams surveyed for proper Water Typing	Timber harvest	
1	Develop a LTFPA stand #2, receive approval prior to harvest	administrative	
1	Bring all stream crossing (except FFFPP) up to standard	Timber harvest/fire	
2	Develop sale area unit 3 as described	Timber harvest	
2	Apply for Family forest fish Passage Program	Timber harvest	
2	Pre-commercially thin 10 ac. unit stand #2	Silvicultural practice	
3	Develop a LTFPA stand #1, receive approval	administrative	
4	Begin silvicultural un-even age and variable density thinning stand 1	silvicultural	

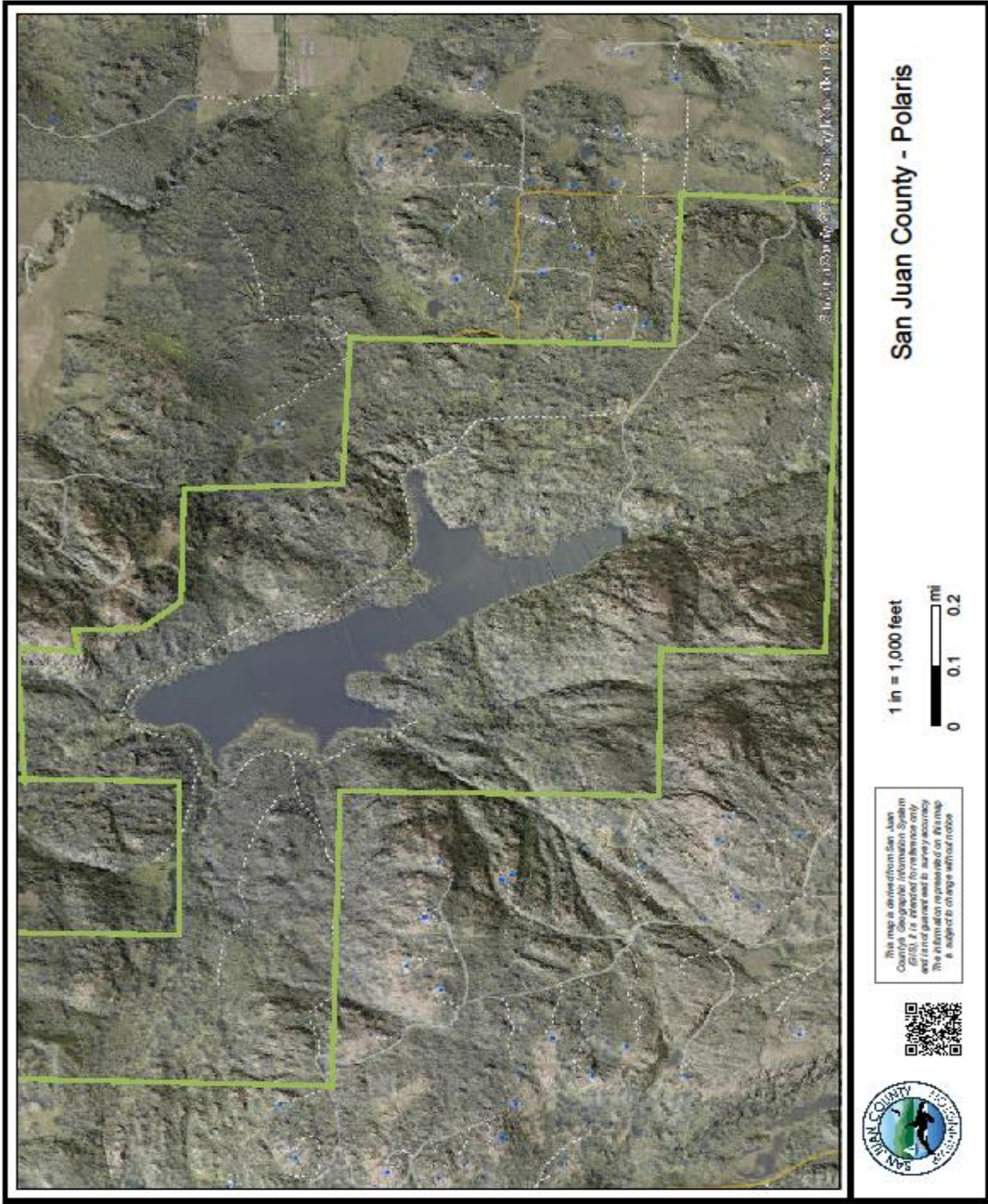
NOTES

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VICINITY MAP



LIDAR LAND FORMS

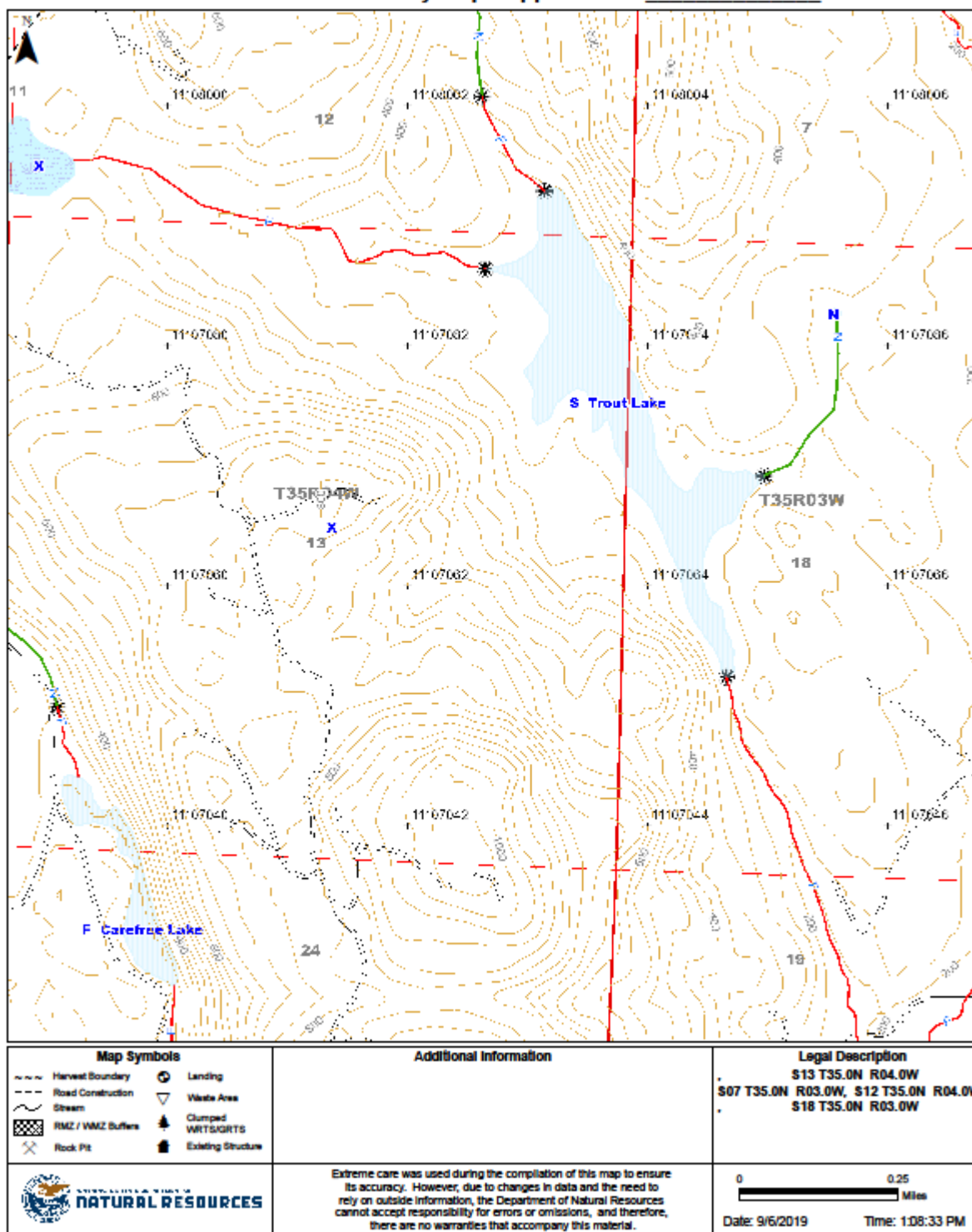


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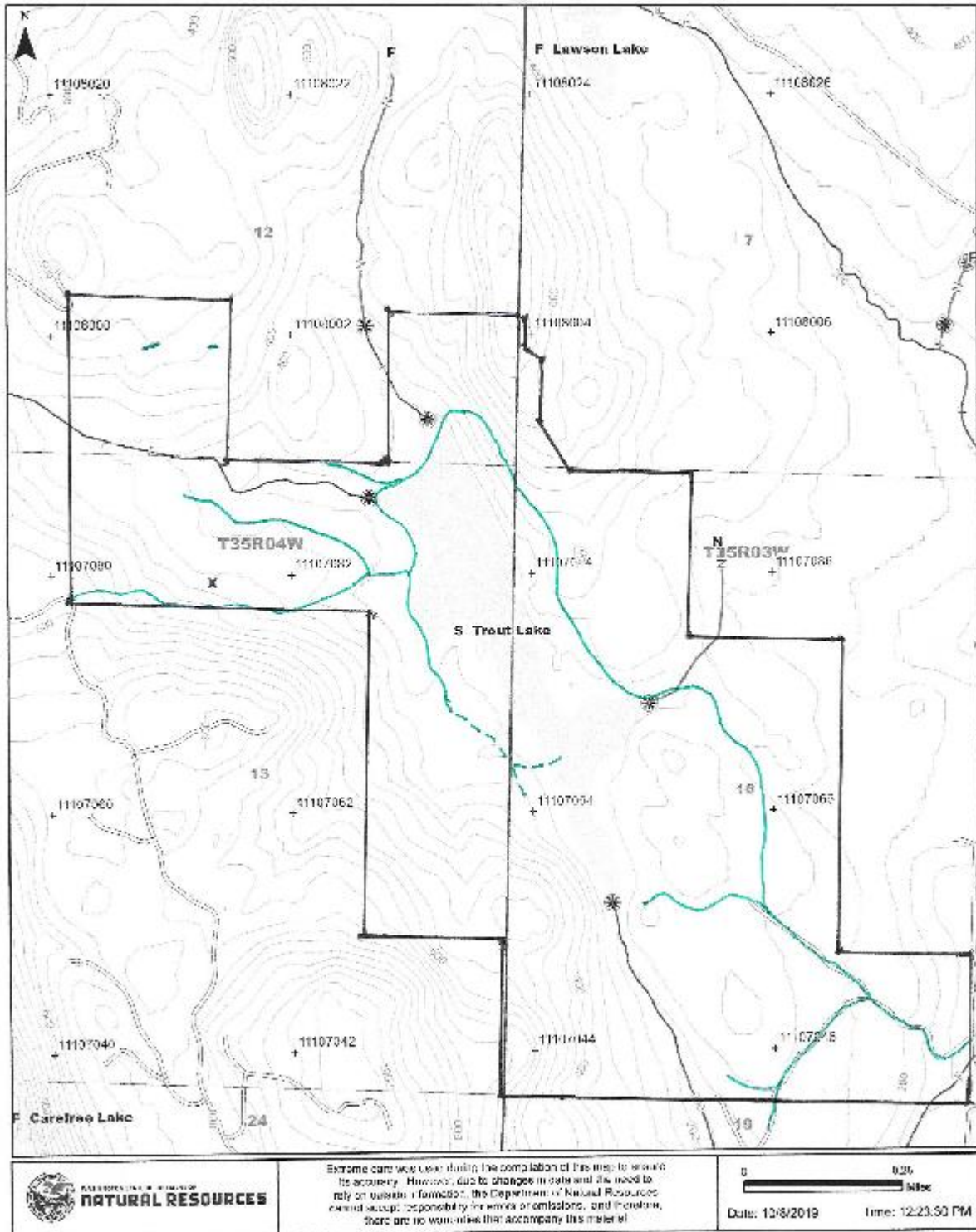
Polaris

