DEPARTMENT OF NATURAL RESOURCES

OFFICE OF THE COMMISSIONER OF PUBLIC LANDS
1111 WASHINGTON ST SE MS 47001
OLYMPIA, WA 98504-7001

March 9th, 2022

The Honorable Bernard Dean
Chief Clerk of the House
338B Legislative Building
Olympia, WA 98504

The Honorable Brad Hendrickson
Secretary of the Senate
412 Legislative Building
Olympia, WA 98504

Dear Chief Clerk Dean and Secretary Hendrickson:

Please accept the enclosed State of Washington Natural Heritage Plan (NHP), submitted on behalf of Department of Natural Resources (department), as directed in RCW 79.70.030. The statute requires the department to submit the NHP biennially to the appropriate committees of the Legislature on the progress of the Natural Heritage Program, natural heritage resources under consideration, and the selection criteria of the natural areas. The 2022 NHP marks the 50th anniversary of the Natural Areas Preserves Act of 1972 and we respectfully submit for your information and review.

Should you have any questions, please contact me at 360-486-3469 or Brian.Considine@dnr.wa.gov

Sincerely,

Brian Considine
Legislative Director
Office of the Commissioner of Public Lands

Enclosure: 2022 State of Washington Natural Heritage Plan; Commissioner of Public Lands Cover Letter

cc:
Members of the Senate Agriculture, Water, Natural Resources & Parks Committee
Members of the House Rural Development, Agriculture & Natural Resources Committee

DEPARTMENT OF NATURAL RESOURCES

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March 9th, 2022

The Honorable Kevin Van De Wege, Chair
Agriculture, Water, Natural Resources & Parks Committee, Washington State Senate
P.O. Box 40424
Olympia, WA 98504

The Honorable Ed Orcutt, Vice Chair
Joint Legislative Audit & Review Committee
Washington State House of Representatives
P.O. Box 40600
Olympia, WA 98504-0600

Dear Respected Committee Chairs and Members:

Washington has a rich natural heritage comprised of an incredible diversity of natural resources: marine eelgrass beds, temperate rainforests, lowland prairies, bogs, alpine meadows, dry forests, and shrub-steppe ecosystems are a few examples. These and other ecosystems support thousands of species, many of which occur nowhere else on earth. However, this natural heritage is at risk from various threats, including development pressure and climate change. As stewards of this incredible biodiversity, it is our responsibility to retain it for future generations, so that they, too, can appreciate and benefit from Washington's unique natural heritage.

The *2022 State of Washington Natural Heritage Plan* marks the 50th anniversary of the Natural Area Preserves Act of 1972, which the Legislature passed as a critical step toward protecting Washington state's natural heritage. This *Plan* reflects current conservation science and addresses new threats to biodiversity. The *Plan* outlines a framework that ensures the most important places are targeted for establishing new natural areas. Additionally, the priorities identified in this *Plan* serve to guide land use decisions and other federal, state, and local conservation actions throughout Washington. In the coming years, the Department of Natural Resources (DNR) will look to leverage existing biodiversity information and the conservation priorities in this *Plan* to identify sites of statewide biodiversity significance, or Essential Conservation Areas, to guide landscape and site-scale conservation actions across the state.

In the 50 years since the Natural Area Preserves Act was passed, DNR has partnered with other state and federal agencies and private conservation groups to build an impressive statewide network of natural areas. This *Plan* highlights the accomplishments of these existing partnerships and the value they bring to improve our knowledge about what is already protected on both conserved and working lands, enhance access for education and recreation, and improve the effectiveness and efficiency of conservation.

The lands we have conserved represent some of the best examples of Washington's natural, undisturbed ecosystems, and they often provide protection for our rarest and most vulnerable plant and animal species. However, the work of identifying and conserving our natural heritage is not complete, and DNR alone cannot achieve success. Partnerships with other agencies, land trusts, citizen scientists, and private landowners are needed to fill information gaps and

implement conservation actions. We invite you to assist in this critical endeavor of conserving Washington's natural heritage, and we encourage officials to use the priorities in the *Plan* when making decisions that may affect Washington's imperiled biodiversity.

Establishing natural areas not only protects our state's native biodiversity, it also provides opportunities for environmental education, scientific research, and places for people of all ages to connect with nature. School districts and individual teachers interested in providing outdoor learning experiences are encouraged to reach out to us.

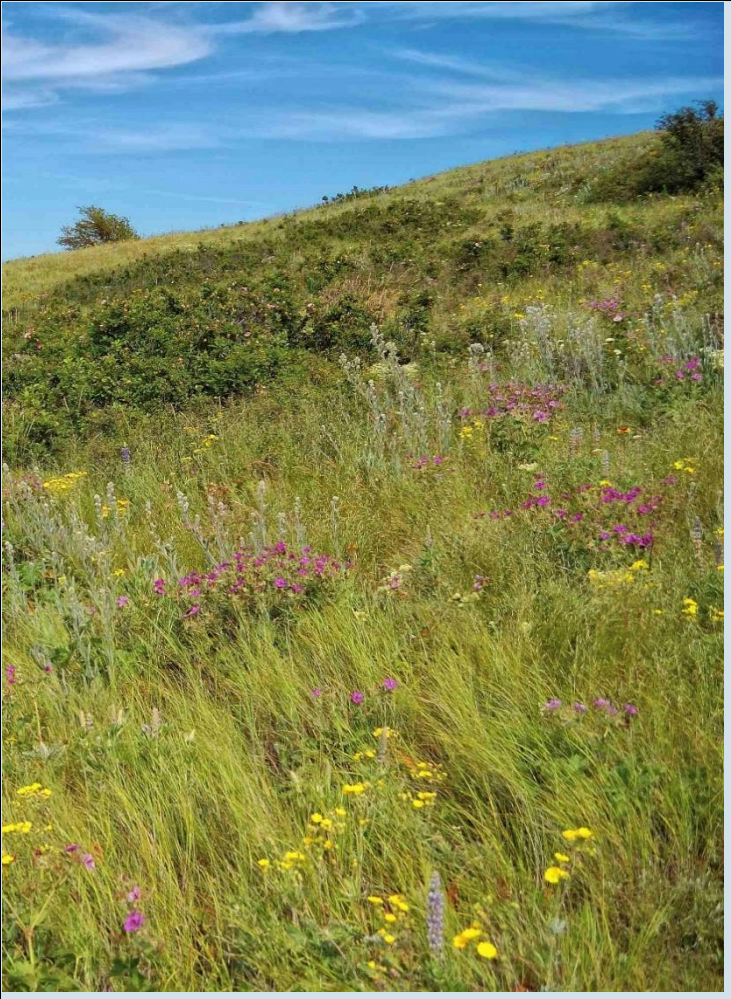
Our ultimate intent is to increase the awareness, appreciation, and educational use of the special places that showcase Washington's natural heritage, and protect them for future generations.

Sincerely,

Hilary S. Franz
Commissioner of Public Lands

Enclosed: 2022 State of Washington Natural Heritage Plan

Cc: Senator Jesse Salomon, Vice Chair; Senator Judy Warnick, Ranking; Senator Jim Honeyford, Senator Christine Rolfes; Senator Shelly Short; Senator Derek Stanford. Representative Sharon Shewmake, Vice Chair; Representative Bruce Chandler, Ranking; Representative Tom Dent; Representative Joe Fitzgibbon; Representative Mark Klicker; Representative Shelley Kloba; Representative Joel Kretz; Representative Debra Lekanoff; Representative Joel McEntire; Representative Melanie Morgan; Representative Ed Orcutt; Representative Bill Ramos; Representative Joe Schmick; Representative Larry Springer.



State of Washington Natural Heritage Plan 2022

WASHINGTON STATE DEPARTMENT OF NATURAL RESOURCES

State of Washington Natural Heritage Plan 2022

Prepared by

Washington Natural Heritage Program,

Recreation and Conservation Division,

Washington State Department of Natural Resources

Olympia, WA

March 08, 2022

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Cover Photos

Upper left (Palouse prairie, Steptoe Butte); upper right (Kahlotus Ridgetop NAP); bottom (old growth noble fir forest, Goat Marsh Research Natural Area).

Unless otherwise noted, all photos used in this publication were takenby Joe Rocchio and used with permission.

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List of Abbreviations

ACEC – Area of Critical and Environmental Concern
BLM – Bureau of Land Management
BSA – Biological Study Area
CLT - Columbia Land Trust
CNLM - Center for Natural Lands Management
Council – Natural Heritage Advisory Council
CSU – Colorado State University
DNR – Washington Department of Natural Resources
ECA – Essential Conservation Area
EPA – United States Environmental Protection Agency
NAP – Natural Area Preserve
Natural Heritage Program – DNR, Natural Heritage Program
Natural Areas Program – DNR, Natural Areas Program
NRCA – Natural Resources Conservation Area
NPS – National Park Service
PCEL - Palouse-Clearwater Environmental Institute
Plan – State of Washington Natural Heritage Plan
RCW – Revised Code of Washington
RNA – Research Natural Area
SJPT - San Juan Preservation Trust
SLT - Skagit Land Trust
State Parks – Washington State Parks and Recreation Commission
STPK – Washington State Parks and Recreation Commission
TNC - The Nature Conservancy
USFS – United States Forest Service
USFWS – United States Fish and Wildlife Service
USNVC – United States National Vegetation Classification
WAC – Washington Administrative Code
WDFW – Washington Department of Fish and Wildlife

Executive Summary

The State of Washington has a rich natural heritage. Our beautiful state contains a wide diversity of landscapes that support an array of ecosystems including marine eelgrass beds, tidepools, salt marshes, lowland rainforests, montane coniferous forests, subalpine and alpine meadows and parklands, shrub steppe, grasslands, prairies, sand dunes, riparian areas, forested swamps, vernal pools, marshes, fens and bogs. These ecosystems are home to more than 2,600 native vascular plant species; thousands of mosses; lichens, liverworts, and fungi; 140 mammals; 451 freshwater and marine fishes; 341 birds; 25 amphibians; 28 reptiles; and more than 20,000 species of invertebrates. Some of these species are unique to Washington and found nowhere else on earth. For example, 84 plant species have their entire global range within Washington State.

This incredible biodiversity faces increasing threats stemming from various land uses and climate change. Land conversion from native vegetation cover to other uses, invasion by non-native species, and the impacts of climate change reduce the footprint of natural habitats and decrease the ecological health of remaining areas of native ecosystems. Given the magnitude of these threats, we have a decreasing margin of error when it comes to decisions that will affect the future of Washington's biodiversity. To ensure the long-term persistence of Washington's rich natural heritage, it is imperative that bold conservation steps, guided by thoughtful policy built upon science-based priorities, are implemented to stem the tide of biodiversity loss. Conservation actions, whether made by state agencies, county planning departments, or conservation organizations, require objective information regarding those elements of biodiversity in need of special conservation attention, where those elements are found on the landscape, and how best to manage the lands that support thoseelements.

Conserving Washington's Biodiversity

The 2022 State of Washington Natural Heritage Plan marks the 50th Anniversary of the Natural Area Preserves Act of 1972. This 50-year milestone is celebrated in the Natural Heritage Plan. To achieve the bold vision of this plan we must:

- Fund an innovative method of mapping and prioritizing Essential Conservation Areas that would preserve biodiversity statewide.
- Increase funding for the creation of new natural areas.
- Invest in understanding and mitigating climate related impacts to our most sensitive species and ecosystem.
- Integrate environmental justice into the way we identify lands in need of conservation.
- Identify acquisition opportunities with Tribes that enhance traditional uses.
- Create outdoor education opportunities for all public school students.

The Natural Area Preserves Act also recognized the need for an objective, scientific approach to guide identifying candidate sites for the statewide system of natural areas and to inform land use decisions that effectively and efficiently conserve Washington's biodiversity. To achieve these goals, they established the Washington Natural Heritage Program within the Washington Department of Natural Resources.

Washington Natural Heritage Program

The Washington Natural Heritage Program was established by the Washington State Legislature in 1981 to meet the needs for objective information to guide biodiversity conservation and land use decisions. The specific objectives of the program are to:

- maintain a classification of the state's natural heritage resources
- conduct an inventory of the locations of these resources
- share this information with agencies, organizations and individuals for environmental assessment and land management purposes, and
- assist with the nomination and selection of sites for inclusion within the statewide system of natural areas.

State of Washington Natural Heritage Plan

The Natural Heritage Program is tasked with developing the *State of Washington Natural Heritage Plan* (Plan) to identify conservation priorities and the processes by which potential natural areas are selected and approved. The framework for evaluating potential natural areas has been designed to ensure that the needs and benefits recognized by the Legislature in 1972 are realized in an efficient and effective manner. Not all natural lands can be conserved as natural areas, thus the Natural Heritage Plan outlines an approach for building the statewide system of natural areas that includes the best remaining examples of Washington's biodiversity. There are two primary purpose of the Plan:

- guide land use decisions by providing a list of species and ecosystems that are of conservation concern; and
- guide selection of new natural areas by establishing the framework and criteria by which natural areas are selected; and identifying those species and ecosystems with representation needs in the statewide system of natural areas.

On January 19, 2022, the Natural Heritage Advisory Council approved the State of Washington 2022 Natural Heritage Plan. The 2022 edition of the Plan reflects current conservation science and addresses new threats to biodiversity. To ensure effective and efficient conservation success, new approaches have been implemented. The approach for compiling the list of ecosystem types covered in the Plan has been updated and now includes two ecosystem lists: (a) coarse scale ecosystems and (b) fine scale ecosystems. Additionally, the Plan presents two different types of priorities intended to guide different conservation actions:

- State Conservation Status – a list of endangered, threatened, and sensitive species and ecosystems, and

- Natural Area Representation Priority – a list of species and ecosystem priorities for inclusion in the statewide system of natural areas.

When applied appropriately, these different priority lists will help DNR and our conservation partners focus conservation efforts on those elements of biodiversity that are in most need of conservation attention, and will provide a more transparent approach to tracking representation of Washington's ecosystem diversity. Together, these changes will improve effectiveness of conservation activities ranging from natural area designation to management of sensitive species.

The Plan is also used in numerous grant applications administered by the Recreation and Conservation Office. For example, the critical habitat, natural areas, and urban wildlife categories of the Washington Wildlife and Recreation Program grants require applicants to cite species and communities with special status. This Plan is one of the resources applicants are asked to consult in determining whether such species and communities are present. The priorities and conservation ranks published as part of the Plan also serve to guide other federal, state and local conservation actions throughout Washington.

Statewide System of Natural Areas

Maintaining biodiversity is critical to our economic, environmental, and social well-being. Recognizing the significant values of biodiversity, the Natural Area Preserves Act noted:

> *"All areas within the state, except those which are expressly dedicated by law for preservation and protection in their natural condition, are subject to alteration by human activity. Natural lands, together with the plants and animals living thereon in natural ecological systems, are valuable for the purposes of scientific research, teaching, as habitats of rare and vanishing species, as places of natural historic and natural interest and scenic beauty, and as living museums of the original heritage of the state. It is, therefore, the public policy of the state of Washington to secure for the people of present and future generations the benefit of an enduring resource of natural areas by establishing a system of natural area preserves, and to provide for the protection of these natural areas."*

The Legislature followed with a directive to create a statewide system of natural areas that provides the following benefits to Washington's biodiversity and human needs:

- maintains habitats for rare species and for conservation of important examples of terrestrial, aquatic, and marine ecosystems;
- provide opportunities for research and education about native species and ecosystems; and
- protection of ecosystem services that contribute to our overall quality of life, providing clean air and water, recreational opportunities, scenic diversity, etc.

