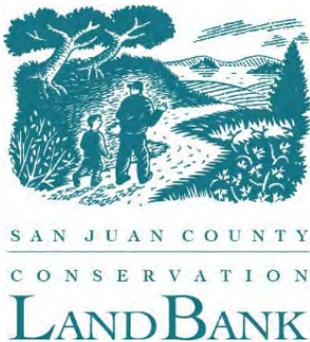


Turtleback Mountain Preserve Stewardship and Management Plan



September 2022

**San Juan County Conservation Land Bank
350 Court Street No. 6
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Turtleback Mountain Preserve, Orcas Island Stewardship and Management Plan

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Executive Summary

Turtleback Mountain Preserve was purchased in 2006 at a cost of \$17.5 million. The 1,613-acre natural area is the San Juan County Conservation Land Bank's largest property; and its acquisition was made possible only through partnership with the San Juan Preservation Trust (SJPT). The SJPT's fundraising campaign raised \$7.5 million from over 2,000 donors and established an endowment fund that supports the Land Bank's ongoing stewardship of the Preserve. In 2020, a private \$2 million donation to the Land Bank enabled the acquisition of 35.5 acres along the southern boundary, which extended the Preserve down to the shoreline of Massacre Bay.

Public access and habitat management initiatives for Turtleback Mountain Preserve were first established in 2008. This stewardship and management plan (SMP) updates the 2008 document in a variety of ways and describes the intended scope of ecological and public access projects for the next ten years.

Stewardship actions will continue to focus on managing noxious weeds, promoting healthy, resilient forests, and protecting the Preserve's many streams and wetlands. The following ecological objectives and activities are proposed in this plan:

- **Stream Enhancement:** replace undersized culverts to improve conveyance and sediment transport; and add downed wood to channels to slow flow and reduce scour.
- **Forest Management:** thin high density stands to increase forest resilience to climate change and targeted roadside areas to reduce fire risk; and remove young, competing conifers from oak habitats.
- **Promote Biodiversity:** increase standing and downed dead wood for habitat; and extend seeding and out-planting of native flora.

Turtleback Mountain Preserve is a sizeable and diverse resource for outdoor enthusiasts. The following modest changes to the current public are proposed in this plan:

- **New trails:** develop a trail for those with limited mobility at the South Entrance; and construct a new, pedestrian-only trail within the new (2020) addition area.
- **Infrastructure improvements:** widen and improve the Morning Ridge trail and remove a steep section of the nearby access road; upgrade the South Entrance parking lot; and replace undersized culverts that compromise the road system and trails.
- **Hunting:** hold public meetings to explore the possibility of allowing deer hunting in select, remote areas of the Preserve to maintain a healthy deer population and promote biodiversity.

A. Introduction

Turtleback Mountain Preserve is the second largest conservation area within San Juan County. The Preserve's expansive, undeveloped ridgelines route precipitation into multiple watersheds, and its protected wetlands, streams, and broad contiguous forests protect water quality.¹ The Preserve supports a wide assemblage of native plants and wildlife; provides trails for a variety of user groups; and only grows in its significance as a natural area as development within San Juan County and around the Puget Sound continues. The protection of undeveloped natural areas is a central tenet of the Conservation Land Bank's mandate²; and establishing interconnected natural areas is one approach to mitigating the global crises of biodiversity loss and climate change. Turtleback Mountain Preserve provides important linkages between Crow Valley and other conservation lands on the rural, western half of Orcas Island. Additional development and further fragmentation of the islands' finite landscapes will increase the value of such protected areas in maintaining water resources and wildlife, providing outdoor experiences, and preserving the general quality of life.

Turtleback Mountain Preserve remains the single largest project, both in terms of acreage and cost, ever undertaken by the Land Bank. Its acquisition in 2006 is also an exemplary model of community-based conservation. The endeavor would not have been possible for such a small county organization without the partnership support of the nonprofit San Juan Preservation Trust and the many, remarkable contributions -- which raised \$8.5 million for the project -- made by members of the surrounding community.

In 2012, the San Juan Preservation Trust connected its 30-acre Turtlehead Preserve property to Turtleback Mountain Preserve with the acquisition of the intervening 111 acres. In 2020, a substantial donation to the Land Bank expanded the Preserve by 35.5 acres. At the same time the coastal land adjacent to the Preserve, known as Haida Point, was returned to the Lummi Nation. Turtleback Mountain is within the ancestral lands of the Coast Salish peoples; and the Land Bank seeks to engage in partnerships with the Lummi Nation and other Coast Salish peoples to reincorporate Traditional Ecological Knowledge and management practices into future stewardship of the Preserve.

The Land Bank creates a Stewardship and Management Plan (SMP) for each preserve to guide decision-making and work planning, and to promote transparency. These plans are

¹ SJC GIS Services map Eastsound, West Sound and President Channel watersheds within the Preserve.

² The Land Bank's mandate is to "preserve in perpetuity areas in the county that have environmental, agricultural, aesthetic, cultural, scientific, historic, scenic or low-intensity recreational value and to protect existing and future sources of potable water."

underlain by an emphasis on natural resource protection and enhancement. For the 76 percent of Land Bank properties that are open to the public, SMPs also define the level of public access in ways that meet the mission to provide low-intensity recreational opportunities. These plans are revised periodically in response to changing environmental and social conditions.

Public access and forest health initiatives were first approved in the 2008 Turtleback Mountain SMP. This document updates the original plan, adds the aforementioned 35.5 acres acquired through a donation, and extends the scope of both ecological and public access projects. In a broad sense, the Land Bank's stewardship goals for Turtleback Mountain Preserve are:

- To protect and enhance the property's ecological values;
- To promote habitat resiliency in the face of climate change;
- To provide the local community with opportunities for low-intensity recreation and environmental education; and
- To seek opportunities to partner with the Lummi Nation and other Coast Salish peoples to reincorporate Traditional Ecological Knowledge and management practices into stewardship of the Preserve.

The Preserve's ecological resources and the Land Bank's conservation objectives are described in Section C. Activities for the next ten years, based upon short-, medium-, and long-term goals, are summarized in Table 3. The proposed stewardship actions continue to focus on managing noxious weeds, promoting healthy, resilient forests, enhancing Garry oak habitat, and protecting the Preserve's many streams and wetlands.

This plan also summarizes the Land Bank's current and potential future public access (Section D). It provides a ten-year management cost projection (Section E) and details the Land Bank's ongoing public process (Section F). Management planning is an iterative process and all the activities outlined are subject to final approval and available funding.

B. Preserve Overview

Turtleback Mountain Preserve encompasses approximately 1,612 acres of Orcas Island's western half. It is located 4.8 miles from the Orcas Island ferry terminal and access is provided from both Deer Harbor and Crow Valley Roads (Fig. 1). The Preserve extends from sea level to an elevation of 1,519 feet.

There are at least 24 wetlands in the Preserve, and 12 streams originate within the property boundaries. These sources of freshwater enhance biodiversity; contribute to the larger wetlands and perennial streams in the surrounding lowlands, and influence and enrich the nearshore marine habitats of West Sound, Judd Cove and West Beach. Importantly, Crow Valley, which receives significant runoff from Turtleback Mountain Preserve, has some of the highest rates of aquifer recharge on Orcas Island.³

Major plant communities at Turtleback Mountain Preserve are typical of drier areas the Puget Trough region. However, microtopography and soils, historical burning, and ongoing disturbance such as windthrow have created a high degree of habitat diversity. The flora has been delineated into 46 community types.⁴ The current conditions of the native grasslands, and the canopy, understory and ground-layer within forested areas, reflect past land use activities as well as fire suppression, deer overpopulation and species introductions. Although the Preserve is highly altered from its historical condition, its steep slopes and thin, rocky soils support a high diversity of native plants and wildlife: amphibians inhabit the moist conifer forests and wetlands, and numerous reptiles, songbirds and pollinators occupy the area's remnant oak habitat.

Since establishing the Preserve, the Land Bank has received both state and federal funding to restore oak woodlands and savannas to more open-grown conditions. Extensive efforts have been made to remove non-native brambles, protect oak seedlings, and reduce the density of conifers. These open-grown conditions were previously fostered by Coast Salish peoples' intentional use of fire.