Forest Practices Activity Map - Application

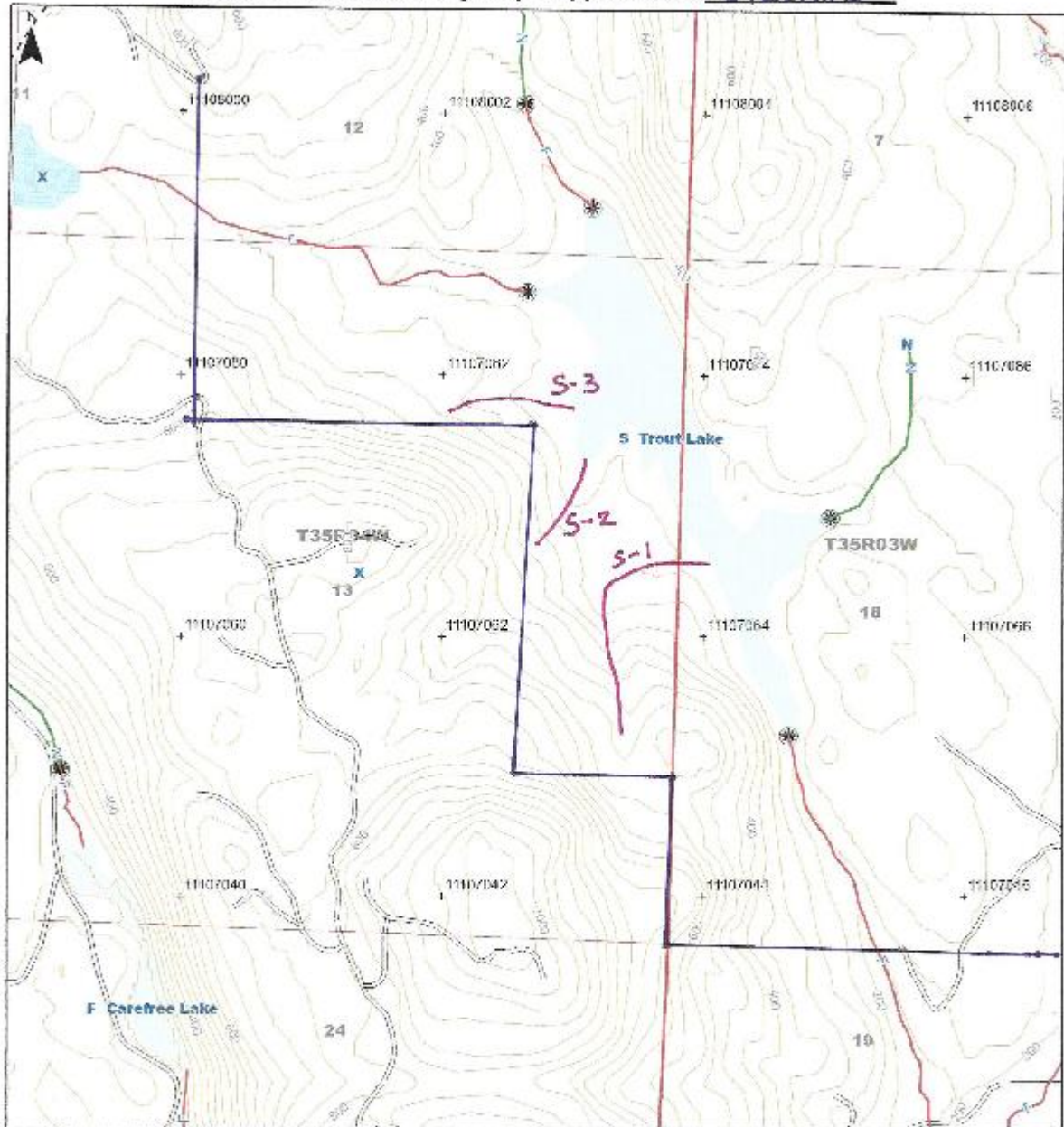