Many land use designations provide critical protection and conservation of native species and ecosystems but do not necessarily meet the goals set out in the Natural Area Preserves Act. Therefore, it is important to recognize the different types of conservation lands with the appropriate management intent, permanence, and management potential that leads to long-

term maintenance of the targeted species and/or ecosystems conservation, research, and education values. Land use designations such as state Natural Area Preserves, Natural Resources Conservation Areas, and Biological Study Areas, federal Research Natural Areas and Areas of Critical Environmental Concern, and some non-governmental organization nature preserves meet the specific management goals of the statewide system of natural areas.

Several other land-use designations make significant contributions to the conservation of native species and ecosystems, but are not considered part of the statewide system of natural areas. Such places include local, state, and public lands that remain largely dominated by native land cover. Examples include National Parks, National Forests, Wilderness Areas, State Wildlife Areas, State Parks, county parks and some land trust lands. These areas provide important conservation values, such as connecting high quality habitat areas, contributing to landscape-level resiliency to climate change, and providing other ecosystem services, as well as serving as areas for outdoor recreation, enabling firsthand experiences with nature. However, these lands do not provide the degree of protection permanence, management intent, or selection criteria consistent with the goals of the Natural Area Preserves Act.

Natural Heritage Advisory Council

The Natural Area Preserves Act established the Natural Heritage Advisory Council (Council) to advise DNR, Washington Department of Fish and Wildlife (WDFW), and State Parks and Recreation Commission (State Parks) regarding implementation of the Natural Area Preserves Act. The Council provides several, critical functions (RCW 79.70.070):

- review new natural area recommendations from DNR, WDFW, and State Parks;
- provide guidance for management activities on natural areas; and
- provide direction and approval of the Plan.

The Council has 15 members. Ten voting members are appointed by the Commissioner of Public Lands and serve four-year terms. Five of the 10 members must be recognized experts in the ecology of natural areas. Of the remaining five members appointed by the Commissioner, at least one must be or represent a private forest landowner and at least one must be or represent a private agricultural landowner.

The remaining five members are non-voting ex-officio members appointed by their agency leads to represent their respective agencies. These members are from Department of Natural Resources, Department of Fish and Wildlife, Department of Ecology, State Parks and Recreation Commission, and Recreation and Conservation Office.

Natural Areas Designation Process

Natural areas are incorporated into the statewide system through voluntary registration or dedication, each with their own designation process. Voluntary registration recognizes the important contributions private landowners are making toward conserving Washington's biodiversity but does not carry permanent commitments to manage sites for conservation values. Dedicated natural areas are a more formal designation that commits land owners to

management objectives consistent with the preservation of the biodiversity elements in perpetuity.

Registration of Natural Areas - Many occurrences of federally listed and candidate plant species, other high priority species, and rare and high-quality ecosystems are located on private lands where no formal protections are currently in place. For many rare species and ecosystem types, registry sites are potentially significant for their long-term conservation. Registration of such sites recognizes the important contributions private landowners are making to achieve the objectives of the Natural Area Preserves Act. DNR works with interested landowners to get their lands registered. The registration program is strictly voluntary and the landowner can opt out of the register at any time.

DNR can remove sites from the register of natural areas at any time upon written request by the landowner, or if the Council determines that the site is no longer managed for the natural heritage resources present, or the site no longer meets the original criteria for selection. Landowners are notified in writing of removal of a natural area from the register.

Dedication of Natural Area Preserves - Dedication of a natural area is a formal designation that provides conservation of targeted species and ecosystems in perpetuity. Dedicated natural areas include designations such as state Natural Area Preserves, Natural Resources Conservation Areas (DNR), Research Natural Areas (federal agencies), Areas of Critical and Environmental Concern (BLM), and non-governmental organization nature preserves.

Designation most often occurs through acquisition of lands or via a cooperative agreement between DNR and the applicable land owner. When a recommended natural area occurs on private lands or on DNR trust lands, the Natural Areas Program works with willing sellers to acquire lands approved within a designated natural area boundary. For Natural Area Preserves on other state agency lands or non-governmental organizations, DNR enters into a cooperative agreement with the applicable organization in which a legal or administrative commitment is made by the landholder to manage the land for the protection of a natural heritage resource.

Informing Land Use Decisions

A primary mission of the Natural Heritage Program is to gather and analyze biodiversity data and make it available to public and private agencies and individuals to inform land use decisions. Information from the Natural Heritage database is available to land management agencies, land trusts and conservation organizations for use in strategic planning and to help inform conservation acquisition / easement decisions and/or management and restoration activities. For these purposes, the State Conservation Status are used to prioritize conservation actions and guide land use decisions, rather than the Natural Areas Representation Priorities.

The Natural Heritage Program has no direct regulatory authority. The conservation status assigned to species and ecosystems is advisory only. However, information and expertise provided by the Natural Heritage Program are used in limited circumstances in the application of laws and regulations. The Natural Heritage Program database also supports land management policies of agencies and the private sector.

Endangered Species Act - The US Fish and Wildlife Service uses information provided by the Natural Heritage Program to inform listing and recovery decisions under the Endangered Species Act. Much of the information about locations and threats to species (particularly for plant species) originates with the Natural Heritage Program, and program scientists serve on advisory teams that develop plans for recovering federally listed species.

Federal Sensitive Species Policies - The Natural Heritage Program provides the US Forest Service and Bureau of Land Management with rare species data and documentation to support the global and state ranks assigned to each species. Both agencies use the global and state ranking to develop their lists of sensitive species that are used to guide management on their lands. Because the same ranking system is used by natural heritage programs in all 50 states, the USFS and BLM can create a policy that can be evenly applied across the country.

Forest Certification - The conservation status assigned to Washington's species and ecosystems by the Natural Heritage Program are used by the forest products industry to identify areas for protection under forest certification standards. One example is the Sustainable Forestry Initiative certification standard that provides special protection to species and ecosystems that are globally critically imperiled or globally imperiled. The Natural Heritage Program provides the location of such species and ecosystems to the Department of Natural Resources and a number of Washington's private timber companies to assist them in maintaining the forestry certification requirements.

Washington State Environmental Policy Act (SEPA) - Government agencies use the SEPA environmental checklist to determine whether a project proposal may have adverse impacts to environmental resources. If adverse impacts are probable, the checklist can also help inform what avoidance, minimization and/or mitigation measures could be taken to avoid or offset impacts. Natural Heritage Program data are included in the environmental checklist and help identify where significant impacts may occur to rare species and ecosystems.

Growth Management Act - The Department of Ecology developed a wetland rating system (Hruby 2014a, Hruby 2014b) for use by county and city governments under the Growth Management Act. One factor that influences the assigned wetland category is whether or not rare species or ecosystems, as identified by the Natural Heritage Program, are present. The Natural Heritage Program recently developed a "Wetlands of High Conservation Value" online map viewer to assist users of the wetland rating system to find where these rare species or ecosystems occur (https://www.dnr.wa.gov/NHPwetlandviewer).

Status of the Statewide System of Natural Areas

Since the first designation of Sand and Goose Islands as Natural Area Preserves (NAPs) in 1973, the statewide system of natural areas has grown steadily over the years. Today, there are 215 designated natural areas across the state, including 68 in federal ownership, 110 in state ownership, and 37 in private conservancy. DNR alone manages 57 Natural Area Preserves and 39 Natural Resources Conservation Areas. State Parks and Washington Department of Fish and Wildlife combine to manage an additional 11 natural areas. Washington State University manages 3 Biological Study Areas. Federal agencies manage

68 natural areas, including 51 Research Natural Areas and 17 Areas of Critical Environmental Concern. Non-governmental conservation organizations also manage 37 natural areas in Washington.

The statewide system of natural areas protects more than 154 vascular plant species, 22 nonvascular plant species, 113 fine filter ecosystem types, and 49 coarse filter ecosystem types. The majority of natural areas are located in the Puget Trough, Columbia Plateau, and Northwest Coast ecoregions while the Blue Mountains, Canadian Rockies, and Okanogan ecoregions contain fewer natural areas. Several factors have influenced the number of natural areas in each ecoregion, including the size of the ecoregion and how much of it occurs within Washington, the pattern of land ownership (public vs. private), the degree to which lands within each ecoregion have been converted or degraded to non-natural land cover, the biotic richness of the ecoregion, and how well the ecoregion has been inventoried.

Accomplishments Since the 2018 Natural Heritage Plan

The Natural Heritage Program and Natural Areas Program have made considerable advances toward achieving the goals of the Natural Area Preserves Act since publication of the 2018 State of Washington Natural Heritage Plan. The Natural Heritage Program continues to advance the state of knowledge concerning which species and ecosystems are priorities for conservation, growing the database of priority species and ecosystem locations, and improving ways to distribute these critical data to inform conservation decisions. The Natural Areas Program's ongoing restoration and management of DNR natural areas has both improved ecological conditions in many sites and maintained excellent condition on others.

Data Collection and Distribution

Since 2018, Natural Heritage Program staff have completed numerous projects—primarily supported by external grants and contracts—and received data from external partners that have added 452 additional records, modified 648 existing records, and deleted 16 records in the program's Biotic database.

The Natural Heritage Program distributes biodiversity data in a number of ways. Some federal, state, and local government agencies have elected to receive biannual updates to the program dataset. Online access to Natural Heritage Program data is a significant way in which critical biodiversity information is distributed into the hands of decisions makers. Between 2018 and 2021, the program's "Data Products & Requests" web page (https://www.dnr.wa.gov/NHPdata) had 7,178 page views. The Program's Wetlands of High Conservation Value map viewer, an online, interactive mapping tool that allows users' to determine the location of rare and high-quality wetland ecosystems and rare plants (https://www.dnr.wa.gov/NHPwetlandviewer), had 14,081 page views in the same time frame. The Natural Heritage Program also shares technical reports and publications on their website.

Another significant outlet for distributing the program's biodiversity data is LandScope America, an online resource for the conservation and land-protection community. LandScope was developed by NatureServe, the National Geographic Society, and other partner organizations to increase the effectiveness of conservation action and investment throughout

the United States. Washington was one of five pilot states when LandScope was initially developed. Between November 2019 and November 2020, LandScope Washington (http://www.landscope.org/washington/) received 13,526 page views, a number that is significantly higher than the next highest tally—California had, 406 page views (Lori Scot, NatureServe, personal communication).

Natural Area Acquisitions and Management Activities

As of June, 2021, a total of 5,111 acres have been acquired and added to 18 of DNR's designated natural areas. Significant additions include 1,469 acres added to the Chehalis River Surge Plain Natural Area Preserve, 863 acres added to the new Kennedy Creek Natural Resources Conservation Area, 662 acres added to the new Blanchard Core Natural Resources Conservation Area, and 236 acres added to the new Crowberry Bog Natural Area Preserve.

Since 2018, DNR Natural Areas Program staff have implemented various management activities such as prescribed burning, invasive species control, hydrological restoration, forest thinning, and planting native species at numerous natural areas. A few examples include the restoration of shrub steppe habitat at four Natural Area Preserves located in the Columba Plateau, extensive restoration of oak forest and wet prairie ecosystems at Lacamas Natural Area Preserve, and restoration of prairie habitat at Mima Mounds Natural Area Preserve which involved prescribed burning of 70 acres and replanting of native prairie species.

Education & Outreach Activities

Natural Heritage and Natural Areas Program staff are regularly invited to share their knowledge of rare species and ecosystems with many different organizations. Natural Heritage and Natural Areas Program staff routinely provide presentations to various professional and conservation groups such as Washington Botanical Symposium, Washington Butterfly Association, Invasive Plant Control groups, and Cascadia Prairie-Oak Partnership. Natural Heritage and Natural Areas Program staff regularly lead field trips to DNR natural areas for a variety of organizations, including Washington Native Plant Society, professional groups and societies (wetland scientists, geologists, etc.), and school groups, ranging from elementary to university. Some of these groups are also authorized to visit certain natural areas, without DNR staff, for educational activities.

Research on Natural Areas

Since 2018, the Natural Areas Program has authorized 40 research projects on natural areas. Projects range from measurements of thermal tolerance in songbirds, to assessing fire effects on seed predation of a rare plant, to investigating climate change effects on coastal wetlands. A number of natural areas were selected as baseline reference standard sites for two recent studies: the National Wetland Condition Assessment conducted by the EPA (https://www.epa.gov/national-aquatic-resource-surveys/nwca) and a global study on grassland diversity and productivity (https://nutnet.org/).

Natural Heritage Program staff completed a multi-year research project at Crowberry Bog Natural Area Preserve with colleagues from Colorado State University. Their research was

recently published in the journal *Ecohydrology* and describes the ecological characteristics that make this site of national and continental significance. The publication is open access and can be found here: https://onlinelibrary.wiley.com/doi/full/10.1002/eco.2287. Natural Heritage Program staff are also nearing completion of a multi-year study looking at how surrounding land use may impact the ecological integrity of Puget lowland bogs. This work is being conducted in collaboration with colleagues from Colorado State University, and funded with a U.S. EPA Wetland Program Development grant.

Further Advancing Natural Area Preserves Act Goals

Natural Heritage Program Data Map Viewer

The Natural Heritage Program was recently awarded a grant to expand the scope and functionality of an existing online map viewer (https://www.dnr.wa.gov/NHPwetlandviewer) to increase accessibility to critical biodiversity information for decision makers and the public. The project is funded by a National Estuary Program, Near Term Action grant associated with Puget Sound Partnership goals. This map viewer will be updated to include all species and ecosystems currently tracked in the Natural Heritage Program's Biotics database. The updated map viewer will also include additional layers and functionality to provide users with a more effective and efficient tool to explore and access critical biodiversity information. The map viewer is expected to be live and accessible to the public by December 2022.

Identify Essential Conservation Areas

Identifying sites of conservation significance is another way to direct partners to places on the landscape that have biodiversity significance. The Natural Heritage Program is seeking funding to develop a map and database of such sites—referred to as "Essential Conservation Areas"—for Washington. The end result would be a statewide list of sites of biodiversity significance to guide landscape and site-scale conservation. This information would inform a renewed conservation vision for the state and is necessary to develop priorities to ensure strategic investments are targeted at areas with high biodiversity values.

Using existing Natural Heritage Program data, Essential Conservation Areas (ECAs) will be delineated so that each occurrence is located within an ECA. Some ECAs may only have a single element occurrence (i.e., population of a rare species or location of an ecosystem) while others may have multiple element occurrences. Based on the conservation status of the elements found within an ECA, a Biodiversity Rank will be assigned to each ECA reflecting the overall conservation significance of the site. Two additional ranks will also be assigned to each ECA: (1) Management Urgency rank and (2) Protection Urgency rank. Together, these three ranks will be used to prioritize where conservation actions are most needed on the landscape in order to protect Washington's most imperiled species and ecosystems.

Identify New Natural Area Recommendations

Natural Heritage Program staff will continue to identify potential new natural areas to capture additional natural area representation priorities identified in this Plan. Potential new natural areas are identified through a variety of resources including project work, input

from DNR region staff, site leads from the Natural Heritage Advisory Council, recommendations from land trust partners and colleagues from other state and federal agencies, and input from the public. As potential sites come to light, Natural Heritage Program staff will assess whether the site supports species and ecosystems with Natural Area Representation Priorities and whether the site is currently in adequate ecological condition. This process also includes coordination with Natural Areas Program staff to determine manageability of the site and other potential obstacles to long-term stewardship.