Historic place names, early accounts and archaeological studies all indicate a significant Native American presence in the area.⁵ Known settlements were located along marine

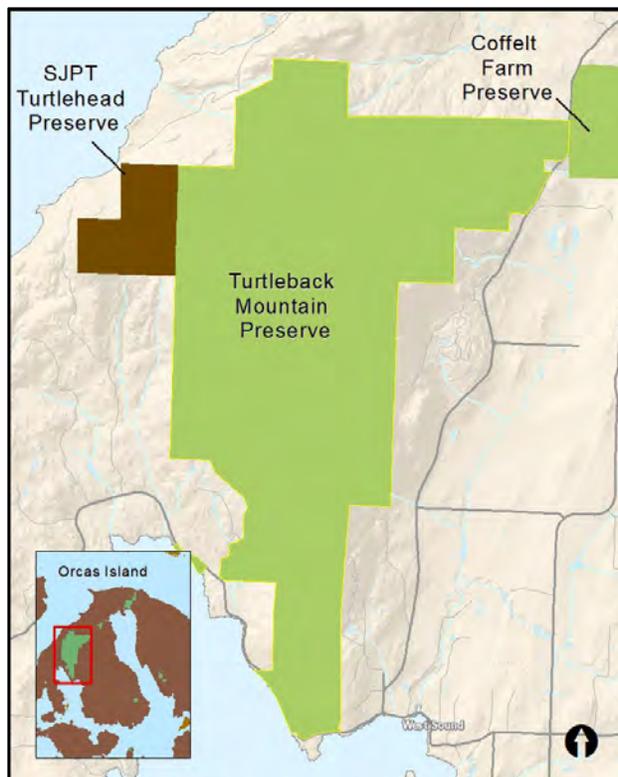


Figure 1. Preserve context

³ [SJC Water Resource Management Plan, 2004](#)

⁴ This included five different grasslands and 10 types of forests.

⁵ Wessen, 2007

shorelines and the people associated with some of these settlements were referred to as the “*swe’l?x*.” A winter village, possibly named “*e’le’l??*,” was located near the southeastern corner of the Preserve in the area now known as West Sound.⁶ Although evidence of permanent settlements within the Preserve is lacking, it is likely that people associated with “*e’le’l??*” and other local settlements hunted, gathered, and stewarded resources on Turtleback Mountain.

Maps from 1895 indicate two or three homesteader’s names associated with the mountain.⁷ Other evidence of colonial settlement exists in the creation of ditches, which altered the flow of streams and wetlands, and a few fruit trees that likely germinated from fallen fruit of an abandoned orchard. More modern land use activities included grazing of sheep and feral goats, recreation by private owners, and commercial timber extraction.

Once the Preserve came into public ownership, community members expressed a wide variety of access interests: some wanted none, others favored pedestrian-use only, and others expressed a desire for trails to ride horses and mountain bikes. The Land Bank sought to accommodate all these requests and delineated the Preserve into three different zones: Reserve Zones, Pedestrian Zones, and a Multiple Use Zone (Fig. 2).

Reserve Zones are dedicated natural areas that contain some of the Preserve’s most fragile grasslands as well as many of its steepest slopes and cliffs. These zones are intended to provide a sizeable area, largely free of human disturbance, that is dedicated to supporting native flora and fauna. No trails exist in these areas, and public access is by permission only. The Pedestrian Zones, located on the Preserve’s southern slopes, are dedicated to foot-traffic. The Multiple Use Zone is located on the Preserve’s northerly aspects where suitable conditions -- hardened surfaces, a wide corridor, and a gradual grade -- combine to provide for mountain biking and horseback riding. This management plan proposes designating the Preserve’s 35.5-acre addition as a Pedestrian Zone. This recommendation is discussed in further detail in Section D.

⁶ Suttles, 1951

⁷ U.S. Coast and Geodetic Survey



Acquisition History

The San Juan County Conservation Land Bank acquired 1,576 acres of Turtleback Mountain in 2006. The total purchase price was \$17.5 million, and the high cost was covered through creative partnerships and the generous contributions of over 2,000 individuals.

The Land Bank committed \$10 million, held in bonds, to the project. The San Juan Preservation Trust (SJPT) led the fundraising campaign that raised \$7.5 million for the purchase and an additional \$1 million for a stewardship endowment fund. This fund is managed by the SJPT and dedicated to the stewardship of the Preserve's natural environment. The purchase protected the mountain's ecological, scenic, and low-intensity recreational values. In July 2020, a private \$2 million donation to the Land Bank enabled the acquisition of 35.5 acres along the southern boundary, and the Preserve now extends down to the shoreline of Massacre Bay.⁸

Conservation Easement

The Medina Foundation granted a Conservation Easement (CE) to the San Juan Preservation Trust prior to selling the property to the Land Bank.⁹ The CE ensures that SJPT will review and approve all resource management plans and that the Preserve's conservation values are protected in perpetuity.

Existing Infrastructure

The extensive road system and the OPALCO powerline corridor on Turtleback Mountain Preserve were in place prior to the Land Bank's ownership. Parking areas and segments of trails were developed after acquisition to facilitate public access.

Parking Areas

The parking lot for the South trailhead is located off Wildrose Lane. It accommodates 10 vehicles and is the most heavily used. A portion of the adjacent field provides for high season overflow parking. The North parking lot is accessed from Crow Valley Road. It also has space for 10 vehicles, including one or two horse trailers. There are no permanent structures in the parking areas, but each one features a portable toilet and serves as trailhead.

Roads and Trails

The Preserve's existing road network is essential to current access. Originally built for logging operations and as entry to the previous owner's cabin, the main roads now function primarily as public trails. Land Bank staff also use the service roads to conduct stewardship

⁸ Parcels 260544002000 and 2600544001000. Please see Figure 5.

⁹ Conservation Easement AFN: #2006-1116003.

activities such as ecological restoration and storm clean-up. Periodic road maintenance is performed to enable vehicle access by staff and emergency services personnel.

The North Entrance road extends for approximately 4.5 miles, and the South Entrance road extends for just over one mile. In general, the northern road is better constructed and less prone to erosion than the southern road. Steep sections of the South Trail near the entrance and above the junction with Morning Ridge erode regularly during heavy rains. This plan proposes to decommission the steep upper section of the road, which also bisects the Preserve's largest and highest quality Garry oak savanna, and to re-route use to an expanded and improved Morning Ridge Trail (see Section D) and to replace undersized and/or failing culverts throughout the road network. The Land Bank will consult with a road engineer, or an experienced local expert, to determine future, effective road maintenance methods and make repairs to grade and drainage. Forest roads must meet the State's maintenance requirements.¹⁰ Best management practices include minimizing runoff, preventing erosion, and protecting both stream bank stability and wetland functions.

The Preserve's current trail system extends for approximately eight miles (Fig. 2). The trail system includes vehicle-accessible, gravel trails (South, North, Center Loop and Raven Ridge); smaller, single-track trails (Ridge Connector, Lost Oak and Morning Ridge); and short spurs that enable scenic views (North Valley Overlook, Waldron Overlook) and access the summit of Ship Peak.¹¹ The North Trail also provides access to SJPT's Turtlehead Preserve. In 2019, staff installed new trail signage and re-routed portions of the Lost Oak Trail. These projects represent ongoing efforts to improve user experience and minimize off-trail use by maintaining a well-defined trail network.

Utility Access Easement

The main powerline to Deer Harbor bisects the southern third of the Preserve. OPALCO has an access easement to service these transmission lines. In 2019, the Land Bank collaborated with OPALCO on their project to clear the corridor and replace power poles. The final project supported both Garry oak habitat enhancement goals -- firs were removed and disturbed soils were seeded -- and improved the safety of the utility system.

¹⁰ Washington Administrative Code 222-24-052. <https://apps.leg.wa.gov/wac/default.aspx?cite=222-24-052>

¹¹ For more details about trails review this Land Bank [map](#).

C. Ecological Overview and Conservation Objectives

Habitat and resource protection is a guiding principle of the Land Bank's stewardship program. Maintaining or restoring an area's ecological health also typically preserves, and enhances, its scenic and open-space character and its recreational opportunities. For example, wildlife activity on a preserve affords memorable, outdoor experiences.