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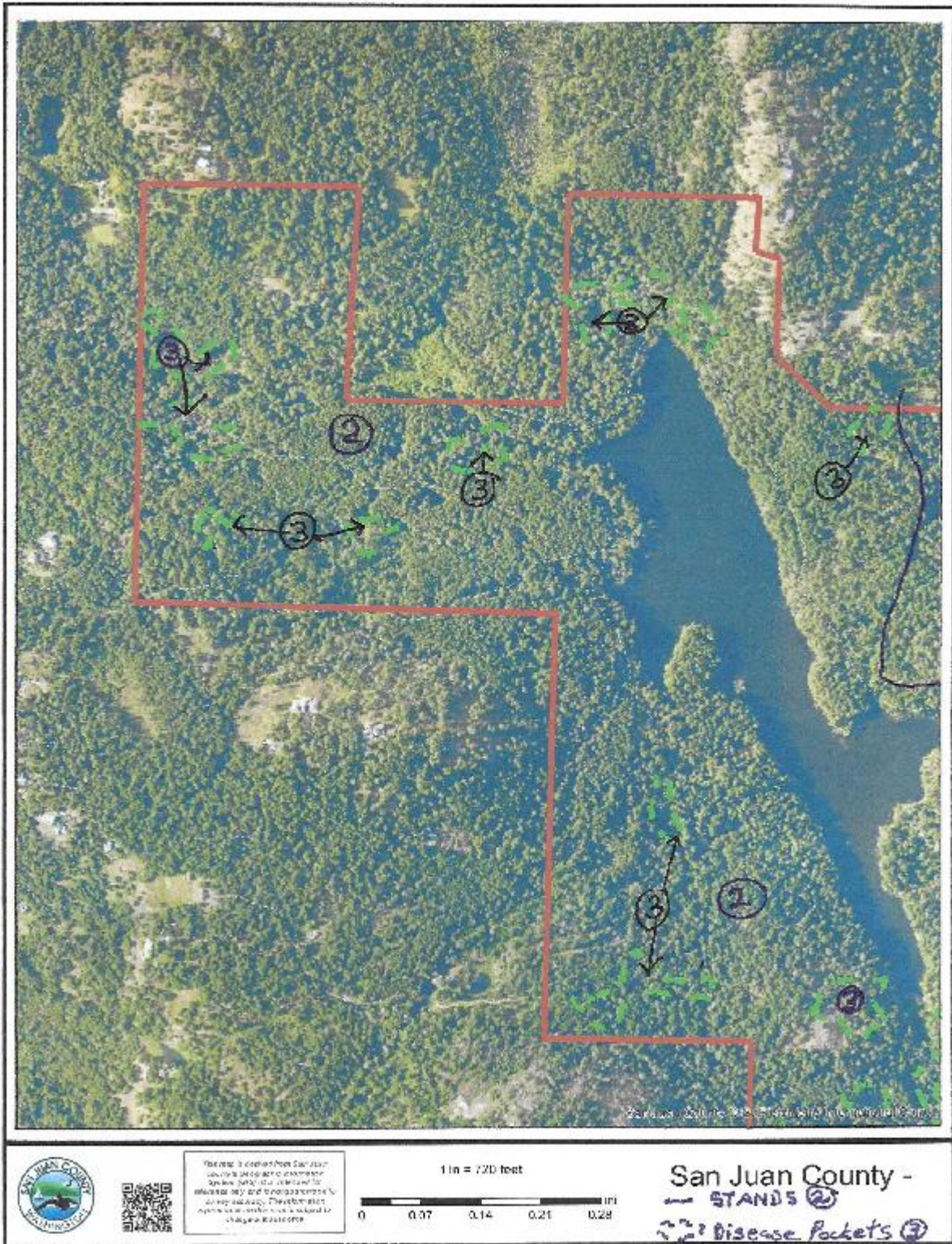
Forest Practices Base Map **ROADS**