Natural Areas Management Actions

DNR Natural Areas Program staff will identify and implement management actions needed for multiple DNR natural areas. Forest health and resilience activities, such as forest thinning, prescribed burning, and invasive species control are planned at five natural areas. Forest restoration and hydrological restoration are planned for Camas Meadows Natural Area Preserve. Restoration of shrub steppe vegetation and rare plant habitat are planned for areas recently impacted by repeated wildfires at Upper Dry Gulch Natural Area Preserve.

DNR's Climate Resilience Plan

In 2020, DNR developed a plan that assessed agency activities to address and respond to climate change. This plan identified priority responses for each program and, at a statewide level, actions needed to achieve climate resilience on DNR managed lands (DNR 2020b). Because the conservation work of both the Natural Heritage Program and Natural Areas Program are integrated throughout the agency's programs and operations, the conservation efforts of these programs were identified as a significant contribution to DNR's goals for achieving climate resilience objectives (DNR 2020b).

To ensure these significant contributions continue, and to address the risks that climate change poses the mission and responsibilities of both the Natural Heritage and Natural Areas Programs, the following strategies and actions associated with program work have been identified:

- assess vulnerability and enhance monitoring of designated natural areas;
- incorporate climate change considerations into designated natural areas site prioritization, selection, and design; and
- fund and implement statewide inventory of rare species and ecosystems.

DNR's Forest Health Plan

Washington's forests are faced with numerous threats that require bold action. Climate change, drought, increasing frequency and severity of fire, invasive species, and development pressure are impacting the health of forest ecosystems and the well-being of many Washington communities (DNR 2020a). The 2020 Washington Forest Action Plan outlines strategic goals and actions to address these threats at a meaningful scale. The plan requires that DNR prioritize the places most at risk, develop partnerships to leverage expertise and resources, and invest in actions that will ensure the health and integrity of Washington's forests.

Natural Areas Program forest restoration and management actions on DNR natural areas also helps achieve many other forest health and landscape resilience goals identified in the plan (DNR 2020a).

Education & Outreach

Natural Heritage and Natural Areas Program staff will continue to provide outreach to our external partners and participate in activities that expand awareness and knowledge of Washington natural heritage.

Natural Heritage and Natural Areas Program staff are participating in a series of workshops and staff-level discussions about how to increase outreach to diverse communities in order to ensure equitable engagement of education, research, and conservation related activities. Staff will work with DNR's Equity Manager to further advance these goals.

Research

With support from U.S. EPA Wetland Program Development grants, Natural Heritage Program staff will be conducting the following research:

- assigning climate change vulnerability assessment ranks to Washington's wetland ecosystems over the next few years;
- convening the state's experts on invasive plant species to develop an assessment and ranking of the invasive risk of nonnative plants; and
- testing the ability of Floristic Quality Assessment indices that the Natural Heritage Program previously developed (Rocchio and Crawford 2013) to track changes in ecological integrity.

With funding support from the U.S. Forest Service and U.S. Fish and Wildlife Service, Natural Heritage staff will also continue to assess climate vulnerability of rare plant species.

These research efforts will result in data and ecological assessment tools that will improve the ability of DNR and external partners to conserve, restore, and manage Washington's critical biodiversity elements.

The Natural Areas Program will be partnering on and implementing the following research on DNR natural areas:

- investigating the hydrology at Camas Meadows NAP to help identify potential actions to restore the natural hydrologic regime (project being conducted in partnership with Chelan County);
- assessing methods for enhancing habitat for the Island marble butterfly at Cattle Point NRCA (project in partnership with WDFW); and
- monitoring long-term population trends and wildfire response of Whited's milkvetch at Upper Dry Gulch NAP.

Purpose of the Natural Heritage Plan

The State of Washington has a rich natural heritage. Our beautiful state contains a wide diversity of landscapes and ecosystems ranging from coastal dunes, lowland bogs, ancient rainforests, lowland prairies, alpine meadows, dry forests, shrub steppe, and grasslands, each featuring unique assemblages of plant and animal species.

However, Washington's biodiversity faces numerous stressors, including land conversion from native vegetation cover to agricultural, residential, and commercial uses, invasion by non-native species, and the impacts of climate change. To ensure the long-term persistence of Washington's rich natural heritage, it is imperative that we take bold conservation steps, guided by thoughtful policy built upon science-based priorities.

Natural Area Preserves Act

The 2022 State of Washington Natural Heritage Plan marks the 50th Anniversary of the Natural Area Preserves Act of 1972, which the Washington State Legislature (Legislature) passed as a critical step toward protecting Washington's natural heritage (Revised Code of Washington 79.70). In passing the Natural Area Preserves Act, the Legislature recognized the need for, and benefits of, permanently designating areas explicitly for conservation of biodiversity and geological features, research, and education. The Natural Area Preserves Act authorized the Washington State Department of Natural Resources (DNR) to establish and manage a statewide system of natural areas through cooperation with federal, state and local agencies, private organizations and individuals. In 1991, the Legislature passed the Natural Resources Conservation Areas Act, which established another critical conservation land use designation, to protect critical biodiversity resources, geological features, archeological features, and scenic areas are also compatible with low-impact recreation uses. Collectively, these designated natural areas are intended to provide critical habitat for rare and vanishing species, conserve representative examples of the state's ecosystems, and ensure the availability of places for scientific research and education. Today, this system consists of lands managed by numerous federal and state agencies as well as private conservation organizations.

Natural Area Preserves Act

The Natural Area Preserves Act mandates that the Washington Natural Heritage Program develop the **State of Washington Natural Heritage Plan** to establish the framework and priorities upon which the statewide system of natural areas is built.

Washington Natural Heritage Program

To enable implementation of the Natural Area Preserves Act, the Legislature recognized the need for providing an objective, scientific approach for establishing priorities for conservation actions and to guide the process of identifying candidate sites for the statewide system of natural areas. In 1981, the Legislature amended the Natural Area Preserves Act and established the Washington Natural Heritage Program within DNR. The Natural Heritage

Washington Natural Heritage Program Objectives

- maintain a classification of the state's natural heritage resources
- conduct up-to-date inventories of the locations of these resources
- share this information with agencies, organizations and individuals for environmental assessment and land management purposes, and
- assist with the nomination and selection of sites for inclusion within the statewide system of natural areas.

Program was initially formed in 1977 as a cooperative effort of the DNR, Washington Department of Fish and Wildlife, Washington Department of Ecology, Washington State Parks and Recreation Commission, Interagency Committee for Outdoor Recreation, and the Washington Field Office of The Nature Conservancy. By formally establishing the Natural Heritage Program within a state agency, the Legislature brought a scientific process of prioritization to the policies established in the Natural Area Preserves Act.

Today, the Natural Heritage Program continues to connect conservation science with conservation actions by collecting, maintaining, and distributing data on rare species and ecosystems, as well as providing a number of other services and products in support of conservation in Washington.

Natural Heritage Plan

The Natural Area Preserves Act requires the Natural Heritage Program to develop the State of Washington Natural Heritage Plan (Plan) to identify conservation priorities and the processes by which potential natural areas are selected and approved. Specifically, the purpose of the Plan is to identify:

- species and ecosystems that are of conservation concern;
- priority species and ecosystems to be considered in the selection of potential natural areas; and
- criteria and processes by which natural areas are selected.

While amendments have been made and guidance has evolved across the 50 years since passage of the Natural Area Preserves Act, the basic criteria and process for selecting natural areas remain the same. However, our understanding of how to successfully conserve our native species and ecosystems has greatly improved. Ecological integrity provides the benchmark against which we prioritize conservation targets as well as identify restoration goals. Our understanding of the ecology and associated threats of many rare species has increased. The importance of landscape context in achieving successful conservation is better recognized. With an increased understanding of ecosystem variability and function, ecosystem classifications have advanced tremendously. The U.S. National Vegetation Classification now provides a peer-reviewed approach to ecosystem characterization, while the Ecological Integrity Assessment methodology provides a systematic approach for assessing the ecological condition or quality of ecosystem occurrences (Faber-Langendoen et

Ecological integrity is the structure, composition, function, and connectivity of an ecosystem when occurring within the bounds of natural or historical disturbance regimes.

al. 2019). In addition, federal agencies now produce statewide vegetation maps that increase our understanding of ecosystem diversity and distribution.

Threats to Washington's biodiversity have also changed. The state's population is over 7.5 million, having nearly doubled in the last 40 years. Climate change is expected to amplify the challenges of conserving species and ecosystems within designated natural areas. Washington is already experiencing climate-induced change such as increased spread of some non-native, invasive species, increased chance of catastrophic wildfires, increased ocean acidity, increased extreme weather events, and reduced climate suitability for some species.

The 2022 edition of the Plan reflects current conservation science and presents new approaches to most effectively and efficiently achieve conservation success in light of these challenges. The Plan presents two different types of priorities intended to guide different conservation actions:

- State Conservation Status – a list of endangered, threatened, and sensitive species and ecosystems, and
- Natural Area Representation Priorities – a list of species and ecosystem priorities for inclusion in the statewide system of natural areas.

When applied appropriately, these priorities will help DNR and our conservation partners focus conservation efforts on those elements of biodiversity most in need of conservation attention.

The Plan identifies the contributions to the statewide system of natural areas that are made by federal, state and local agencies as well as private conservation organizations. By strengthening existing partnerships and building new ones, we are improving our knowledge about what is already protected on both conserved and working lands, enhancing access for education and recreation, and improving the effectiveness and efficiency of conservation.

Additionally, the Plan is used in numerous grant applications administered by the Recreation and Conservation Office. For example, the critical habitat, natural areas, and urban wildlife categories of the Washington Wildlife and Recreation Program grants require applicants to cite species and communities with special status. This Plan is one of the resources applicants are asked to consult to determine whether such species and communities are present. The priorities and conservation ranks published as part of the Plan also serve to guide other federal, state and local conservation actions throughout Washington.

The Plan highlights conservation tools the Natural Heritage Program and DNR Natural Areas Program use to expand the impact of the Natural Area Preserves and Natural Resources Conservation Areas Acts (RCW 79.70, RCW 79.71).

Although geological, archeological, and scenic features are identified in the Natural Area Preserves Act and Natural Resources Conservation Act, those features are not addressed in this Plan. However, many designated natural areas do protect these critical natural and cultural resources.

The Natural Heritage Plan lays the foundation and describes the context that will help guide conservation of biodiversity in the state of Washington.

Conserving Washington's Biodiversity

Washington has a tremendous diversity of landscapes ranging from the marine waters of the outer coast and Puget Sound to the volcanic peaks rising from the Cascade Mountains, the broad Columbia Plateau, the rolling Palouse hills, the Columbia River, as well as extensions of the Rocky Mountains in the northeastern corner of the state. These landscapes support a diversity of ecosystems including marine eelgrass beds, tidepools, salt marshes, lowland rainforests, montane coniferous forests, subalpine and alpine meadows and parklands, shrub steppe, grasslands, prairies, sand dunes, riparian areas, forested swamps, vernal pools, marshes, fens and bogs.

Washington's coastal forests are part of a temperate rainforest extending from southeast Alaska to northern California.

These ecosystems are home to more than 2,600 native vascular plant species, thousands of mosses, lichens, liverworts, and fungi, 140 mammals, 451 freshwater and marine fishes, 341 birds, 25 amphibians, 28 reptiles, and more than 20,000 species of invertebrates. Some species are unique to Washington and not found anywhere else on earth. For example, 84 such plant species have their entire global range within Washington. The Olympic and Wenatchee mountains, the Columbia River Gorge, and the Columbia Plateau are all rich in species that are restricted to those geographic areas.

Why Washington's Biodiversity Matters

Washington's natural beauty and biodiversity are critical elements of our state's identity. Washington conjures images of towering volcanoes, salmon, orcas, old-growth rainforests, the Columbia River, and the flood-scoured coulees of the Columbia Basin. But our biodiversity provides much more than simply aesthetic value.

Washington's native species and ecosystems contribute billions of dollars annually to Washington's economy, from fisheries and hunting, to timber production, and many outdoor recreational pursuits. Healthy, intact ecosystems are resilient and are able to continue to provide valuable ecosystem services in the face of increased threats such as climate change and invasive species. Intact ecosystems provide land managers and students of all ages with

Washington supports a diverse range of ecosystem types such as (a) temperate rainforests, (b) foothill grasslands, (c) shrub steppe, (d) bogs, (e) dry forests, and (f) salt marshes. *Photo credit of salt marsh: WA Dept. of Ecology Coastal Atlas*

outdoor laboratories in which to learn how ecosystems function, as well as learning how to safely and rewardingly recreate in such places. Our species and ecosystems provide us with a foundation for our cultural and spiritual values.

Threats to Washington's Biodiversity

A number of factors can have negative impacts on the viability of Washington's species and ecological integrity of the state's ecosystems. Numerous threats to Washington's biodiversity can reduce the footprint of native ecosystems, degrade ecological integrity, and displace native species.

Conversion of natural ecosystems to other uses is ongoing and decreases the footprint of natural ecosystems. Those lands remaining in a natural or semi-natural state are increasingly fragmented and isolated, another stressor on biodiversity (Figure 1). These activities can also increase the spread of invasive species (Washington Biodiversity Council 2007). The number and abundances of invasive species are increasing. Non-native, invasive plant and animal species cause significant economic impact to property owners, farmers and ranchers, people involved in aquaculture and fisheries, and others as a result of reduced yields and the cost of control/eradication efforts. Invasive species can also cause tremendous impact to Washington's biodiversity. Invasive species have been identified as a threat to more than 25% of the state's plant species of conservation concern (Bishop et al. 2005). Aquatic nuisance species have been identified as the second leading threat to biodiversity within Puget Sound.

Reed canary grass (*Phalaris arundinacea*), an invasive, nonnative species, has displaced native species in many wetland types across the state, including this riparian wetland in the Columbia Basin.

Climate change will likely reshape our ecosystems and alter the mix of species that live within Washington. Rising sea levels will impact nearshore habitats and estuaries. Changing temperature and precipitation patterns will alter patterns of wildfire frequency and severity, resulting in changes in the species composition and structure of our forests. The flow of water through watersheds will change, altering riparian and wetland ecosystems. Successful conservation will depend on gaining a better understanding of the impacts of climate change on our species and ecosystems. Meeting the water storage needs for a growing population, particularly in light of climate change projections, may pose additional risks for species and ecosystems.