In general, ecosystems contribute their greatest values and services, their greatest support to native species, when they are in their most natural state. This is also when they can exhibit the most resilience to disturbance. Historic uses have reduced the Preserve's ecological values. Wetlands, grasslands, and forests have all been altered by activities such as ditching, grazing, road building and logging. The removal of overstory conifers from some areas has simplified forest structure and composition. More broadly, the cessation of frequent, low-intensity burning by Coast Salish peoples has resulted in the expansion of Douglas fir and the subsequent decline or loss of many oak-associated species.

Despite these alterations, Turtleback Mountain Preserve still displays a high degree of habitat diversity and ecological function; and within the context of San Juan County, it is a significant natural area. The Preserve is well known for having some of the best remaining Garry oak habitat in the islands. This is reflective of numerous factors including, but not limited to, topography, soils, and past stewardship practices by Coast Salish peoples. Several of the plant communities within the Preserve's oak habitats and rocky balds are also highly ranked for conservation. They support rare wildflowers and butterflies, and since acquisition the Land Bank has prioritized restoration activities within these areas.

The Land Bank does not endeavor to restore the ecological conditions that existed at the Preserve prior to European settlement. The proposed management actions detailed in this section focus on maintaining or restoring biodiversity, promoting old-growth characteristics within forests, increasing carbon storage potential, protecting water resources, supporting pollinators, and reducing the risk of catastrophic fire.

The San Juan Islands are predicted to become increasingly subject to seasonal drought conditions and heightened wildfire risks. The State's Department of Natural Resources (DNR) has identified the islands as a priority area within western Washington and allocated funds to promote forest health initiatives on this preserve and elsewhere in the County.¹²

¹² See the DNR's 2020 [Forest Action Plan](#)

Classification of the Preserve into habitat types helps to inventory resources, and to organize and prioritize management activities. For general management purposes, the modern-day resources that exist on Turtleback Mountain Preserve have been divided into major areas based on land cover (Table 1). A map of the Preserve that displays the locations of these major habitat types is provided in Figure 3. Collectively, these areas provide a diversity of habitats for resident and migrating birds, mammals, amphibians, reptiles, and invertebrates.

Table 1. Land cover and approximate area

Habitat Type	Acres	% of Total
Wetlands	13	0.8%
Alder Mixed Conifer	42	2.6%
Mesic Mixed Conifer	243	15.1%
Mesic Douglas Fir	613	38.0%
Dry Douglas Fir	405	25.1%
Transitional Douglas Fir and Oak Woodland	151	9.4%
Oak Savanna and Rocky Balds	145	9.0%

Total 1,612

Stewardship activities within these habitat types, their estimated costs, and their proposed sequence over the next ten years, are outlined in Table 3. Stewardship and restoration work will be supported by grants such as the 2021 Washington DNR Landscape Scale Restoration (LSR), by Land Bank stewardship funds, and by the SJPT-managed Turtleback stewardship endowment. Priorities for specific habitat areas may be revised in response to available funding and changing site conditions. Even with careful management, the Preserve’s conservation values face threats from stressors such as drought and invasive species, changing land uses on surrounding properties, and further fragmentation of the island’s finite landscape.

Wildlife

As a large, protected landscape Turtleback Mountain Preserve supports, and has provided opportunities for study of an assortment of animal species. Mammals known to inhabit the Preserve include bats, Douglas tree squirrels, otters, black-tailed deer, and raccoons. Four amphibians utilize the wetlands including, long-toed salamanders, rough-skinned newts, red-legged frogs, and Pacific chorus frogs.¹³ Documented reptiles include the locally

¹³ Identified initially in 2008 by Rozewood Environmental Services, Inc. Eggs masses and adults have been located by staff. Latin names for identified species are: *Ambystoma macrodactylum*, *Taricha granulosa*, *Rana aurora* and *Pseudacris regilla*

uncommon Sharptailed snake as well as, garter snakes, Northern alligator lizards and a population of Western fence lizards.¹⁴

Pollinator species have attracted scientific study, and surveys yielded 14 butterfly species on the Preserve.¹⁵ One of these, the *Propertius* duskywing, is recognized by the State as a "Species of Greatest Conservation Need." In western Washington, this butterfly's populations are small and isolated, due to its specialization and limited habitat, and future research to specify key life-cycle requirements is desired.

The most robust study of wildlife on Turtleback Mountain Preserve has focused on avifauna. A total of 58 bird species have been detected during surveys.¹⁶ Species of note include Bald and Golden Eagles as they have additional federal protection outside of the Migratory Bird Treaty Act. Four species detected outside of established plots were included in the total species count; and these include black-throated gray warbler, Cooper's hawk, great horned owl and song sparrow.

The Land Bank commissioned bird surveys before and after restoration activities occurred in oak habitats, and the improvements made within oak areas on the south end of the Preserve appear to have enhanced diversity. These surveys recorded change in bird species and population densities throughout restoration units and indicated an overall increase from 27 species in 2013 to 38 species in 2019. This survey data also showed an increase in the population densities of species determined to be at risk by Partners In Flight, including band-tailed pigeon, common nighthawk, olive-sided flycatcher, tree swallow and violet-green swallow. Both species of swallows were observed using natural cavities within the oaks.

Major Habitat Areas

In all, botanists have identified at least 160 native and 61 non-native plant species within the Preserve. For both brevity and management strategy the Preserve's various habitat areas, determined primarily on their predominate plant communities, were divided in three categories: wetlands and streams, upland forests, and oak habitats and rocky balds. These delineations represent a melding of surveys and assessments.¹⁷ It is important to

¹⁴ *Contia tenuis*; *Sceloporus occidentalis*

¹⁵ Western tiger swallowtail (*Papilio rutulus*), pine white (*Neophasia menapia*), margined white (*Pieris marginalis*), Sara's orangetip (*Anthrocarus sara flora*), Spring azure (*Celastrina argiolus*), Mylitta crescent (*Phyciodes mylitta*), Satyr anglewing (*Polygonia satyrus*), mourning cloak (*Nymphalis antiopa*), Milbert's tortoiseshell (*Nymphalis milberti*), Lorquin's admiral (*Limenitis lorquini*), *Vanessa sp. (prob. a Painted lady)*

¹⁶ Bird surveys were performed by RavenSight Consulting.

¹⁷ Vegetation assessments have been performed by Land Bank and SJPT staff, the Center for Natural Lands Management, Rozewood Environmental Services Inc., and Rainshadow Consulting.

note, however, that there is variability within each habitat. Upland forests contain five different stand types. The Preserve's oak habitats encompass woodlands, savannas and prairies; and these areas all differentiate from each other by their abundance of Garry oaks and shrubs, and by their underlying herbaceous communities.

Noxious weeds are present in nearly all of the Preserve's habitat areas. Thickets of Himalayan blackberry and non-native roses as well as English hawthorn and Scotch broom are found throughout. The spread of invasive species ranks second only to habitat loss as a threat to global biodiversity. Therefore, the Land Bank puts a high priority on invasive weed control. In general, the Land Bank's weed management efforts are focused in areas of greatest priority and vulnerability, and where actions have the greatest chance of success. Staff follow Integrated Pest Management approaches, with the preferred methods being manual and mechanical control, and with cut stem and spot herbicide treatment used on a case-by-case basis for species that are especially difficult to control.¹⁸ Also, to reduce the impacts of excessive herbivory on native flora the Land Bank proposes to implement managed deer hunting in appropriate areas. Additional details are provided in Section D.

To link broad objectives to site-specific goals, the Preserve's areas with notable and distinct ecological values were mapped (Fig. 3). Staff then assigned ratings (e.g., Poor, Fair, Good) to represent their current condition. Future stewardship activities, to enhance the Preserve's ecology, were then identified by determining a reasonable, desired future condition for each area. A summary of current and desired future conditions is provided in Table 2.

The ratings used by staff reflect multiple ecological criteria with an emphasis on aspects of biology, ecology, or ecological processes that, if missing or altered, could lead to future declines or losses to either species or habitats.¹⁹ A similar process is used by other conservation organizations to help prioritize stewardship goals, actions, and monitoring. The ecological attributes and ratings in use by the Land Bank represent an iterative, adaptive process informed by research, field observations and peer review.