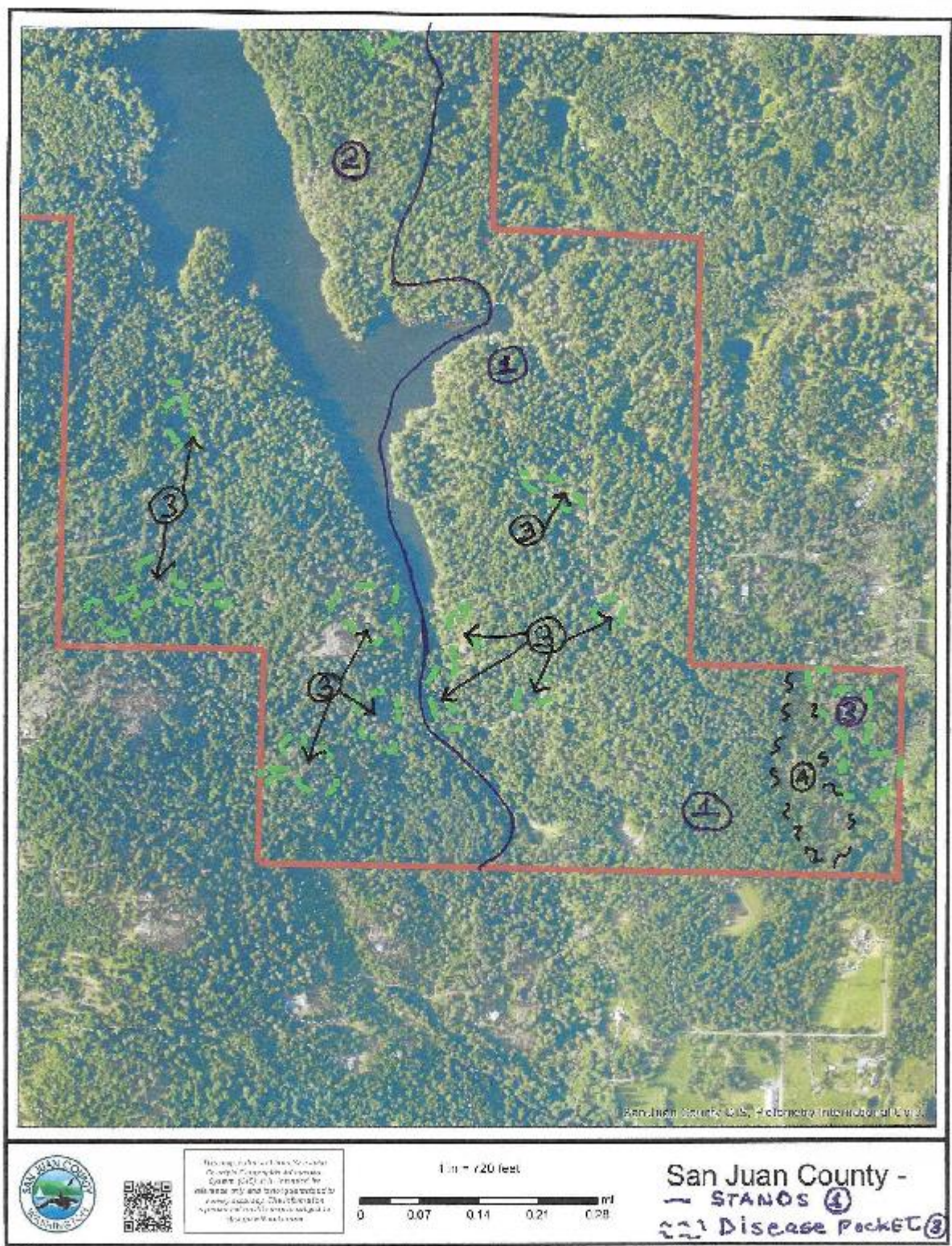


Forest Practices Activity Map - Application # STREAMS

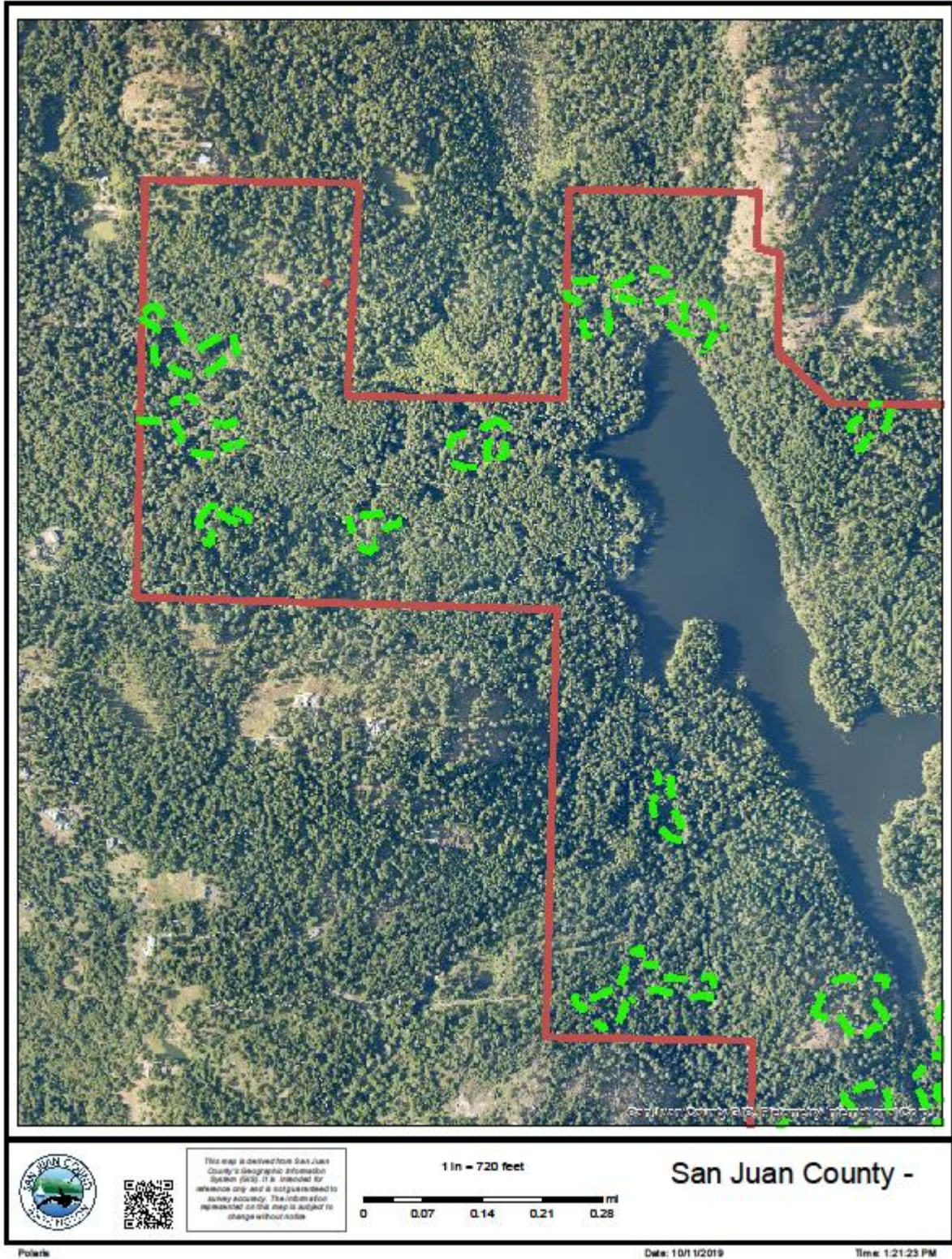


Map Symbols	Additional Information	Legal Description
<ul style="list-style-type: none"> --- Natural Boundary --- Small Contour Lines --- Stream --- RMZ / WMA Buffer --- Rock Pile ● Landing ▽ Waste Area ● Campsite ● Flocking Structure 		<p>S13 T35.0N R04.0W S07 T35.0N R03.0W, S12 T35.0N R04.0W S16 T35.0N R03.0W</p>
<p>DEPARTMENT OF NATURAL RESOURCES</p>	<p>Extreme care was used during the compilation of this map to ensure accuracy. However, due to change in data and the need to rely on outside information, the Department of Natural Resources cannot accept responsibility for errors or omissions, and therefore, there are no warranties that accompany this material.</p>	<p>0 0.25 Miles</p> <p>Date: 9/8/2013 Time: 1:08:33 PM</p>