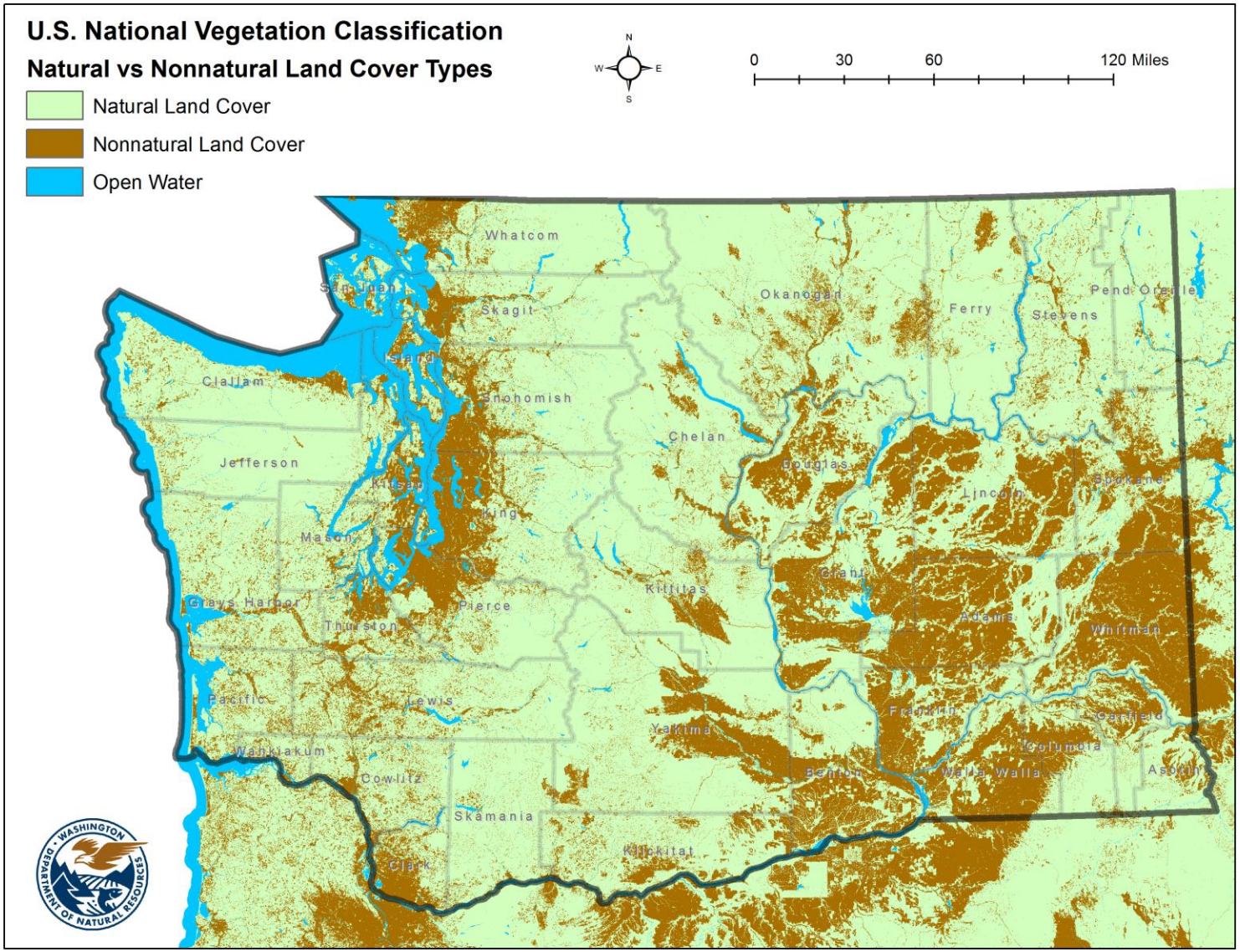


Figure 1. Natural and Non-natural Land Cover in Washington State

Fragmentation, isolation, and loss of ecological function will be increasingly difficult to address making successful, long-term conservation more challenging to achieve.

Given the magnitude of these threats, we have a decreasing margin of error when it comes to decisions that will affect the future of Washington's biodiversity. These decisions, whether made by state agencies, county planning departments, or conservation organizations, will require objective information regarding what elements are in need of special conservation attention, where those elements are found on the landscape, and how best to manage the land for the conservation of those elements.

Gathering and Distributing Biodiversity Data

Which species and ecosystem need conservation attention? Where are the best places to conserve rare species and ecosystems? Natural heritage programs across North America, and the methodology they employ, were developed to help answer these questions. The Natural Heritage Program was created by the Legislature to provide an objective basis for establishing conservation priorities, informing policy makers and land managers to more effectively protect Washington's biodiversity.

In passing the Natural Area Preserves Act, the Legislature recognized the need for a systematic and objective approach to inventory and protection efforts. The Legislature was interested in both effectiveness (protecting those elements most at risk) and efficiency (avoiding unnecessary duplication of protection efforts). The Natural Heritage Program was established to provide a systematic and objective approach to achieve these goals.

The Natural Heritage Program is part of a network of over 100 governmental and non-governmental programs located in the United States and Canada (Figure 2). This network is known as NatureServe. Information about species and ecosystems can be readily shared across the network because similar methodologies and data management standards are used by network members, which increases the accuracy and utility of conservation data and, ultimately, the effectiveness and efficiency of conservation actions. In fact, this networks' data products and biodiversity information are used in many other places around the world.

Natural Heritage Methodology

Natural Heritage Program methodology addresses three critical steps needed to guide natural areas site selection.

- **Classification**: What are the biodiversity elements that are of conservation concern?
- **Inventory**: Where do these elements occur?
- **Conservation Planning**: What needs to be done to protect them?

These questions are addressed in an ongoing and iterative manner. Each step—classification, inventory, and conservation planning—is repeated as more information is gathered, new stressors and threats develop, and/or conservation actions take place. These iterative evaluations inform and improve our understanding of critical biodiversity conservation needs and the outcome of conservation actions (https://www.dnr.wa.gov/NHPmethods).

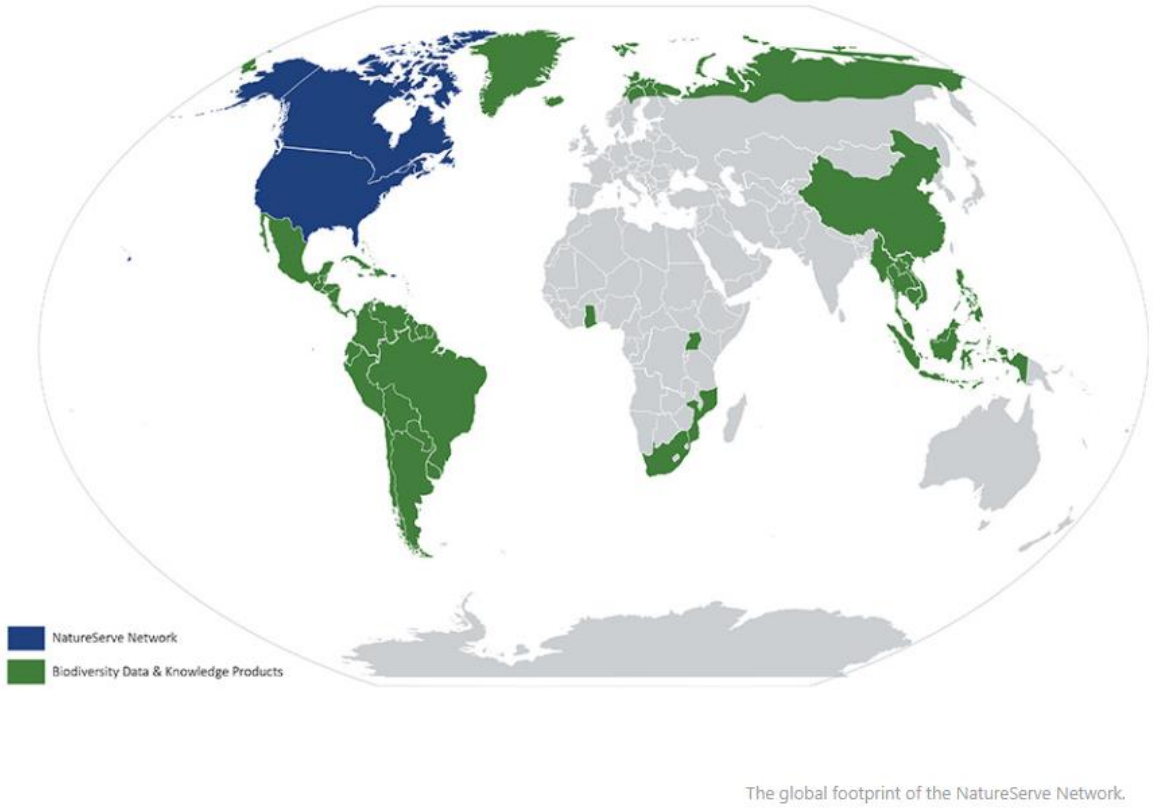


Figure 2. The Natural Heritage Network. The Washington Natural Heritage Program is part of the international, NatureServe network (http://www.natureserve.org) which includes more than 1000 conservation professionals affiliated with more than 100 governmental and non-governmental organizations around the world.

Classification: Identifying the Components of Biodiversity that are of Conservation Concern

Biodiversity is most often thought of as the total number and abundance of individual species in a given area. However, biodiversity can also be measured by the genetic variation of a species' population and by the variety of habitat or ecosystem types in a given region. The genetic composition of a species varies between populations within its geographic range. When a population is lost, so is its genetic diversity. Once lost, this unique genetic information cannot be reclaimed. Ecosystem diversity reflects the variety of relationships between species and the ecological template of a region's landscapes. Often the diversity of ecosystem types is correlated with the total number of species in a given area. At a coarser scale, the diversity of landscapes in a region is dictated by the patterns of elevation, geology, soils, and climate of that region.

The conservation of biodiversity needs to include all levels of diversity: genetic, species, ecosystem, and landscape diversity. Each level is dependent on the other levels and are inextricably linked. Achieving adequate representation of the various scales of biodiversity

in a conservation program is a daunting task. For example, developing individual conservation strategies to meet the needs of all species in a landscape is an extremely challenging, if not impossible task. Efficient but effective approaches to such efforts are needed to ensure wise use of limited conservation funds.

Past Natural Heritage Plans addressed the various levels of biodiversity by focusing on two components to biodiversity known as the coarse filter / fine filter approach to conservation (Noss 1987). This approach assumes that conserving the full suite of coarse filter targets provides protection for the majority of species and ecological processes in a given landscape, while the fine filter focuses on those rare species that may fall through the cracks of the coarse filter. This Plan makes a slight modification by adding fine scale *ecosystem* units as another fine filter target:

- coarse filter components (coarse filter ecosystem types), and
- fine filter components (rare species and rare, fine scale ecosystem types).

The goal of conserving representative examples of coarse filter priorities is to represent the full suite of ecosystem types within the statewide system of natural areas. Focusing additional conservation efforts on fine filter priorities makes sure we also conserve those rare species and rare and unusual ecosystems that might otherwise go unnoticed as part of the coarse filter.

In order to systematically apply the coarse filter / fine filter approach, a list of species and ecosystems first needs to be developed. The first step in developing this list is to identify all of the species and ecosystems that occur in Washington. Next, that list needs to be prioritized in order to recognize those species and ecosystems that are in greatest need of conservation attention.

Pink sand verbena (*Abronia umbellata*), a state sensitive species, is found on coastal dunes in southwest Washington.

Classifying Biodiversity Elements

Classification provides a common language for referring to elements of biodiversity and results in a reasonably definitive list of species and ecosystem types. These lists then allow the setting of priorities for conservation planning. There are many different taxonomic sources for plant names and approaches for ecosystem classification. The resources used for this Plan are described below.

Species Taxonomy

The primary reference for taxonomic names and concepts for Washington vascular plants is the second edition of the Flora of the Pacific Northwest (Hitchcock and Cronquist 2018). The Washington Flora Checklist, maintained by the University of Washington Herbarium at the Burke Museum, is referenced for any name changes since Hitchcock

and Cronquist (2018) was published. Other sources include Flora of North America (FNA Editorial Committee 1993-2021) and species-specific taxonomic monographs.

Ecosystem Classification

The ecosystem concept does not have a fixed scale in its general usage. It has been used to characterize areas that vary in size from an individual stand of trees to large landscapes. In part because of this, and in order to better understand the diversity of ecosystems, ecologists have developed various ecosystem classification systems to fit differing objectives. The Natural Heritage Program uses several classification systems for identifying the list of ecosystem types in the state. These are defined below.

- **Marine and Estuarine Aquatic Ecosystems**: The Marine and Estuarine Habitat Classification System for Washington State (Dethier 1990) is used to define marine and estuarine aquatic ecosystems. Water depth, substrate, wave energy and the plant and animal species associated with each habitat are used to define these aquatic ecosystems. For this Plan, these units are only used to define coarse scale, unvegetated marine and estuarine aquatic ecosystem types.
- **Freshwater Aquatic Ecosystems**: In the 1980's, the Natural Heritage Program developed a list of freshwater aquatic ecosystems based on variation in elevation, hydrological patterns, and water chemistry. These units were conceptualized within the Cowardin (1979) Lacustrine and Riverine classes. For this Plan, these units are only used to define coarse scale, unvegetated, freshwater, aquatic ecosystem types.
- **Wetland and Terrestrial Ecosystems**: The U.S. National Vegetation Classification (USNVC 2021) is the primary ecosystem classification used by the Natural Heritage Program for vegetated wetland and terrestrial ecosystems. For this Plan, these units are used to define both coarse scale and fine scale ecosystem types.

Classifying Conservation Priorities

Once lists of species and ecosystems have been compiled, the next step is to identify which individual species and ecosystems are of greatest conservation concern. This is accomplished using the Conservation Status Rank, a method used across the NatureServe and natural heritage program network (Master et al. 2012). This ranking system facilitates an assessment of a species' or ecosystem's rarity and degree of imperilment. Each species or ecosystem type is assigned a conservation status rank across its entire range (Global or "G" rank) or across its

An example of an Estuarine Gravel Beach marine/estuarine coarse filter type (foreground) in Puget Sound.

range within a given state or province (Subnational or "S" rank). Infraspecific taxa are also assigned a conservation status rank across their entire range (Trinomial or "T" rank). Conservation status ranks are assigned on a scale of 1 to 5. A rank of G1 indicates a full species or ecosystem that is critically imperiled on a global basis and is at great risk of extinction. A T1 indicates that a subspecies or variety is critically imperiled on a global basis and is at great risk of extinction. S1 indicates critical imperilment within a particular subnational region (in our case, State of Washington), regardless of its status elsewhere. A number of factors, such as the total population size, range, the number of occurrences, ecological integrity, threats, etc., contribute to the assignment of global and state ranks. The global ranks are assigned through a collaborative process involving both NatureServe and natural heritage program scientists from each of the subnational natural heritage programs where the species or ecosystem is found. Subnational ranks are assigned by scientists within the applicable subnations, who collaborate with other scientists and knowledgeable individuals. The information supporting these ranks is developed and maintained by the natural heritage programs and NatureServe.

Inventory: Determining Where Species and Ecosystems Occur

Understanding where species and ecosystems of conservation concern are located is another critical piece of information for identifying conservation and natural area representation priorities. The Natural Heritage Program manages information for more than 7,000 individual location records of rare species and ecosystems across the state (Figure 3). These location records are called 'element occurrences' and are stored in the Natural Heritage Program's Biotics database. Each element occurrence record consists of information gathered by the observer of the element. Historical records are those which have not been observed in over 40 years. Many of these records originate from natural history work undertaken as part of the transcontinental railway surveys and other early surveys of the state and are less than complete by today's standards. More recent field surveys typically include information regarding:

Field surveys of rare species and ecosystems by Natural Heritage Program staff are critical for understanding which species and ecosystems are conservation priorities.