¹⁸ For further details see the Land Bank's *Guidance for Integrated Pest Management Plan*

¹⁹ These values are also referred to as Key Ecological Attributes (KEAs) and this methodology for determining conservation action was developed by The Nature Conservancy in 2007.

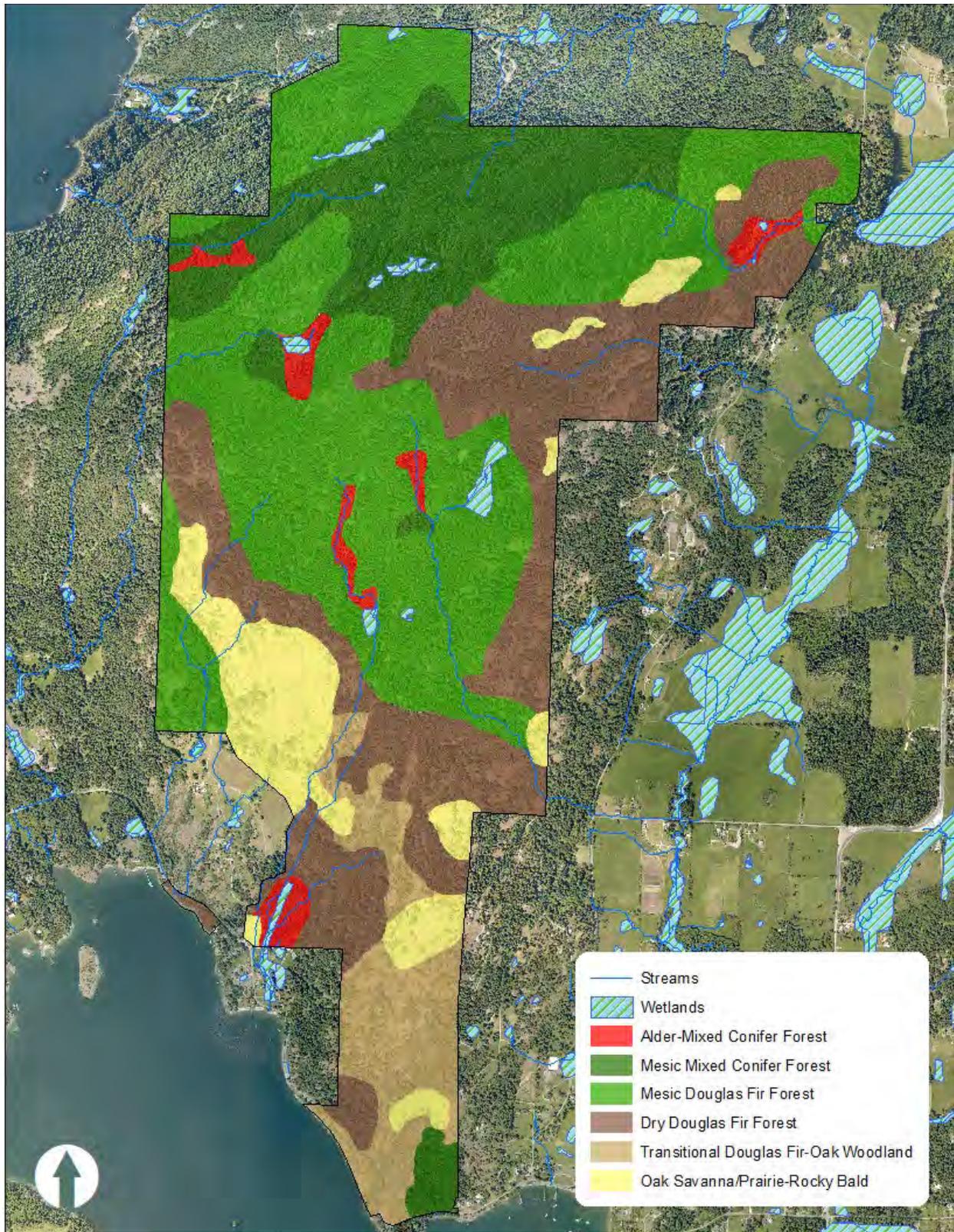


Figure 3. Generalized Land Cover of Turtleback Mountain Preserve

Table 2. Generalized current and desired future condition²⁰

AREA	CURRENT CONDITION	DESIRED FUTURE CONDITION
Wetlands & Streams	FAIR to GOOD– Some wetland hydrology altered through artificial drainage. Signs of channel incision due to altered drainage patterns and undersized culverts.	GOOD– Some wetland hydrology altered through artificial drainage. Few or no signs of active channel incision. No detectable impacts from forest management operations.
Upland Forests	POOR to GOOD – Conditions range from mature, mixed-age structure to areas of high density and low-vigor trees. Signs of heavy understory browsing. Excessive invasive species cover in some areas.	GOOD to VERY GOOD – Appropriate stand density to develop old growth characteristics. Adequate snags and downed wood, diverse native shrubs in understory and ground layer. Priority invasive species removed.
Oak Habitats	POOR to FAIR– Extensive conifer encroachment and low levels of oak recruitment. Low species richness and high levels of invasive cover.	FAIR to GOOD – Diverse, mixed-age trees within woodland and savanna. Reduced cover of high-priority invasive species, increased cover of common natives, and stable (non-declining) populations of uncommon or rare species.
Rocky Balds	POOR to FAIR – Extensive conifer encroachment and non-native grass and forb cover. Desirable natives uncommon and possibly declining.	FAIR to GOOD – No conifer encroachment, and reduced cover of high-priority invasive species. Increased cover of common natives and stable (non-declining) populations of uncommon or rare species.

²⁰ Key Ecological Attributes and indicator rating definitions available upon request

Wetlands and Streams

Freshwater environments such as streams and wetlands are among the most imperiled habitats in the region, particularly across the archipelago. This is because much of their historic extent has been altered for, if not lost to, agriculture and settlement. Wetlands take many forms -- bogs, wet prairies, forested wetlands -- and many wetland areas combine the various types. Still, all wetlands provide ecosystem services. They filter sediment and bacteria from surface water; recharge groundwater by slowing flow and allowing infiltration; and recently, they have gained recognition for their carbon-storage capabilities.

Twenty-four known wetlands are located within Turtleback Mountain Preserve. Combined, they total approximately 13 acres. The largest wetland encompasses roughly three acres. It has extensive, organic soil deposits and a central, one-acre stand of shore pine. Although this wetland isn't categorized as a bog, it may qualify as a mature forested wetland if the trees are confirmed to be more than 80 years old.

Over a dozen streams originate within the Preserve. Along with the wetlands, they serve to enhance biodiversity and contribute to critical surface and groundwater resources on the surrounding private and public lands. The unnamed streams are all intermittent and non-fish bearing. Many are mapped by the Wild Fish Conservancy and described in the Washington Administrative Code.²¹ Wetlands are defined and regulated in San Juan County.²² In some cases, wetlands and streams may also be regulated under the federal Clean Water Act.²³ Any activities related to forest management or road maintenance will comply with federal and state laws.

Protecting wetland hydrology and stream corridors will continue to be a stewardship priority. Many of the Preserve's small, high gradient stream channels show signs of incision, or deep-cut erosion, due to altered drainage patterns, undersized culverts and increasingly severe rainfall events. Where feasible, the Land Bank will remove or replace undersized culverts. When opportunities arise during forest thinning operations, logs and woody debris will be placed, as appropriate, into stream channels to increase channel 'roughness' and slow flow, which can trap sediment and prevent further incision.

Summary of proposed wetland and stream enhancement activities:

- **Protect wetland hydrology**
- **Replace undersized culverts**
- **Add downed wood to channels to slow flow and trap sediment**

²¹ WAC 222-16-030

²² See provisions in the Unified Development Code, Title 18, San Juan Code (SJCC) sections 18.35.085 - 18.35.105

²³ This can be administered by the US Army Corps of Engineers or by the State's Department of Ecology

Upland Forests

Forests sequester and store carbon, filter water, help control floods and erosion, and sustain biodiversity. Much of Turtleback Mountain Preserve is forested with common conifer species such as Douglas fir, grand fir, Western hemlock, Western red cedar and lodgepole pine. Less common, juniper is also found on the Preserve.²⁴ Scattered hardwood species include bigleaf maple, red alder, Pacific madrone, and Garry oak. Common shrubs such as oceanspray, snowberry, dwarf Oregon-grape, salal, Nootka rose and baldhip rose occupy the understory.