DESEASE POCKETS NORTH



DESEASE POCKETS SOUTH

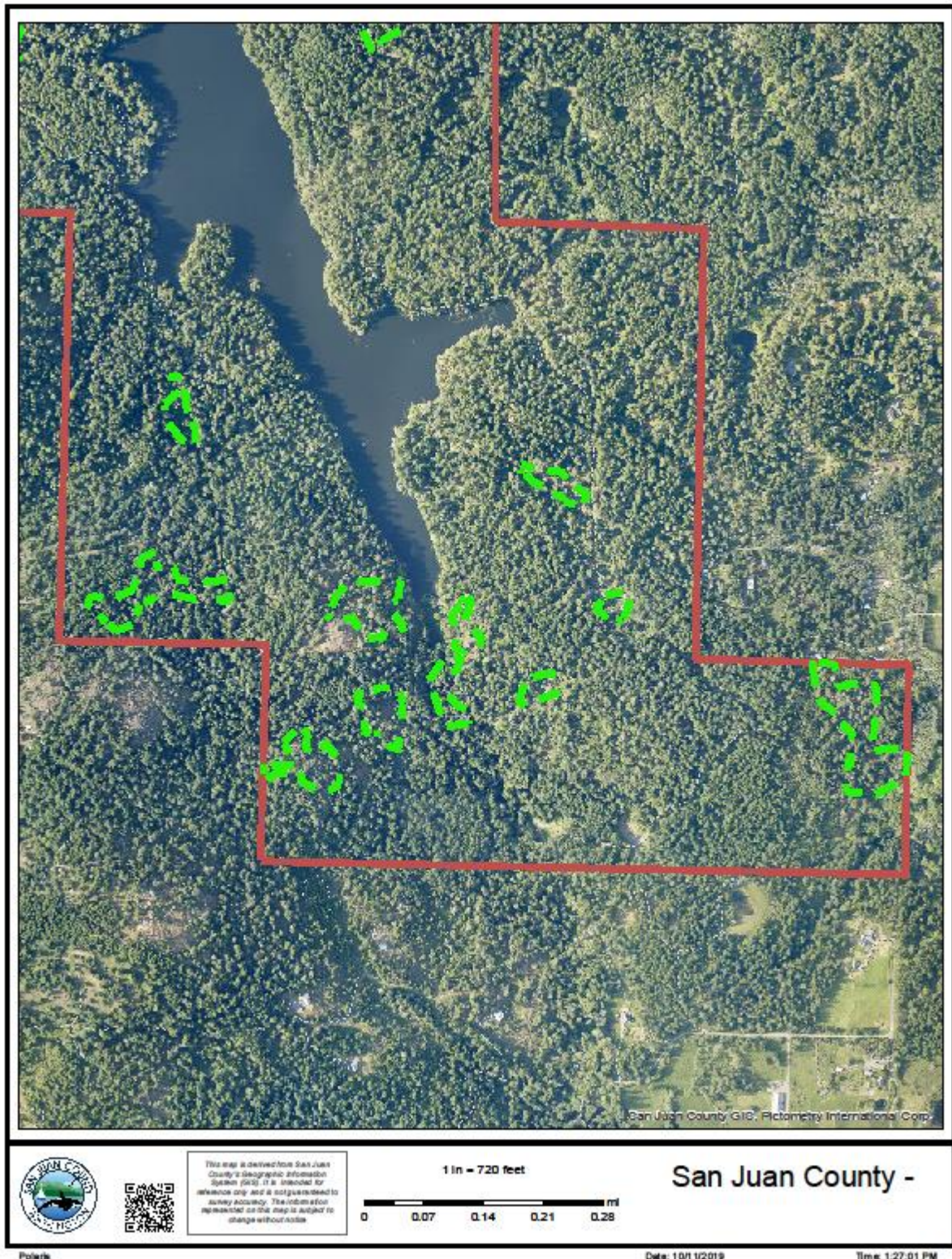




Photo top of hill looking east on access road shows channeling of storm water and worn wheel tracks



Phot shows road damage, ditch line failure, culvert failure at main road junctions with pump site access



Cooking debris from cabin site



China ware from cabin site



Possible historic cabin north of access road in area of pump house



Savanah type forest setting in rock outcrop areas, higher elevations in stand 1. Approximately 10 trees should be removed from this area. Old forest stump's spaced +/- 60'



Photos showing in fill of smaller DF along edges of out crops and balds.



Photo of 30 year old trees naturally seeded after a timber harvest. Small area north edge of ownership. Also a trail in this area running east/west to non-ownership.



Typical patch of younger fir impacted with competition from madrone. Type of stand would need pre-commercial thinning to release DF. Small areas, less than one acre in size.



Typical forest stand; area north of Dallas Mountain access. Note broken stems typical of several steam rots noted in forest health section. Approximately 9 trees should be removed from the near portion of the photo.