- site location;
- population size and/or area occupied;
- associated species;
- overall description of site, including landscape context;

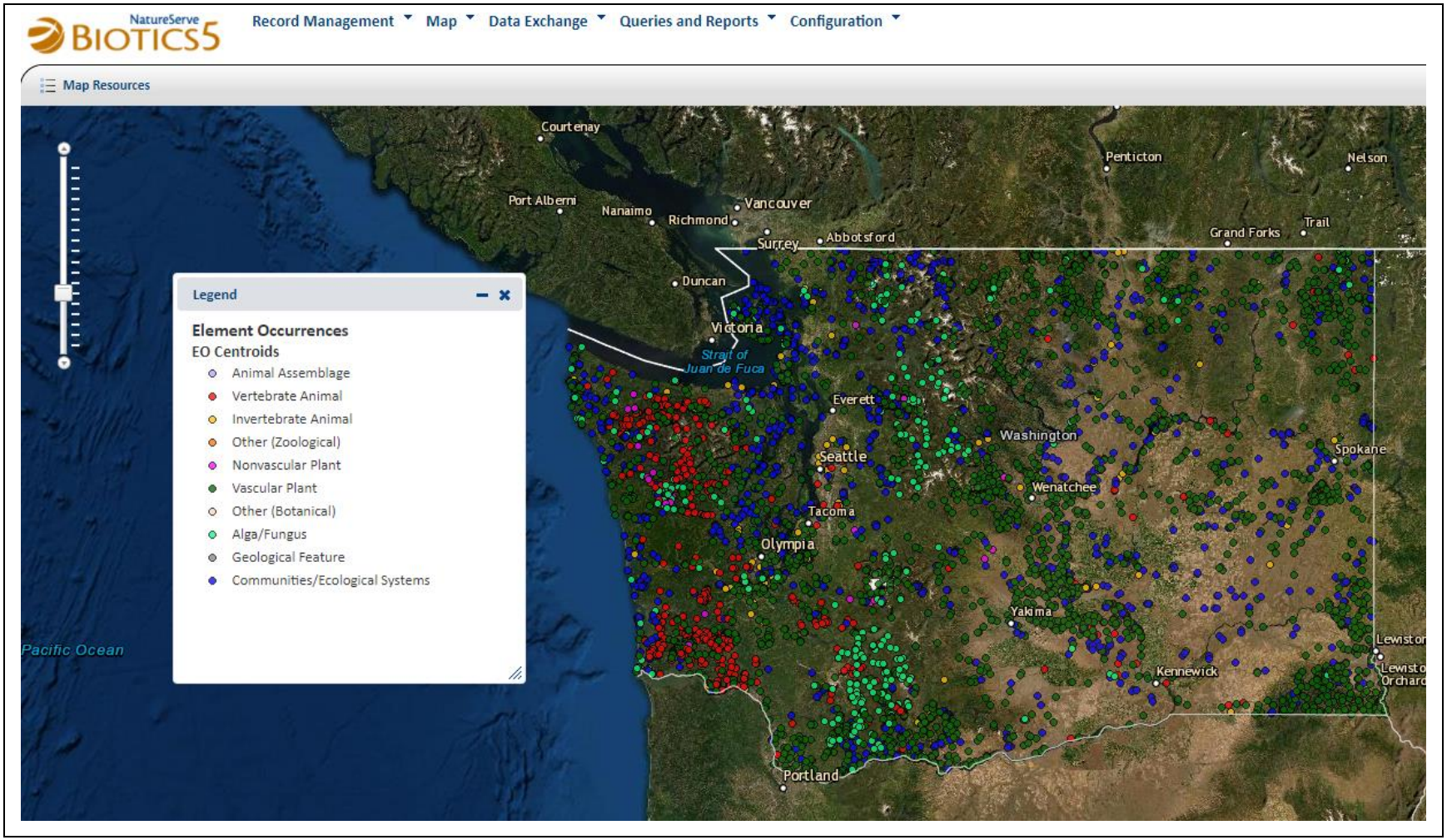


Figure 3. Rare Species and Ecosystem Location Records (element occurrences) in the Natural Heritage Program's Biotics Database

- current ecological integrity; and
- threats and/or management comments.

Inventory efforts focus both on updating information about known locations as well as searching for new locations of rare species and ecosystems. Locational information comes from a wide variety of sources, including:

- federal and state agency biologists submit information on priority species;
- members of the Washington Native Plant Society and other conservation organizations provide rare plant sighting information;
- consultants submit rare species and ecosystem data to the program;
- Natural Heritage Program scientists routinely conduct field inventories for high priority species and ecosystems across the state; and
- Natural Heritage Program staff extract information from published literature.

The Natural Heritage Program currently tracks nearly 4,000 known locations of more than 350 rare vascular plant and nonvascular species. In an effort to keep the information as current as possible, the Natural Heritage Program partners with the University of Washington's Rare Care program (https://botanicgardens.uw.edu/science-conservation/rarecare/). Through this partnership, trained volunteers revisit known populations, monitor the site's overall condition, and provide updated information to the Natural Heritage Program.

The Natural Heritage Program also collects information on the distribution, abundance, condition, threats, and trends of rare and high quality ecosystems. Currently, there are nearly 3,000 records of rare and high-quality ecosystems occurrences in the Natural Heritage Program's database. The majority of inventory effort is focused on U.S. National Vegetation Classification plant associations (fine filter ecosystem target). Although the program maintains a list of marine, estuarine, and aquatic ecosystem types, very little inventory effort is currently focused on those ecosystem types. This is primarily due to the expertise of current Natural Heritage Program staff but also due to prioritization of information needs. In addition to the inventory efforts of Natural Heritage Program ecologists, ecosystem location data also comes from information provided by private, non-profit, and government collaborators but to a lesser degree than for rare plant species.

Conservation Planning: Protecting Species and Ecosystems

The Natural Heritage Program has been compiling and sharing objective biodiversity information for over 40 years. The list of species and ecosystem of greatest conservation concern, as well as the database of sites where they are located, allows the Natural Heritage Program to develop a variety of information products to help guide and inform conservation and land use planning. The Natural Heritage Program provides information to a number of agencies, organizations, private businesses, and individuals. These data are used for a variety of conservation assessment objectives to provide protection for rare species and rare and high-quality ecosystems such as:

- identifying new natural areas;
- guiding conservation, management, and restoration activities;

- informing land use decisions; and
- increasing public awareness and appreciation for Washington's biodiversity.

Statewide System of Natural Areas

The Natural Area Preserves Act in 1972 and the Natural Resources Conservation Areas Act in 1991 recognized the need for, and benefits of, permanently designating areas explicitly for conservation purposes. The Washington State Department of Natural Resources was authorized to work with federal, state and local agencies and private organizations to establish and manage a statewide system of natural areas to represent Washington's biodiversity in a network of conservation sites. The Natural Heritage Program was given the responsibility of identifying and implementing an objective, scientific approach for this effort.

The framework for evaluating potential natural areas has been designed to ensure that the needs and benefits recognized by the Legislature in 1972 are realized in an efficient and effective manner. Past and new site recommendations for inclusion in the statewide system of natural areas is primarily based on Natural Heritage Program data. Application of the objective methodology used by the Natural Heritage Program ensures that potential additions to the statewide system of natural areas have high conservation value and protect those elements most in need of representation.

> "*All areas within the state, except those which are expressly dedicated by law for preservation and protection in their natural condition, are subject to alteration by human activity. Natural lands, together with the plants and animals living thereon in natural ecological systems, are valuable for the purposes of scientific research, teaching, as habitats of rare and vanishing species, as places of natural historic and natural interest and scenic beauty, and as living museums of the original heritage of the state. It is, therefore, the public policy of the state of Washington to secure for the people of present and future generations the benefit of an enduring resource of natural areas by establishing a system of natural area preserves, and to provide for the protection of these natural areas.*"
>
> **Natural Area Preserves Act. 1972**

Purpose of Natural Areas

Maintaining biodiversity is critical to our economic, environmental, and social well-being. The statewide system of natural areas provides the following benefits to Washington's biodiversity and human needs:

- maintains habitats for rare species and for conservation of important examples of terrestrial, aquatic, and marine ecosystems;
- provides opportunities for research and education about native species and ecosystems; and
- protects ecosystem services that contribute to our overall quality of life, providing clean air and water, recreational opportunities, scenic diversity, etc.

Habitats for Rare Species and Ecosystems

A primary goal of the statewide system of natural areas is to protect representative examples of the state's rare species and ecosystem types. Selection of natural areas not only considers

the presence of these targeted elements but also the ability of the site to sustain populations of those rare species or maintain ecological integrity of the targeted ecosystem type. Because of the degree of human-induced habitat loss, degradation of habitat quality and fragmentation of natural landscapes, the statewide system of natural areas represents some of the last places where rare species can survive, and some of the best remaining examples of the state's ecosystems, especially in landscapes where other conservation designations such as National Parks or Wilderness Areas are lacking.

The state threatened small goldenweed (*Pyrrocoma liatriformis*) is restricted to Palouse prairie remnants in southwest Washington. The Kramer Prairie Biological Study Area (pictured above) protects one of those populations.

Research and Education Opportunities

The statewide system of natural areas includes some of the most intact examples of Washington's ecosystems and species' habitats. Due to their relatively undisturbed character, the statewide system of natural areas provides opportunities for research that enable scientists and resource managers to understand how ecosystems function—enabling us to better conserve and restore them and continue to benefit from the ecosystem services they provide. Because of the complexity of ecosystems, Jenkins and Bedford (1973) suggest that we must first understand the function of undisturbed ecosystems (i.e. those lacking significant human-induced impacts) before we can begin to study how anthropogenic activities affect them and thereafter make informed ecosystem management decisions. The statewide system of natural areas seeks to protect examples of all natural ecosystems in order to provide researchers and land managers with the information needed to maintain critical ecosystem services.

These natural areas also provide ideal outdoor classrooms for many of the same reasons they are excellent places for research. This network of natural areas offers places to educate Washingtonians ranging from school-age to adults about natural ecosystems, including the species and processes that make them special, and to apply lessons from fields as diverse as science, math, and art. In nature-based education, students become exposed to a variety of science-based and environmental management careers. The Natural Heritage Program and DNR's Natural Areas Program are exploring opportunities to increase the educational use of natural areas. These activities may include working with land trusts to align language around the many values of natural areas and connecting K-12 schools to local natural areas. Ultimately, these activities are expected to increase the understanding and appreciation of

the role of natural areas in relation to biodiversity, native ecosystems, ecosystem services, economics, and traditional and current human uses. Many natural areas also provide an opportunity to connect people from different backgrounds to the cultural history of our landscape.

Ecosystem Services

Ecosystem services can be thought of as "benefits of nature." The ecosystem services provided by designated natural areas include greenhouse gas and climate regulation, water regulation, nutrient filtration, habitat for pollinators, fish, and other wildlife, and opportunities for recreation and aesthetic appreciation.

The value of the ecosystem services provided by the statewide system of natural areas has not been quantified, but is expected to be substantial. For example, the open spaces in the Central Puget Sound region have been estimated to provide $11.4 to $25.2 billion (Chadsey and others 2015) in economic benefits to the regional economy every year.

Types of Natural Areas

Many land-use designations provide critical protection and conservation of native species and ecosystems. However, not all of them meet the goals set out in the Natural Area Preserves Act. Therefore, it is important to recognize the different types of conservation lands which occur on the landscape and specifically, those designations with the appropriate management intent, permanence, and potential that leads to long-term maintenance of the targeted species and/or ecosystems conservation, research, and education values.

Those land use designations listed in Appendix H that provide adequate protection of an element, ensures permanent protection of an element (i.e. secure designation), and uses equivalent selection criteria are appropriate for inclusion in the statewide system of natural areas. Designations such as Natural Area Preserves, Natural Resources Conservation Areas, and federal Research Natural Areas are designations that always meet the criteria of the statewide system of natural areas. Designations such as Areas of Critical Environmental Concern, Biological Study Areas, land trust preserves, and Register of Natural Areas are often compatible with natural area goals but sites with those designations are assessed on a case-by-case basis.

National Parks and federal Wilderness Areas are places where human-related impacts are minimized and native species and ecosystems are maintained in good ecological condition. However, such areas may have significant levels of recreation and other historical land uses, such as mining and grazing, and thus are typically not considered part of the statewide system of natural areas.

Other public lands and private conservation properties that maintain native ecosystems are often managed for specific habitat goals. However, because they may also allow numerous other land use activities such as intensive recreation, grazing, logging, mining, roads, hydrological development, etc. they are not included as part of the statewide system of natural areas.

Natural Heritage Advisory Council

The Natural Area Preserves Act established the Natural Heritage Advisory Council (Council) to advise DNR, Washington Department of Fish and Wildlife (WDFW), and State Parks and Recreation Commission (State Parks) regarding implementation of the Natural Area Preserves Act. The Council provides several, critical functions (RCW 79.70.070):

- review new natural area recommendations from DNR, WDFW, and State Parks;
- provide guidance for management activities on natural areas; and
- provide direction and approval of the Plan.

The Council has 15 members. Ten voting members are appointed by the Commissioner of Public Lands and serve four-year terms. Five of the ten members must be recognized experts in the ecology of natural areas. Of the remaining five members appointed by the Commissioner, at least one must be or represent a private forest landowner and at least one must be or represent a private agricultural landowner.

Five non-voting ex-officio members are appointed by their agency leads to represent their respective agencies. These members are from Department of Natural Resources, Department of Fish and Wildlife, Department of Ecology, State Parks and Recreation Commission, and Recreation and Conservation Office.

The Natural Heritage Advisory Council discussing management issues at Klickitat Canyon Natural Resources Conservation Area.

Natural Areas Designation Process

Once a potential natural area has been identified, the site can be designated as part of the statewide system of natural areas through voluntary registration (WAC 332-60) or dedication, each with their own designation process. Voluntary registration recognizes the important contributions private landowners are making toward conserving Washington's biodiversity but does not carry permanent commitments to manage sites for conservation values. Dedicated natural areas are a more formal designation that commits land owners to management objectives consistent with the preservation of the biodiversity elements in perpetuity.

Registration of Natural Areas

Many occurrences of federally listed and candidate plant species, other high priority species, and rare ecosystems are located on private lands where no formal protections are currently in place. Where such places have been identified by the Natural Heritage Program as being a priority of conservation and where landowners voluntarily manage the sites with conservation of the species and/or ecosystems in mind, the site can be included on the registration of natural areas (i.e., "registry sites"). For many rare species and ecosystem types, registry sites are potentially significant for their long-term conservation value. The registration program is strictly voluntary and the landowner can opt out of the register at any time. The process for designating a registry site is outline below:

1) DNR notifies a landowner, in writing, of the site's natural heritage resource and the site's eligibility for the register of natural areas.
2) DNR must obtain written permission from the landowner to proceed with the site evaluation process.
3) Once permission is granted by the landowner to proceed with the site evaluation process, DNR prepares a recommendation to the Council.
4) The Council reviews the recommendation and approves or rejects registration of the site.
5) DNR notifies the landowner of the Council's determination and, for an approved site, offer the landowner the opportunity to voluntarily place the site on the register.
6) If the landowner agrees to register the site, DNR provides the landowner with a certificate of registration.
7) DNR may offer voluntary management guidelines and may enter into a management agreement with the landowner of a registered natural area.

DNR can remove these sites from the register of natural areas at any time upon written request by the landowner or if the Council determines that the site is no longer managed for the natural heritage resources present, or the site no longer meets the original criteria for selection. Landowners are notified in writing of removal of a natural area from the register.