As previously mentioned, the Preserve's upland forests include five different stand types. These all combine to provide a relatively contiguous canopy extending across over 85 percent of the Preserve. Descriptions for each stand type are provided, and then followed by a discussion about future management recommendations.

Alder mixed conifer: The alder mixed conifer stand type is found within the Preserve in six, small areas. These patches are widely distributed and nearly all are associated with wetland features and found in areas with gentle topography. Pure stands of red alder are rare. Most often conifers, such as Douglas fir, grand fir, and hemlock are scattered within the alders and dominant in both height and diameter.

**Mesic mixed conifer:* Characterized by the significant presence of Western red cedar, Western hemlock, or a combination of both moisture-dependent species, this stand type is found on northerly aspects with moderate to steep slopes. A substantial part of the main road (and the North Trail) runs through this stand and extensive logging of accessible, large diameter trees has occurred. In many areas Douglas firs are now the largest trees on site. There are robust, younger generations of shade-tolerant species like cedar and grand fir, and areas where regeneration of hemlock has formed dense thickets. Drought stress is evident in the form of dying cedars and further mortality from drought and insects is expected to increase in the coming decades.

Mesic Douglas fir: This type occupies the largest area of the property. Although Douglas fir is dominant in this stand, red alder and other conifers such as grand fir, hemlock, and cedar, are also present. Within a riparian corridor, one patch of impressive old growth remains. Logging was extensive, yet also selective. It occurred in small units, and this created a fine-scaled mosaic of age classes and stand density.

²⁴ *Juniperus scopulorum*

* Indicates a priority habitat type for management

**Dry Douglas fir:* Found on moderate to steep slopes with southerly aspects, trees within this stand type average 100 years old. A small number of scattered lodgepole pine, Pacific madrone, and Garry oak are found throughout this type on the edge of openings and large rock outcrops. Two to three cohorts are present in the understory, although numerous small patches exist where there is only a single age-class present.

**Transitional Douglas fir and Oak woodlands:* The transitional Douglas Fir-Oak woodland stand type borders grasslands and/or dry Douglas fir types. It is found in the southern portion of the Preserve. Historically, this area was comprised of savanna and an open woodland with firs and oaks. In the absence of fire, this transitional zone has become increasingly colonized by firs. They are young -- ranging from 42 to 48 years old -- and grow rapidly due to lack of competition. However, some areas have reached higher densities and are beginning to self-thin via competitive mortality.

Logging activity was extensive in certain areas and that, as well as altered fire regimes, has increased the vulnerability of the Preserve's forests to stressors such as drought and wildfire. As previously stated, among the Land Bank's overarching objectives for the Preserve's expansive forests are to enhance habitat, reduce the risk of catastrophic fire and promote resilience to climate change. Primary management tools for achieving these objectives include establishing fuel breaks and reducing stand densities by thinning.

Fuel breaks reduce the abundance and the connectivity of surface fuels and ladder fuels to moderate fire behavior and burn severity. These treatments utilize roads and trails to improve their effectiveness. In western Washington species with high foliar water content such as red alder, bigleaf maple and Garry oak, are generally fire resistant, and they will be retained in areas designated as fuel breaks.²⁵

Thinning to support resilience to climate change emphasizes residual forest structure, composition, and understory. Conserving large, old trees is the foundation of these treatments. Reducing competition within stands can increase vigor and allow remaining trees to release and develop old growth characteristics. Plantings of small trees and shrubs such as serviceberry, elderberry, and huckleberry in the understory, creating snags, and leaving large woody debris in these project areas will also enhance biodiversity and provide for greater wildlife habitat.

Considerations for implementation include minimizing soil impacts through timing of management actions and use of existing roads and corridors, preventing new introductions of invasive plants, promoting public safety and education through use of signage and

²⁵ See OSU Extension publication on "[Firebreaks and Shaded Fuel Breaks.](#)" *pnw618achapter4.pdf*.

temporary area closures, and optimizing labor, equipment, and timing in planning to reduce costs. Many of these recommendations and their general cost estimates are reflected in the budget projection in Section E.

Summary of proposed forest management activities:

- **Thinning high density stands to enhance forest resilience to climate change**
- **Promoting standing and downed dead wood for habitat**
- **Creating fuel breaks within priority areas to reduce fire risk**
- **Managing priority weeds**
- **Seeding and out-planting of native flora**

Oak Savannas and Rocky Balds

Included on Washington State’s list of priority habitats, westside Garry oak woodlands, savanna and prairie, as well as rocky balds are distinct, highly variable plant communities.²⁶ Again, they are combined here for the sake of brevity. These vegetation types are found throughout the Preserve, predominantly on steep, rocky, and often south-facing sites.

Junipers can be found mixed within the oak woodlands and savannas. The prairies and rocky balds support camas and other native forbs as well as grasses²⁷, lichens, mosses, and even prickly-pear cacti. Higher-quality grasslands, those that are dominated by native species, persist within the Preserve’s higher elevations, rugged terrain, and mesic exposures. Non-native grasses and shrubs tend to dominate exposed south-facing slopes. Although no federal or state listed plant species have been identified on the mountain, there are numerous, locally uncommon species of importance.²⁸

Collectively, these open or sparsely forested habitats merit special consideration and management planning. They retain many ecological attributes but have been altered extensively by the cessation of burning by Coast Salish peoples, the subsequent encroachment of firs, and the past century of livestock grazing. In addition, these plant communities face ongoing threats from invasive species, excessive herbivory by deer and, where unprotected, conversion to agriculture or development.

²⁶ Washington Department of Fish and Wildlife. 2008, Updated June 2019. *Priority Habitat and Species List*. Olympia, WA, <https://wdfw.wa.gov/publications/00165>

²⁷ Such as *Danthonia californica* and *Festuca roemeri*

²⁸ Uncommon species include: bicolor linanthus (*Leptosiphon minimus*), pink microsteris (*Microsteris gracilis*), yampah (*Perideridia gairdneri*), bittercress (*Cardamine nuttallii* var. *nuttallii*), and purple sanicle (*Sanicula bipinnatifida*).

As rare and declining systems, these oak habitat areas have been the primary focus of the Land Bank's restoration efforts since acquisition of the Preserve. Common activities in oak habitat areas include removing Douglas fir trees and invasive shrubs, caging oak seedlings, casting native seeds, and planting grasses, forbs, and acorns.

Conservation goals and objectives for oak habitats within the Preserve were identified in 2018.²⁹ These included: identifying and protecting the best remnant habitats, removing Douglas fir and Himalayan blackberry to release both oaks and balds, and creating connections between protected areas with diverse herbaceous communities.

In the southern part of the Preserve, Land Bank staff conceptualize restoring connectivity within a mosaic of oak habitats. Restoration activities here would parallel previous restoration efforts and focus on removing young conifers, creating snags, planting and, potentially, controlled burning. Many of the oaks that have been released from competing Douglas firs show signs of recovery. For example, oaks released in the vicinity of Morning Ridge trail and beyond have responded to increased sunlight by developing new branches. Still, there are many other large and small oaks throughout the Preserve that remain overtopped by conifers, and staff will continue to dedicate stewardship funds and seek grants to recover these rare, and remnant habitats.

Summary of proposed oak habitat and rocky bald management activities:

- **Removing encroaching conifers**
- **Protecting intact, high-diversity plant communities**
- **Managing priority weeds**
- **Seeding and out-planting of native flora**

²⁹ *Turtleback Mountain Preserve Site Assessment*, Center for Natural Lands Management, 2018

Table 3. Turtleback Mountain Preserve natural resource protection areas, prioritized management actions and associated cost

ACTIVITY	KEY ECOLOGICAL ATTRIBUTES	STRESSORS	PROPOSED ACTIONS	TIMING³⁰	EST. COST³¹
Wetland and stream stewardship	Area/extent; Native wetland plant cover	Climate change, alterations to wetland hydrology, species introductions	Add woody debris to incising stream channels. Control priority invasive species. (Undersized culverts are addressed in Table 4.)	Medium to long term	\$50,000
Upland forest stewardship	Stand density and structure; Standing and downed dead trees; Vegetative structure: native shrub and ground layer	Climate change, previous logging, fire suppression, grazing and deer browse, species introductions	Complete selective thinning. Increase snags and downed wood. Control priority invasive species. Limited understory planting.	Near to long term	\$1,100,000
Garry oak stewardship	Area/extent; Native herbaceous plant cover	Climate change, conifer encroachment, species introductions	Remove encroaching conifers. Control priority weeds. Establish native forbs.	Near to long term	\$200,000
Rocky bald stewardship	Area/extent; Native herbaceous plant cover	Climate change, conifer encroachment, species introductions	Remove encroaching conifers. Control priority weeds. Establish oaks and native forbs. Implement beneficial controlled disturbance.	Medium to long term	\$50,000
Fuel breaks	Not applicable	Not applicable	Establish fuel breaks along roads to reduce potential for wildfire's ability to spread rapidly and to improve manageability.	Near to medium term	\$150,000

³⁰ Near term = 1-2 years, medium term = 3-10 years, long term = 11+ years

³¹ See additional cost details in Table 5.

D. Public Access Overview and Objectives

Turtleback Mountain Preserve is a sizeable and diverse resource for outdoor enthusiasts. The expansive, wild setting enables serene observation of forests, open meadows, and wildlife. The mountainous terrain offers far-reaching views as well as opportunities for rugged recreation. The established network of trails, which total approximately eight miles, create options for hiking, mountain biking and horseback riding.

Providing access to the natural beauty and diversity of the San Juan Islands is an important part of the Land Bank's mission. The conservation mandate specifies preserving areas for "low-intensity" recreation. This stipulation reduces the likelihood that human use will degrade a preserve's ecology. Limited, low-intensity recreation also helps assure quietude for visitors; retain the rural character of neighboring communities; and protect the organization from increased management costs that tend to result from high-intensity uses. For these reasons, public access to Land Bank properties is primarily designed for pedestrians.

This plan proposes modest changes to current public use. These include developing an accessible trail for those with limited mobility at the South Entrance (Fig. 4), constructing a new, pedestrian-only trail within the recent preserve addition (Fig. 5), and improving the Morning Ridge trail in association with removal of a section of the steep access road (Fig. 6). In addition, the Land Bank is exploring the possibility of allowing hunting in select areas. Conceptual trail designs and potential constraints, as well as hunting, are discussed in this section as are recommended improvements to infrastructure including the south parking area and road system culverts.

Current Use

Two trailheads with graveled parking areas provide public access to Turtleback Mountain Preserve. The North Entrance accesses the multiple-use trails. The South Entrance accesses the Preserve's pedestrian-only trails and experiences the heaviest use. During the high season, a portion of the field adjacent to the south entrance is used for overflow parking.

Although staff have observed an increase in recreational use over the past several years, the current parking lots and trails remain adequate, and only minor improvements are planned. Impacts from recreation are expected to increase throughout the Puget Sound region as population growth continues and more people seek access to natural areas.³² Maintaining a moderate level of use will be essential to preserving Turtleback's special

³² For more information see The Tulalip Tribes report, [The "Recreation Boom" on Public Lands in Western Washington: Impacts to Wildlife and Implications for Treaty Tribes](#), 2021

qualities. The Land Bank has received a few inquiries about building more trails for mountain biking. However, trail construction on the steep, rocky terrain of the northern Preserve would likely be costly to build and difficult to maintain, and the additional traffic could negatively impact the Preserve's conservation values, visitor experience and safety, and further tax parking capacity. The Land Bank always reserves the option of restricting or discontinuing any aspect of public use if it proves unmanageable or detrimental to the land's conservation values.

The following approaches will be used to manage levels of use:

- **No recreational promotion of the Preserve**
- **No commercial tours**
- **Limited signage and facilities**
- **Land Bank permission required for groups of 15 people or more**

Outreach, Education and Research

To date, a variety of public education programs and events have been held on the Preserve. Interpretive programs may be organized by Land Bank staff or in collaboration with outside groups or experts. Where appropriate, the Land Bank may collaborate with Tribes, organizations, schools, universities, and scientists to increase or disseminate knowledge of the Preserve's ecological resources. Activities related to education and research will be subject to review, conducted on a permission-only basis, and limited in size or duration. As noted, the Land Bank will seek opportunities to collaborate with the Lummi Nation and other Coast Salish peoples. Potential projects include, but are not limited to, restoration plantings and stewardship of oak habitats.

Volunteers

Volunteers have contributed countless hours of service and performed meaningful stewardship activities on the Preserve. Some have served for a single day to plant acorns and wildflowers. Others have signed up for recurring activities like monitoring. The Land Bank will continue to work with community volunteers, and host work parties, to meet some of its stewardship objectives.

Proposed Access Projects

The road and trail system on Turtleback Mountain was designed to provide safe, low-intensity recreational access and to protect the Preserve's ecological attributes. In continued support of these dual objectives, staff identified several projects. These include culvert replacements, road drainage and surface maintenance, as well as trail and parking improvements to be planned in consultation with qualified professionals. Trail projects also remain conceptual. Prior to implementation, they will require feasibility assessments and a thorough review of the potential impacts to ecological and cultural resources.

Specific designs and locations of potential trail improvements will be informed by terrain, management objectives, maintenance requirements, cost, and other factors. Ultimately, project implementation will depend on receipt of regulatory permits, where applicable, and the availability of adequate funding. These projects are summarized in Table 4 along with estimated costs.

South Entrance Parking and Accessible Loop Trail

The level topography at the South Entrance provides an opportunity to establish a short trail for people with limited mobility. This conceptual project includes a 1000-foot soft-surface loop trail to highlight oak and riparian plant communities (Fig. 4). Establishment of the trail would coincide with plantings of Garry oaks, which would be followed by native wildflowers. Additionally, as part of this project, the Land Bank would upgrade the portable toilet to an accessible portable or a comparable facility. Re-design of the parking areas, both the existing lot and the overflow zone, will seek to improve ingress and egress, and to maximize parking efficiency within the existing development footprint.

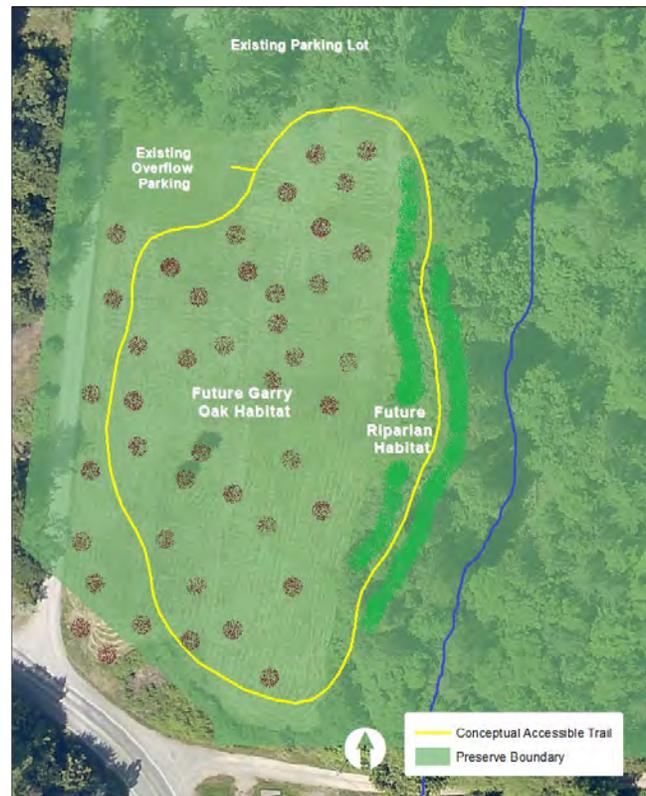


Figure 4. Conceptual trail and habitat enhancement

South Slope Trail

The second project would create approximately a one-mile trail within the Preserve's new addition (Fig. 5). As currently envisioned, the trail would extend west from the Morning Ridge Trail junction, descend through coniferous forest along the edge of an oak-madrone woodland and make a loop above Deer Harbor Road. This southern route will provide sweeping views of the bay and beyond and afford pedestrians the opportunity to witness some of the highest quality oak habitat within the Preserve. Pedestrians will access this area from the South Trailhead. The Land Bank proposes to exclude dogs from this new trail for two reasons. First, scientific evidence concludes that dogs, either on or off leash, are more detrimental to wildlife than people without dogs, and as mentioned, this area

represents some of the Preserve’s highest quality oak habitat.³³ Secondly, the Land Bank has received public comment in support of restricting dogs on some trails to increase the comfort and safety of other hikers, and there are currently no trails on Orcas Island preserves where dogs are restricted.