By informing landowners of the statewide significance of their land, the registry program reduces the chance that elements on these lands might be inadvertently destroyed. This method of protection quickly reaches owners of important sites at a minimal cost to the state. Because the owner has no legal obligation to protect the outstanding natural element(s), protection through registration relies heavily on maintaining cooperative relationships and regular communication with landowners.

Dedication of Natural Area Preserves

Dedication of a natural area is a formal designation that provides conservation of target species and ecosystem in perpetuity. Dedication consists of two forms, the one used depends on ownership of the land involved.

In one form, the state obtains legal interest in land for preservation purposes. This form of dedication, also voluntary, differs from registration in that it entails a legal encumbrance. The instrument of dedication specifies real property interest transferred to the state, and

additional dedication provisions, such as management, custody, use or rights and privileges retained by the owner (RCW 79.70.090; WAC 332-60-110). Upon evaluation by the Natural Heritage Program staff and the Council, any registered natural area may be voluntarily dedicated by its owner. The owners and the state execute an instrument of dedication under regulations adopted by the DNR (WAC 332-60-110). The Council reviews the dedication documents prior to acceptance by the department. DNR's Natural Area Preserves and Natural Resources Conservation Areas are dedicated through this process.

In its other form, lands can be dedicated by public agencies, non-governmental organizations or private individuals through a cooperative agreement with the DNR (WAC 332-60-140). The cooperative agreement must show a significant legal and/or administrative commitment by the managing agency to protect the element(s) identified on the site. The owner is not required to surrender any real property interests or management authority, and may place the property into an appropriate administrative category within its own statutory and regulatory authority. Natural areas managed by other state agencies and non-governmental organizations are dedicated through this process. Dedication through cooperative agreement brings diverse protection activities together under the auspices of the statewide system of natural areas. This form is common for designated natural areas managed by other state agencies or non-governmental organizations, such as land trusts.

Kings Lake Bog NAP protects imperiled bog ecosystem types.

DNR Natural Area Designation Process

The designation process for DNR Natural Area Preserves is demonstrated in Figure 4 and is described below. Many of the considerations outlined below are also used for designating natural areas on other state agency, federal agency, and non-governmental managed lands. DNR Natural Resources Conservation Areas are not required to get Council approval prior to designation. However, DNR staff generally present NRCA proposals to the Council for advice and guidance on boundary establishment and long-term management objectives.

Identifying Potential New Natural Areas

Selection of potential new natural areas is guided by the species and ecosystems listed in the Plan as Natural Area Representation Priorities. Sites that supporting such priority elements and are in remarkably good ecological condition, or are extremely valuable for the continued existence of a rare species, or are one of the last remaining examples of an ecosystem type, generally becomes a candidate for designation as a natural area. Some discoveries are made by Natural Heritage Program scientists during the course of their inventory work. In other cases, a Natural Heritage Program scientist verifies information provided by other state or federal agency employees, academic faculty or researchers, private conservation groups, or individuals.

Kahlotus Ridgetop NAP was selected for designation due to the large area of high-quality grasslands that occur at the site.

Many prospective natural areas have more than one priority species or ecosystem. It is clearly a more efficient use of public and private resources to select sites with more than one priority element, thereby potentially reducing the total number of sites necessary to adequately protect and represent biodiversity and ecosystem functions. However, a single species or ecosystem may be sufficient to warrant establishment of a designated natural area.

In addition to the presence of a priority species or ecosystem, the following considerations related to the species population or ecosystem occurrence are considered before moving forward with a natural area recommendation.

- Size is related to the population size (number of individuals) for rare species, and the area occupied by ecosystems. A site with low population size or small extent of a given ecosystem is generally not a priority unless the site represents one of the last remaining examples of an element.
- Condition refers to habitat suitability for a species and the ecological integrity of an ecosystem. Poor habitat quality or low ecological integrity of an ecosystem often disqualifies a site from a natural area recommendation unless the site represents one of the last remaining examples of an element.
- Landscape context is the condition of the landscape surrounding and affecting the species or ecosystem occurrence. High fragmentation and/or poor ecological integrity of the surrounding landscape can also remove a site from consideration as these conditions often make management of the targeted elements very difficult. This is explored in the following section.

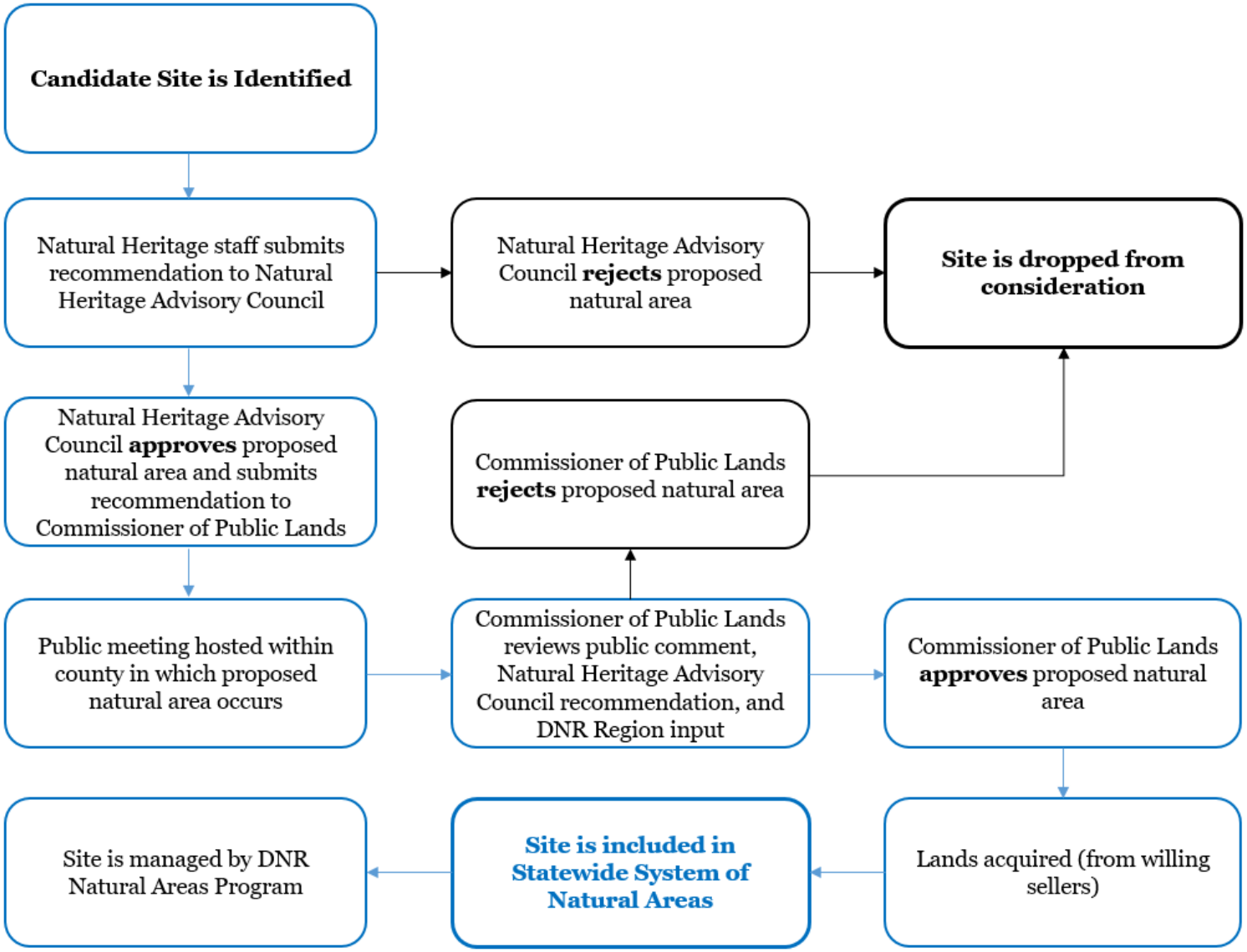


Figure 4. DNR Process for Establishing a New Natural Area.

Assessing Long Term Management Needs

A primary question related to whether a site recommendation is sought is whether the potential natural area can be successfully managed through time to maintain the priority species and/or ecosystems. This approach ensures that biologically important sites with the best likelihood of persisting over the long-term are considered for natural area designation. The following questions guide an assessment of management feasibility:

- how fragmented is the landscape?
- how isolated is the potential natural area from other reasonably intact ecosystems?
- are natural processes disrupted by site isolation or other factors?
- can management activities be used to mimic natural processes, such as fire?
- is the site susceptible to effects from changing land uses on nearby lands?
- is the control of invasive species a current or anticipated challenge in maintaining the site? and
- does current human use of the site create or introduce negative impacts to the site's conservation value?

The management feasibility analysis involves staff from the Natural Heritage and Natural Areas Programs, as well as appropriate DNR Region personnel. For sites managed by State Parks and WDFW, the analysis is generally conducted jointly by scientists from the individual agency and Natural Heritage Program staff.

Recommendation to Natural Heritage Advisory Council

If a site is deemed feasible to manage for the priority species or ecosystems, Natural Heritage Program staff develop a formal recommendation that is submitted to the Council. The recommendation includes information about the priority species and ecosystems, overall conservation significance of the site, current site conditions, human and land use history, educational values, research opportunities, and management needs. As part of the recommendation process, Natural Heritage Program staff lead a Council field trip to the site. Following input from the field trip, Natural Heritage Program staff finalize the recommendation and then submit it to the Council for consideration. Based on the recommendation it receives, the Council may:

- recommend approval as proposed;
- reject as proposed; or
- modify a proposal by adjusting the boundary or changing the natural area category (e.g. recommending designation as a Natural Resources Conservation Area or combined Natural Area Preserve/Natural Resources Conservation Area).

The Council's recommendation is then submitted to the Commissioner of Public Lands for consideration.

Public Hearing

For natural areas that are proposed to be designated and acquired by DNR, a public hearing is held in the county in which the area is located. Elected officials, neighboring landowners, and other stakeholders are provided an opportunity to comment on the proposal. Public input is provided to the Commissioner of Public Lands for consideration.

Decision by Commissioner of Public Lands
If supported by the Council, the natural area recommendation, information gained from the public hearing, and DNR Region concerns and/or support are forwarded to the Commissioner of Public Lands. The Commissioner then makes a decision as to whether to approve the natural area designation and proposed boundary.

Site Acquisition
If a site boundary has been approved by Commissioner of Public Lands, funding is sought to acquire properties within the natural area boundary. It is important to make two key points regarding acquisition of land for natural areas:

- purchases are only made from willing sellers; DNR has no power of eminent domain, and
- purchase price is based on market value appraisals.

If land is transferred out of state trust land status, the trust is compensated for the asset value and replacement land is purchased to provide ongoing income for the trust. DNR's Special Lands Acquisition Program is responsible for purchasing land that has been approved for inclusion within a Natural Area Preserve (NAP) and Natural Resources Conservation Area (NRCA) boundary. The Special Lands Acquisition Program evaluates, prioritizes, coordinates, negotiates, and completes the purchase of special lands properties. The Special Lands Acquisition Program also coordinates the DNR's applications for state and federal land acquisition grants and administers the grant contracts.

Designation Process of Other State Agencies

Designations of natural area preserves on lands managed by other state agencies, specifically WDFW and State Parks, generally follows this process:

1. The criteria and ecological considerations described previously for DNR are also used to screen potential natural areas.
2. Natural Heritage Program staff collaborate with partner agency staff to write and submit a natural area recommendation to the Council.
3. The Council votes on whether to approve recommendation.
4. Council submits their formal recommendation to agency lead who then decides whether to designate the site.
5. Partner agency enters into cooperative agreement with DNR to commit to manage the site for the protection of natural heritage resources.

Designation Process for Federal Agencies

Federal agencies have their own processes for establishing designated natural areas under their management. Research Natural Areas and Areas of Critical and Environmental Concern are generally identified as part of periodic planning processes associated with individual federal agencies. The priorities identified in the Plan guide the selection of new potential federal natural areas (Wilson et al. 2009).

Designation Process for Non-Governmental Organizations

Designations of natural area preserves on lands managed by non-governmental managed lands, generally follows this process:

1. The criteria and ecological considerations described previously for DNR are also used to screen potential natural areas.
2. Natural Heritage Program staff collaborate with partner staff to write and submit a natural area recommendation to the Council.
3. The Council votes on whether to approve recommendation.
4. The Council submits their formal recommendation to organization lead who then decides whether to designate the site.
5. Partner agency enters into cooperative agreement with DNR to commit to manage the site for the protection of natural heritage resources.

Management of Natural Areas

Each agency or organization participating in the statewide system of natural areas has management responsibility for the natural areas they manage. Management decisions are governed by agency policies, guidelines and regulations and through the cooperative agreements established with DNR for natural area designation.

DNR Natural Area Management

Upon acquisition by DNR, the lands become the management responsibility of the DNR Natural Areas Program. Although the natural areas recognized in this Plan are generally in good to excellent ecological condition, they are not always pristine. In many cases, examples of ecosystems without past or ongoing human-induced impacts no longer exist or are not available for inclusion in the statewide system of natural areas. Active management is required in many natural areas to ensure the long- term viability of the priority species and ecosystems found within them.

DNR Natural Areas Program staff have primary responsibility for identifying and prioritizing management and restoration needs across DNR managed natural areas. Many natural areas, both NAPs and NRCAs, are managed under the goals and actions determined through development of site-specific land management plans, while management actions at other sites are guided by the conservation objectives of the Plan or the NRCA Statewide Management Plan (DNR 1992). You can learn more about DNR's natural areas at http://www.dnr.wa.gov/managed-lands/natural-areas.

Invasive species control is an important component to managing DNR natural areas.

Natural Areas Program staff implement the necessary management and restoration actions to maintain the long-term viability of the priority species and ecosystems protected on these natural areas. This work is occasionally conducted in collaboration with other agencies and/or private consultants. Common and recurring management issues include restoring or mimicking natural ecological processes (e.g., fire or hydrology), control of non-native species, and addressing public access.

WDFW Natural Area Management

Upon acquisition by WDFW Natural Area Preserves are rolled into the agency's Wildlife Areas. WDFW manages over 1 million acres in Wildlife Areas statewide, but fewer than 2,000 of these acres are natural area preserves under WDFW fee title ownership. While public access is not prohibited or discouraged on WDFW's NAPs, these areas tend to be more remote and public use may be relatively low.

WDFW Wildlife Area Managers are responsible for periodically monitoring the agency's NAPs to ensure that the ecological values for which the areas were established are still present, as well as working with the Lands Division Planners and regional planning teams, through 10-year Wildlife Area Planning, to prioritize management and restoration needs, and, where necessary, to address changes in those ecological values. WDFW may consult with the Natural Heritage Program where their expertise is needed less (e.g., rare/listed plant surveys, ecosystem assessments, etc.). Where management and restoration actions are warranted, WDFW's Lands Division incorporates these needs into budget requests and grant proposals. Common and recurring management issues are similar to those addressed on DNR's NAPs.

State Parks Natural Area Preserve Management

Natural Area Preserves managed by the Washington State Parks and Recreation Commission are typically examples of particularly rare or high quality ecosystems within parks that also have other lands with designations that allow for higher levels of recreation. Day-to-day management of these areas is the responsibility of state parks operations staff while stewardship staff have the responsibility for identifying management and restoration actions needed to maintain the long-term viability of priority species and ecosystems. This work is often conducted in collaboration with other agencies and/or private consultants. Common and recurring management issues includerestoring or mimicking natural ecological processes (e.g., fire or hydrology), control of non-native species, and addressing public access.