Figure 5. Conceptual pedestrian-only trail

Morning Ridge Trail Improvement

The third project would decommission a 1,300-foot segment of the former logging road on the southern slope that currently serves as the main southern trail (Fig. 6). This portion of the trail is very steep (~30-degree slope), erodes regularly during heavy rains and bisects the Preserve’s largest and highest quality Garry oak savanna. By eliminating this steep

³³ [The impacts of dogs on wildlife and water quality: A literature review. Compiled by Lori Hennings, Metro Parks and Nature. April 2016.](#)

section and widening and improving the nearby Morning Ridge Trail the Land Bank can provide a better trail experience, eliminate the need for expensive maintenance, and restore the connectivity of important Garry oak habitat. The existing interpretive sign area at the bottom of the steep slope would remain as a scenic overlook and a new southwest facing overlook would be established at the road end at the top of the steep slope.

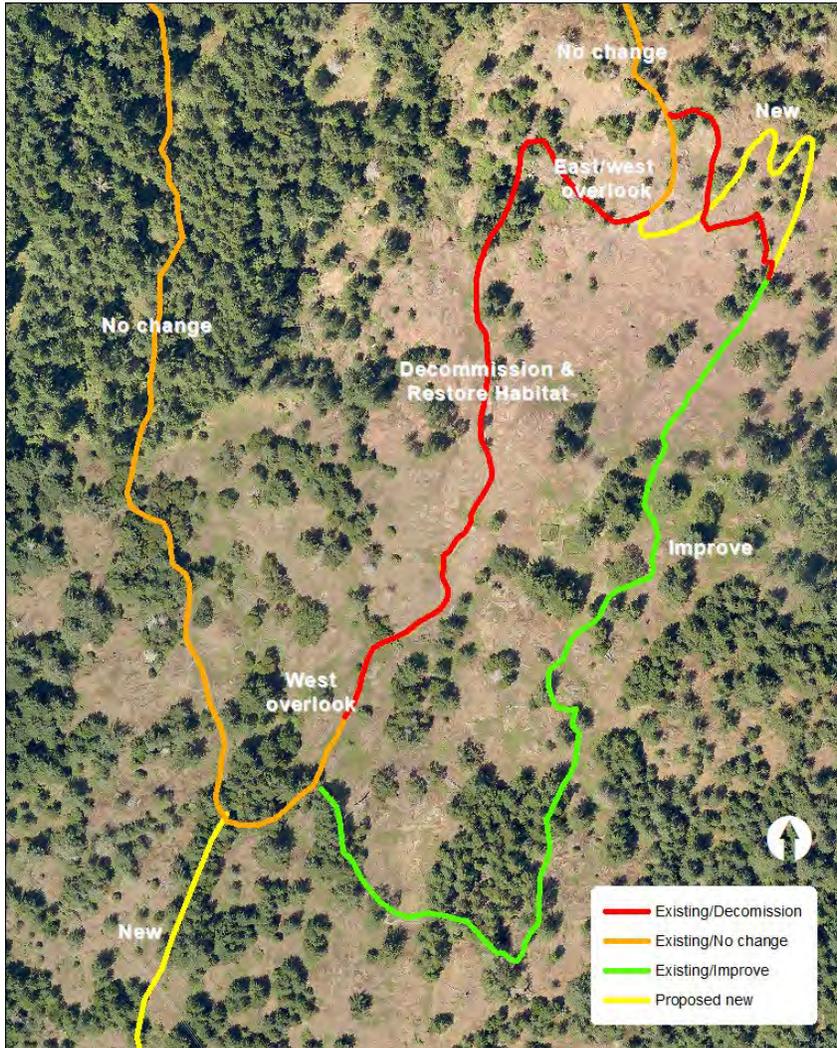


Figure 6. Conceptual South Trail improvements

Summary of proposed access infrastructure improvements:

- **New South Entrance Garry oak loop trail and parking lot improvements**
- **New Turtleback addition trail (No dogs allowed for habitat protection)**
- **Morning Ridge Trail improvement and decommissioning of road/trail segment through savanna**
- **General road maintenance, and replacement of derelict culverts**

Hunting

Unnaturally high populations of Black-tailed deer exist in the San Juan Islands and researchers and wildlife biologists recommend control of deer populations both for conservation purposes and for the health of the animals themselves.³⁴ The overpopulation of deer exemplifies a native species out of balance due to development and the absence of natural predators. Excessive herbivory disrupts forest succession as well as the production of flowers and seeds. This, in turn, reduces the resources -- forage, breeding and sheltering habitat -- available for other fauna such as insects and birds.

Even after the recent impacts of adenovirus hemorrhagic disease (AHD), which culled numerous deer in the islands, state biologists still estimate the population to be excessively high. Biologists also expect the population to rebound with the short-term increase in forage and in the absence of predators. Hunting as a management tool could assist in slowing population growth, which leads to healthier individuals and likely less dramatic losses when AHD returns.

Currently, the Land Bank allows hunting on Lopez Hill and Mount Grant Preserve. The San Juan Preservation Trust (SJPT) allows deer hunting on some of their preserves. These programs were developed in close collaboration with the Washington Department of Fish and Wildlife (WDFW), researchers and local hunters to ensure that hunting is both safe for the public and a sound ecological practice.

The Land Bank will seek public input on opening select, remote portions (within Reserve Zones) of Turtleback Mountain Preserve to deer hunting. This will continue a local recreational and cultural tradition and provide ecological benefits. Any future hunting will be in accordance with state and county rules³⁵ and closely model the program at Mount Grant Preserve, which requires hunter registration and signed permission. More public process and scientific review will occur before any hunting opportunities are implemented.

The hunting rules in effect at Mount Grant include:

- **Mapped “Hunting Zones”**
- **Hunters must register**
- **Limited dates and party size**
- **Parking space is limited to a single vehicle**
- **Construction of blinds, tree stands, or other infrastructure is prohibited**
- **Hunting is managed through [WDFW Hunting Access Program](#)**
- **As required by San Juan County code, all hunters must carry written permission**

³⁴ Arcese, 2012. Milner, 2018

³⁵ San Juan County limits hunting methods to short-range weapons such as shotguns and bows. Current regulations also specify license requirements, the number and gender of animals hunted, and the use of the meat.

Table 4. Access Improvements, 10-year cost projection

ACTIVITY	JUSTIFICATION	PROJECT ELEMENTS	TIMING³⁶	EST. COST³⁷
Culvert replacement (wetlands and streams stewardship)	Improve conveyance by replacing old and undersized culverts	Design, permitting and contracting	Near term	\$150,000
Road maintenance	Improve road surfaces and drainage to ensure emergency access	Planning, contracting	Near term	\$50,000
New south slope trail	Increase low-impact recreational access	Cultural resources review, design, permitting and installation	Near term	\$20,000
South slope road decommissioning and Morning Ridge trail improvement	Eliminate steep road/trail section to eliminate recurring erosion, improve hiking experience and restore Garry oak habitat	Cultural resources review, design, permitting and installation	Medium term	\$20,000
South Entrance Garry oak loop trail	Increase low-impact recreational access and establish accessible Garry oak habitat	Cultural resources review, design, permitting and installation; plant establishment	Near to medium term	\$10,000
South Entrance parking improvements	Improve ingress/egress and parking efficiency	Cultural resources review, design, permitting and contracting	Near to medium term	\$50,000

³⁶ Near term = 1-2 years, medium term = 3-10 years, long term =11+ years

³⁷ See additional cost details in Table 5.