Tribal Considerations

DNR natural area preserves and natural resources conservation areas are managed with recognition of traditional cultural uses and, where known, management practices, as envisioned in both the Natural Area Preserves Act (RCW 79.70) and the Natural Resources Conservation Area Act (RCW 79.71). "Natural historical" features are among the conservation features of NAPs, as is recognized in the department's NAP Public Access Policy in which public access includes "Traditional established aboriginal rights, or rights recognized by treaties or applicable court rulings." For NRCAs, natural flora and fauna are

conserved in part as features that are "critical to the people of Washington," and conservation area management includes a focus on enhancement of traditional uses.

Key management decisions are made during the process of writing site-based NAP or NRCA management plans. Tribes are an important part of this process for the knowledge they can share about natural features and for historical practices that have helped to maintain cultural resources.

Conservation Beyond Designated Natural Areas

The statewide system of natural areas is critical to the long-term persistence of Washington's natural heritage; however, the overall conservation need for protecting Washington's biodiversity is much greater than can be provided by designated natural areas. Significant conservation is achieved through both voluntary protection and the implementation of numerous laws, policies, and regulations.

Natural Heritage Program data not only guide selection of natural areas but also helps public agencies, non-governmental organizations, and private individuals make informed land use decisions (RCW 79.30; Figure 5).

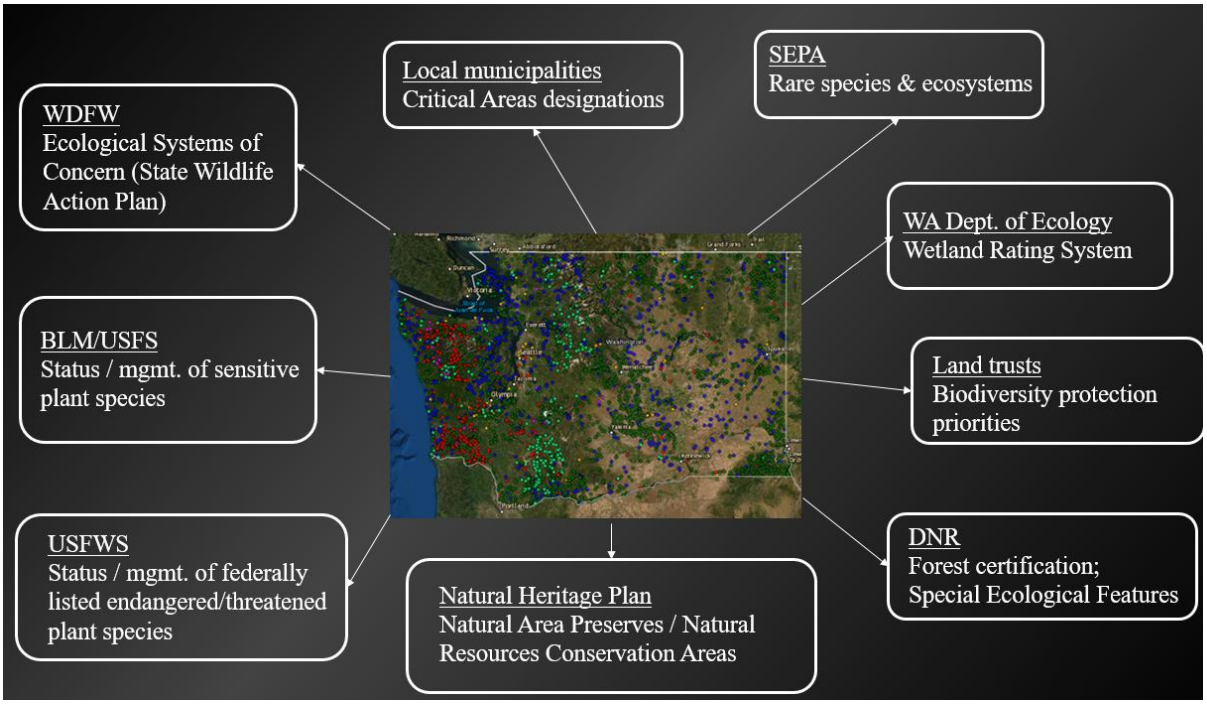


Figure 5. Uses of Natural Heritage Data

Guiding Conservation, Restoration, and Management Actions

The Natural Heritage Program's conservation status assigned to species and ecosystems are used by numerous government agencies, non-governmental organizations, and private individuals to guide limited conservation dollars toward those places where protection is most needed (Figure 5).

Many land-use designations make significant contributions to the conservation of native species and ecosystems, but are not considered part of the statewide system of natural areas. Such places include local, state, and public lands that remain largely dominated by native land cover. Examples include National Parks, National Forests, Wilderness Areas, State Wildlife Areas, State Parks, county parks and increasing land trust conservation properties. These areas provide important conservation values, such as connecting high quality habitat areas, contributing to landscape-level resiliency to climate change and providing other ecosystem services, as well as serving as areas for outdoor recreation, enabling firsthand experiences with nature.

Land Trusts

The conservation impact of Washington's private, nonprofit land trusts has increased dramatically in the past decade. Collaborations with the state's land trusts increase DNR's effectiveness and efficiency of conservation.

Information from the Natural Heritage database is available to these land management agencies and conservation organizations for use in strategic planning and to help inform acquisition, easement, management, and restoration activities. For these conservation purposes, the State Conservation Status should be used to prioritize conservation actions rather than the Natural Areas Representation Priorities.

Another important use of Natural Heritage Program data is to help prioritize Washington Wildlife and Recreation Program grant proposals. For certain grant categories, Plan priorities are used to help applicant convey the biodiversity significance of their project proposals.

Laws, Policies, Regulations

Natural Heritage Program has no direct regulatory authority but the program's data play a critical role in the implementation of many laws, policies, and regulations (Figure 5).

Endangered Species Act

The US Fish and Wildlife Service uses information provided by the Natural Heritage Program to inform listing and recovery decisions under the Endangered Species Act. Much of the information about locations and threats to species (particularly for plant species) originates with the Natural Heritage Program, and program scientists serve on advisory teams that develop plans for recovering federally listed species.

Federal Sensitive Species Policies

The Natural Heritage Program provides the US Forest Service and Bureau of Land Management with rare species data and documentation to support the global and state ranks assigned to each species. Both agencies use the global and state ranking to develop their lists of sensitive species that are used to guide management on their lands. Because the same ranking system is used by natural heritage programs in all 50 states, the USFS and BLM can create a policy that can be evenly applied across the country.

Protecting rare forest associations, such as this globally imperiled Douglas-fir - Western Hemlock / Pacific Rhododendron - California Huckleberry Forest, is one criteria for meeting forest certification standards.

Forest Certification

The conservation status assigned to Washington's species and ecosystems by the Natural Heritage Program are used by the forest products industry to identify areas for protection under forest certification standards. One example is the Sustainable Forestry Initiative certification standard that provides special protection to species and ecosystems that are ranked G1 (globally critically imperiled) or G2 (globally imperiled). The Natural Heritage Program provides the location of G1 and G2 species and ecosystems to the agencies and organizations to assist them in maintaining the forestry certification requirements.

Washington State Environmental Policy Act (SEPA)

Government agencies use the SEPA environmental checklist to determine whether a project proposal may have adverse impacts to environmental resources. If adverse impacts are probable, the checklist can also help inform what avoidance, minimization and/or mitigation measures could be taken to avoid or offset impacts. Natural Heritage Program data are included in the environmental checklist and help identify where significant impacts may occur to rare species and ecosystems.

Growth Management Act

The Department of Ecology developed a wetland rating system (Hruby 2014a, 2014b) for use by county and city governments under the Growth Management Act. One factor that influences the assigned wetland category is whether or not rare species or ecosystems, as identified by the Natural Heritage Program, are present. The Natural Heritage Program recently developed a "Wetlands of High Conservation Value" online map viewer to assist users of the wetland rating system in locating rare species or ecosystems (https://www.dnr.wa.gov/NHPwetlandviewer).

Setting Conservation and Natural Area Representation Priorities

Changes in Natural Heritage Plan Elements & Priorities

A few changes in how conservation priorities are identified have been implemented for the 2022 Plan (Table 1). First, the approach for compiling the list of ecosystem types covered in the Plan has been updated and now includes two ecosystem lists: (a) coarse scale ecosystems and (b) fine scale ecosystems. Second, the approach for assigning Plan priorities has been streamlined and made more consistent between species and ecosystems. Lastly, Plan priorities have been split into two types to more effectively guide conservation actions: (a) State Conservation Status and (b) Natural Area Representation Priorities.

These changes will provide more focused application of Plan priorities and a more transparent approach to tracking representation of Washington's ecosystem diversity. Together, these changes will improve effectiveness of conservation activities ranging from natural area designation to managing sensitive species. A more detailed description of these changes are provided in the following sections.

Natural Heritage Plan Conservation Targets

Plan elements are identified using a "coarse filter / fine filter" approach. In the past, species were considered the fine filter targets and ecosystems were considered to be the coarse filter targets. Previous plans used a variety of ecosystem classification scales to define the list of ecosystems, complicating the interpretation of fine vs coarse scale biodiversity units. For example, ecosystem units listed in the Plan have varied from coarse ecosystem

Table 1. List of Changes from 2018 to 2022 Natural Heritage Plan

Ecosystem Elements		**Natural Heritage Plan Priorities**	
2018 Plan	*2022 Plan*	*2018 Plan*	*2022 Plan*
One list of ecosystem targets (coarse vs fine filter ecosystem types were not distinguished)	Coarse filter ecosystem targets	Single Priority that was primarily meant to guide natural area designations but was often used for other conservation purposes.	Two priority lists for species and two for ecosystems: State Conservation Status and Natural Area Representation Priorities
	Fine filter ecosystem targets	Different criteria for assigning priorities for species vs ecosystems	The same criteria are used to assign priorities for both species and ecosystems.

targets (e.g. "Montane Herbaceous Bald") to fine scale ecosystem targets (i.e. Ponderosa Pine / Long-Stolon Sedge - Roemer's Fescue Woodland). In this Plan, we separate ecosystem types into both coarse filter priorities (i.e. U.S. National Vegetation Classification groups) and fine filter priorities (i.e. U.S. National Vegetation Classification associations). Figure 6 shows how these two units fit into the U.S. National Vegetation Classification (USNVC) hierarchy. To facilitate continuity between past and the current Plan, ecosystem units from past Plans have been crosswalked into their appropriate USNVC units (Appendix G). Table 2 shows the coarse and fine filter elements in the 2022 Plan.

Natural Heritage Plan Targets

Coarse filter targets capture the full suite of biodiversity elements and ecological processes into the statewide system of natural areas. The targets are broadly classified ecosystem units.

Fine filter targets include rare species and rare ecosystem types. Capturing fine filter targets within the statewide system of natural areas ensures they are not lost under the umbrella of the coarse filter and receive adequate representation.

Table 2. Coarse and Fine Filter Species and Ecosystem Targets in the 2022 Natural Heritage Plan

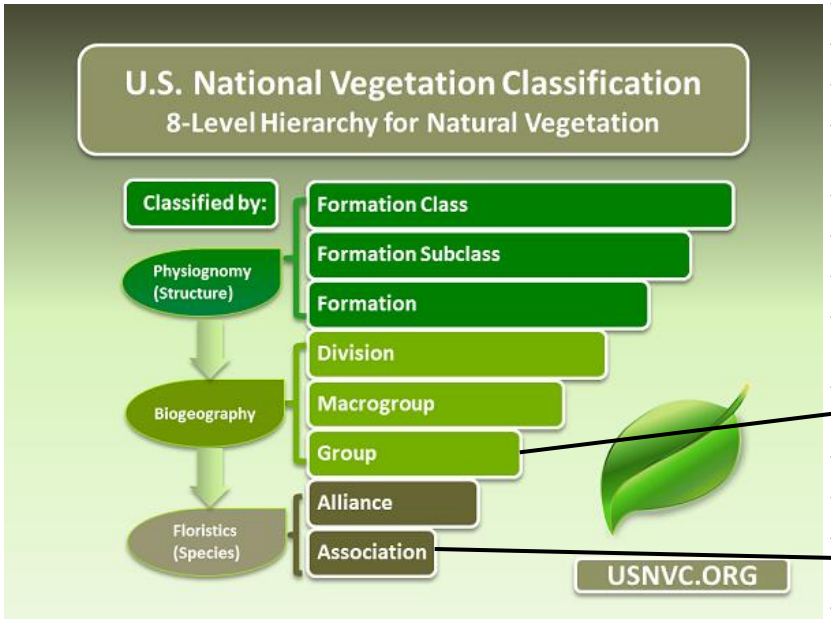
Coarse Filter Targets	U.S. National Vegetation Classification groups
	Marine and Estuarine Aquatic Ecosystems
	Freshwater Aquatic Ecosystems
Fine Filter Targets	Endangered / threatened / sensitive plant species (both vascular and nonvascular plants)
	Rare animal species*
	Endangered / threatened Ecosystems (U.S. National Vegetation Classification associations)

*Rare animal species included in this Plan are carried over from the 2018 Plan. The Natural Heritage Program is currently without a zoologist and thus does not have current staffing capacity to update the list of rare animal species.

Two Sets of Priorities

In past Plans, species and ecosystem priorities were assigned using different criteria. Species priorities were based on the Global, Trinomial and Subnational Conservation Status ranks—the standard Natural Heritage approach to determining rarity/imperilment. These ranks were used to designate rare plants with a State Status of endangered, threatened, and sensitive. With some consideration to threats and current level of protection, these State Status categories were then translated into Plan Priorities (Endangered = Priority 1, Threatened = Priority 2, and Sensitive = Priority 3).

In contrast, ecosystem priorities have been based primarily on representation within the statewide system of natural areas, although rarity or imperilment of the ecosystem type was also considered. Previously, ecosystems were not assigned endangered, threatened, or sensitive status. Instead, the Global and State Conservation Status were used in conjunction with representation to assign Plan Priorities to ecosystems.



Hierarchy Levels	Example
Upper	
Level 1 – Formation Class	Forest & Woodland Class
Level 2 – Formation Subclass	Temperate & Boreal Forest & Woodland Subclass
Level 3 – Formation	Temperate Flooded & Swamp Forest Formation
Mid	
Level 4 - Division	Vancouverian Flooded & Swamp Forest Division
Level 5 - Macrogroup	Vancouverian Flooded & Swamp Forest Macrogroup
Level 6 – Group (Coarse filter)	North-Central Pacific Maritime Swamp Forest Group
Lower	
Level 7 - Alliance	Pacific Northwest Alder – Ash Swamp Alliance
Level 8 – Association (Fine filter)	*Alnus rubra / Athyrium filix-femina – Lysichiton americanus* Swamp Forest Association

Figure 6. Natural Heritage Plan Coarse and Fine Filter Ecosystem Targets within the U.S. National Vegetation Classification.

Because the approaches differed between species and ecosystems, and because the priorities included two related but different pieces of information, Plan priorities were occasionally used out of context. For example, a Priority 1 ecosystem isn't necessarily critically imperiled or most in need of conservation. Instead, that Priority 1 status is primarily an indication of the need to *represent* the ecosystem in the statewide system of natural areas. Conversely, a Priority 1 species is primarily indicating the species' conservation needs and much less its representation needs.

Natural Area Representation Priorities identify which species and ecosystems are priorities for inclusion in the statewide system of natural areas.