E. Cost Projection

This cost projection is intended as a financial planning tool. It is not a commitment of resources. Cost estimates are provided for general operations and for one-time capital expenditures and do not include staff time. All figures are approximate, and costs are adjusted for an average inflation rate of 2.5 percent. Staff and Commissioners will review and revise actual planned expenditures during the Land Bank’s budgeting process. Potential funding sources include Land Bank stewardship funds, SJPT Turtleback Stewardship Endowment funds, and both state and federal grants.

Table 5. 10-year Cost Projection (for planning purposes, only)

Year	General Operations ³⁸		Capital Projects ³⁹		Subtotal
2022/23	\$40,000	Forest management and Garry oak habitat projects grants, seeding and planting; general stewardship, maintenance and monitoring	\$80,000	Culvert assessment, design and permitting; replace priority culverts; cultural resources assessment; trail design, permitting	\$120,000
2023/24	\$90,000	Forest and Garry oak habitat management, seeding and planting; general stewardship, maintenance and monitoring	\$150,000	Replace remaining culverts, road maintenance; South Entrance parking area design and permitting; trail construction; trail improvements	\$240,000
2024/25	\$150,000		\$70,000	South side steep road decommissioning & trail improvements; South Entrance parking improvements and trail	\$220,000
2025/26	\$200,000		\$20,000	Project wrap-up	\$220,000
2026/	\$200,000		\$0	None planned	\$200,000
2027	\$190,000		\$0		\$190,000
2028	\$180,000		\$0		\$180,000
2029	\$170,000		\$0		\$170,000
2030	\$160,000		\$0		\$160,000
2031	\$150,000		\$0		\$150,000

Total \$1,850,000

³⁸ Recurring, non-capital improvement operating expenses such as monitoring and maintenance

³⁹ One-time capital expenses

F. Public Process Overview

To gather and incorporate input from the public regarding the use and management of Turtleback Mountain Preserve, the Land Bank provided and sought information in a variety of ways. These are summarized as follows:

Action	Completed (Planned)
Turtleback forest assessment	October 2021
Turtleback forestry management presentation	December 2021
Commission and SJPT review of Draft SMP	January 2022
SMP revision press release	April 2022
Public review of Draft SMP	May 2022
Commission adoption of Final Stewardship and Management Plan	(Sep 2022)

G. References

Additional information about the Turtleback Mountain Preserve will be made available upon request. Supporting digital documents are hyperlinked when possible.

Arcese, P., Schuster, R., Campbell, L., Barber, A. and Martin, T. G. 2014. *Deer density and plant palatability predict shrub cover, richness, diversity and aboriginal food value in a North American archipelago*. *Diversity Distrib.*, 20: 1368–1378. doi:10.1111/ddi.12241.

Floberg, J., M. Goering, G. Wilhere, C. MacDonald, C. Chappell, C. Rumsey, Z. Ferdana, A. Holt, P. Skidmore, T. Horsman, E. Alverson, C. Tanner, M. Bryer, P. Iachetti, A. Harcombe, B. McDonald, T. Cook, M. Summers, D. Rolph. 2004. *Willamette Valley-Puget Trough-Georgia Basin Ecoregional Assessment, Volume One: Report*. Prepared by The Nature Conservancy with support from the Nature Conservancy of Canada, Washington Department of Fish and Wildlife, Washington Department of Natural Resources Natural Heritage and Nearshore Habitat programs, Oregon State Natural Heritage Information Center and the British Columbia Conservation Data Centre.

Habegger, E. and D. Dougherty. 2007. Turtleback Mountain Preserve Vegetation Mapping, Botanical Inventory, and Logging History. Report to the San Juan County Land Bank, Friday Harbor, WA.

Hamilton, W. et. al. September 2000. Forest Land Management Plan. Prepared by Hamilton Resource Management for Medina Foundation, Seattle, WA.

Hennings, L. 2016. The impacts of dogs on wildlife and water quality: A literature review Compiled by Lori Hennings, Metro Parks and Nature, April 2016

Martin, T. G., Arcese, P. & Scheerder, N. 2011. *Browsing down our natural heritage: Deer impacts vegetation structure and songbird assemblages across an island archipelago*. *Biological Conservation*. 144:459-469

Miskelly, J. October 2007. Report of Preliminary Butterfly Foray on Turtleback Mountain. Report to the San Juan County Land Bank, Friday Harbor, WA.

Orr, L. A., Bauer, H., and Wayenberg, J. 2002. Estimates of Ground-Water Recharge from Precipitation to Glacial-Deposit and Bedrock Aquifers on Lopez, San Juan, Orcas, and Shaw Islands, San Juan County, Washington. Prepared in cooperation with the SAN JUAN COUNTY HEALTH AND COMMUNITY SERVICES, Tacoma, WA.

Rainshadow Consulting LLC., 2010. Turtleback Mountain Forest and Carbon Inventory.

Rainshadow Consulting LLC., 2021. Turtleback Mountain Preserve & Turtlehead Preserve - Action Plan for Forest Health and Climate Change Resiliency.

Rozenbaum, S. January 2008. Turtleback Mountain Preserve Wetland & Stream Inventory and Amphibian Survey. Report to the San Juan County Land Bank, Friday Harbor, WA.

San Juan County Water Resource Management Plan WRIA 2. 2004. Final as Revised & Adopted by San Juan County Board of County Commissioners October 2004.

State University. Extension Service, Oregon. "Firebreaks and Shaded Fuelbreaks" Bennett, M., Fitzgerald, S., Parker, B., Main, M., Perleberg, A., Schnepf, C., Mahoney, R., & Northwest Cooperative Extension, P. *pnw618achapter4.pdf*.

Stein, J. 2000. *Exploring Coast Salish Prehistory: The Archaeology of San Juan Island*. University of Washington Press.

Tetu, J. and E. Habegger. August 2007. Turtleback Mountain Preserve Garry Oak Inventory. Report to the San Juan County Land Bank, Friday Harbor, WA.

The Nature Conservancy 2007. Conservation Action Planning Handbook. https://www.conservationgateway.org/Documents/Cap%20Handbook_June2007.pdf

Tucker, B. and T. King. Lead Authors. 2012. *San Juan County, Washington, Community Wildfire Protection Plan*. Northwest Management, Inc., Moscow, ID. <http://www.sanjuandem.net/About/PDFs/2012%20SJC%20CWPP.pdf>

USDA Natural Resources Conservation Service. 2019. Custom Soil Resource Report for San Juan County, Washington. <https://websoilsurvey.sc.egov.usda.gov/>

Washington Department of Fish and Wildlife. 2008, Updated June 2019. *Priority Habitat and Species List*. Olympia, WA, <https://wdfw.wa.gov/publications/00165>

Washington Department of Fish and Wildlife, 2015. *Washington's State Wildlife Action Plan*. Olympia, WA, <https://wdfw.wa.gov/sites/default/files/publications/01742/wdfw01742.pdf>

Washington Department of Natural Resources, 2018. *State of Washington Natural Heritage Plan*. Olympia, WA, https://www.dnr.wa.gov/publications/amp_nh_plan_2018.pdf?hkhyxx
Wessen, G. September 2007. An Archaeological Survey and Evaluation of Selected Portions of the Turtleback Mountain Preserve, Orcas Island, Washington. Prepared by Wessen & Associated, Inc. for the San Juan County Land Bank.

H. Appendix A. Rules and Use Restrictions

The following use restrictions will be in effect. Restrictions are intended to protect the ecology of the Preserve, the safety and peace of neighbors, and to minimize management costs. They will be posted on site and mentioned in literature as appropriate.

The Land Bank generally relies on signage and periodic contact from staff or volunteers to educate visitors about use restrictions. An enforcement ordinance that governs activities on Land Bank Preserves was adopted by the San Juan County Council on August 25, 2009. When necessary, enforcement actions may be carried out through the San Juan County Sheriff's office.

- Daytime use only
- Pedestrian access only (except where posted for other uses)
- No camping
- No fires
- No vehicles
- No hunting
- Launching or landing of UAV (drones and similar devices) is allowed only for research purposes and requires written permission of Land Bank Director
- No commercial use
- No collection of botanical, zoological, geologic or other specimens except on a permission-only basis for scientific or educational purposes