State Conservation Status guide regulatory decisions, proactive management and conservation, and conservation acquisitions outside the bounds of the statewide system of natural areas.

These inconsistencies are addressed by creating two separate priority lists for rare plants, coarse filter ecosystems, and fine filter ecosystems: (1) State Conservation Status and (2) Natural Area Representation Priorities.

Natural Area Representation Priorities are intended to be used only to identify which species and ecosystems are priorities for inclusion in the statewide system of natural areas. The State Conservation Status is intended to guide regulatory decisions, proactive management and conservation actions, and conservation acquisitions outside the bounds of the statewide system of natural areas. In some cases, the priorities may convey similar urgency, while differing in other scenarios. For example, it is possible a threatened plant species has a low Natural Area Representation Priority. This scenario might occur if there are more than five designated natural areas that protect this particular plant. However, because the plant is still considered threatened, conservation actions outside the statewide system of natural areas remain critical for the overall conservation of this particular species. In other words, designated natural areas alone are not enough to protect a given species and the two different priorities ensure that this nuance is recognized. In addition, given limited resources, and a primary objective of protecting representative examples of all of Washington's rare species and ecosystems, separating these two conservation priorities ensures that resources spent on designated natural areas are

Klickitat Canyon NRCA provides representation for numerous priority plant species, priority ecosystem types and a priority animal species.

distributed across all elements and not solely focused on a limited set of species and ecosystems.

Natural Area Representation Priorities are primarily used by the Natural Heritage Program to determine whether a site supporting a given species or ecosystem is a suitable candidate for natural area designation. The Natural Area Representation Priority is referenced in natural area recommendation documents submitted to the Council to demonstrate the important elements that a site contains. Similarly, Natural Area Representation Priorities can be used for Washington Wildlife and Recreation Program grant proposals for actions that benefit priority species or ecosystems on existing or proposed designated natural areas (Figure 7).

When applied appropriately, these different priority lists will help DNR and our conservation partners focus conservation efforts on those elements of biodiversity that are in most need of conservation attention and will provide a more transparent approach to tracking representation of Washington's ecosystem diversity.

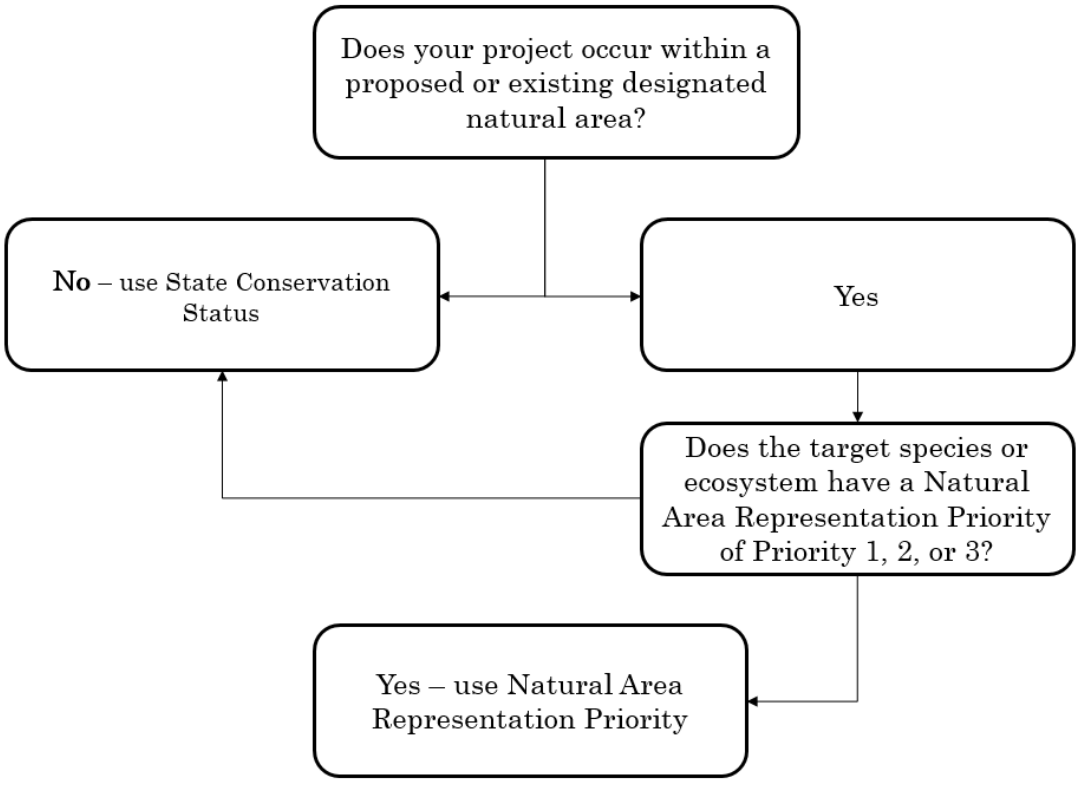


Figure 7. Determining Which Plan Priority to Use for Washington Wildlife and Recreation Program Grants

State Conservation Status

The State Conservation Status is intended to guide regulatory decisions, proactive management and conservation actions, and conservation acquisitions outside the bounds of the statewide system of natural areas. The State Conservation Status is not based on an analysis of the amount of protection needed or currently afforded to each species or ecosystems. Rather, it is a list of those species and ecosystems that are considered endangered, threatened, or sensitive due to rarity and/or imperilment.

Species State Conservation Status

As noted previously, rare plants are already assigned a state endangered, threatened, and sensitive status based on the species Global (G), Trinomial (T), and Subnational (S) Conservation Status ranks (Fertig 2021). These status categories are adopted in this Plan as State Conservation Status priorities (Table 3; Appendix A). The list is useful for focusing regulatory and conservation activities toward those species most imperiled in the state. The list is updated biennially (Fertig 2021).

Note: State Conservation Status were not assigned for animal species. The Washington Department of Fish and Wildlife has responsibility for establishing those status ranks for animals. Those are not presented in this Plan. Please consult WDFW for more information. However, Plan priorities used in the 2018 Natural Heritage Plan are included in Appendix B.

Table 3. Assignment of State Conservation Status for Rare Plants in the 2022 Natural Heritage Plan.

Natural Heritage Conservation Status Rank	State Conservation Status
G1S1, G2S1, G3S1 T1S1, T2S1, T3S1	Endangered
G2S2, G3S2 T2S2, T3S2	Threatened
G3S3, G4S1, G4S2, G4S3**, G5S1, G5S2, G5S3** T3S3, T4S1, T4S2, T4S3*, T5S1, T5S2, T5S3*	Sensitive
SH, SX	Extirpated
G4S3**, G4S4, G5S3**, G5S4, G5S5 T4S3*, T4S4, T5S3*, T5S4, T5S5	No Concern

*G = global conservation status rank; T = trinomial conservation status rank; S = subnational conservation status rank
**S3 taxa evaluated on a case by case basis

Ecosystem State Conservation Status

Although most ecosystem types have already been assigned a Global and State Conservation Status, they have not previously been assigned state endangered, threatened, and sensitive

status. This plan presents the first lists of state endangered, threatened, and sensitive ecosystems for Washington (Table 4; Appendix C). There are two lists, one for coarse filter ecosystems and another for fine filter ecosystems. The lists are useful for focusing regulatory and conservation activities towards the most imperiled ecosystems in the state. The lists will be updated biennially.

Table 4. Assignment of State Conservation Status for Ecosystems in the 2022 Natural Heritage Plan.

Natural Heritage Conservation Status Rank*	State Conservation Status**
G1S1, G2S1	Endangered
G2S2, G3S1, G3S2, GNRSNR**, GUSU**	Threatened
G3S3, G4S1, G4S2, G5S1, G5S2	Sensitive
G4S3, G4S4, G5S3, G5S4, G5S5	No Concern

*G = global conservation status rank; S = subnational conservation status rank
**G2/SNR treated like G2/S2 = Threatened, Higher ranked (i.e. G3/SNR and up) are treated like G3/S3 associations = Sensitive; If a rank spans two ranks (S1S2), the most conservative rank (S1) was used; If range spans three ranks (S1S3), the midpoint (S2) was used. GNR/SNR and GU/SU were treated as threatened.

Fine filter associations that have a GNR/SNR or GU/SU rank were treated as threatened in this analysis. These elements lack a global and state rank due to a lack of information or because they are newly recognized types that have not had a conservation assessment conducted for them yet. However, these types are generally geographically restricted or imperiled. As such, a conservative approach was take to establish their priorities. As their ranks are updated, their State Conservation Status and Natural Areas Representation Priorities will be adjusted accordingly.

Natural Area Representation Priorities

The goal of the statewide system of natural areas is to protect representative examples of Washington's biodiversity. This is accomplished by protecting examples of both coarse and fine filter biodiversity elements. With this objective in mind, the Natural Area Representation Priorities guide the designation of new sites, ensuring that efforts are not focused on just a few very rare elements.

Defining Adequate Representation

There are two key considerations for achieving adequate representation of an element: ecoregional distribution and the number of designated natural areas in which an element is represented.

The spatial distribution of designated natural areas is important from two perspectives: (1) accounting for natural variability and (2) guarding against loss from unforeseen natural or human-induced disturbances, such as severe wildfire. To ensure these considerations are accounted for, an element must be found in at least one designated natural area within all

the ecoregions in which it occurs, before it is considered "adequately represented". In addition, the element must be represented in multiple natural areas before being considered adequately represented.

Ecoregions reflect broad patterns of species composition and distribution, climate, landforms, geology, soils, and hydrology occurring on the landscape. Requiring representation of each species and ecosystem priority in all the ecoregions in which they occur, ensures that genetic diversity of species and ecological variability of ecosystems is captured across a range of landscape patterns. The ecoregions used by the Natural Heritage Program are modified from Level 3 ecoregions identified by U.S. EPA (Pater et al. 1998, Omernik and Gallant 1986). The modifications were made in consultation with a variety of conservation partners, primarily The Nature Conservancy and the Washington Department of Fish and Wildlife, in order to better reflect local, on-the-ground expertise and finer boundary resolution.

The goal of the statewide system of natural areas is not to necessarily provide sufficient conservation of a species or ecosystem across their statewide range. Rather the objective is to provide adequate *representation* of viable populations of rare species and *representation* of ecosystem occurrences with sufficient ecological integrity to remain intact over the long-term. As such, representation goals in this Plan are not the same as adequate conservation for a species or ecosystem across its range.

Quantifying adequate representation has proven to be difficult for conservation biologists (Tear et al. 2005). We suggest an element be included in at least one designated natural area within each ecoregion in which it is found before being considered adequately represented (Table 5). Additionally, an element needs to be included in at least five designated natural areas, regardless of the number of ecoregions in which it is found, before being considered adequately represented. So, if an element is only found in one ecoregion, it would need to be protected in at least five designated natural areas before considered adequately represented. Five is an arbitrary number but is an attempt to ensure some redundancy is built into representation. An extreme disturbance event, such as catastrophic fire, could eliminate the presence of an element in any given natural area. Requiring multiple sites ensures some level of representation in remaining, intact natural areas. As more occurrences of a rare species or ecosystem are incorporated into the statewide system of natural areas, the priority for that element decreases. If representation decreases due to loss of a site from catastrophic disturbances or other reasons, the Natural Area Representation Priority will be adjusted to reflect the new levels of representation. There may be cases where adequate representation is based on more than the suggested number of natural areas provide above and in those cases a rationale will be provided in the applicable list of Natural Areas Representation Priorities.

An element's State Conservation Status also influences how much representation is needed before being considered adequately represented (Table 5). Endangered elements are always considered a potential priority, even if five or more natural areas protect the element. However, threatened and sensitive elements are considered adequately represented—and thus no longer a priority—after at least five examples, within all of the ecoregions in which the element occurs, have been represented in the statewide system of natural areas.

Rare Plant Species Representation Criteria

Rare species are one of the fine filter targets identified in the Plan. Only endangered, threatened, or sensitive species are assigned a Natural Area Representation Priority for each ecoregion within which it occurs. Common species are assumed to be captured through the coarse filter.

For a species to be considered "represented" the population at the site must meet the criteria for an element occurrence (NatureServe 2002). The presence of rare species on natural areas was determined by the intersection of Natural Heritage element occurrences with acquired areas within designated natural area boundaries. Natural Area Representation Priorities for species are found in Appendix D.

Table 5. Natural Area Representation Priorities for Rare Plant Species and Ecosystems.

	Number of Natural Areas the Element is Represented Within				
State Conservation Status	0	1	2	3-5	>5*
Endangered	Priority 1	Priority 1	Priority 1	Priority 2	Priority 3*
Threatened	Priority 1	Priority 1	Priority 2	Priority 3	Adequately Represented*
Sensitive**	Priority 1	Priority 2	Priority 2	Priority 3	Adequately Represented*
No Concern**	Priority 2	Priority 3	Priority 3	Adequately Represented*	Adequately Represented*

*If represented in all of the ecoregions in which element is found
** Does not apply to fine filter ecosystems

Rare Animal Species Representation Criteria

Natural Area Representation Priorities for animal species were not changed from the 2018 Plan. The lists provided in this Plan adopt the 2018 NH Plan priority for each species listed in this Plan.

Ecosystem Representation Criteria

The approach for assigning Natural Area Representation Priorities for coarse and fine filter ecosystem targets are described below.

Coarse filter Ecosystem Elements
Coarse filter ecosystems include USNVC Groups, Marine and Estuarine Ecosystems, and Freshwater Ecosystems. The latter two have been included in past NH Plans but USNVC groups are a new addition.

Using the Global and Subnational (state) ranks identified for each coarse filter target that occurs in the state, Table 4 is used to assign a State Conservation Status to each group. Then, using Table 5, a Natural Area Representation Priority is assigned to each of the state endangered, threatened, or sensitive coarse filter ecosystem targets. Because the goal of representing coarse filter ecosystems is to capture the full suite of ecosystem diversity, even coarse filter ecosystem targets with a State Conservation Status of "No Concern" are assigned a Natural Area Representation Priority.

For a coarse filter ecosystem target to be considered "represented" at a given site, the population at the site must meet the criteria for an element occurrence (NatureServe 2002). This was determined by identifying the USNVC group associated with ecosystem element occurrences, elements represented in the 2018 Natural Heritage Plan, natural area establishment records and research documents (e.g., Franklin et al., 1972) and otherwise known-but-undocumented occurrences based on the professional expertise of NHP staff. located within designated natural areas. This approach may undercount the coarse filter ecosystems represented on designated natural areas since past inventory efforts have focused on fine filter ecosystem targets. The analysis also used recently completed National Park Service (NPS) USNVC vegetation maps spanning NPS RNAs and a few additional natural areas adjacent to park units to determine representation (Nielsen et al. 2021a, Nielsen et al. 2021b, Nielsen et al. 2021c). We assumed that mapped vegetation was element occurrence-quality if it met specific size thresholds, which varied by ecosystem type. Only map classes with 1-to-1 crosswalks to specific USNVC groups were considered. Future analysis may employ the use of GIS models to determine if other coarse filter ecosystem occur on natural areas. Natural Area Representation Priorities for coarse filter ecosystems are found in Appendix E.

Intermountain Dry Tall Sagebrush Steppe & Shrubland Group (coarse filter ecosystem element).

Wyoming sagebrush / bluebunch wheatgrass Association (fine filter ecosystem element).

Fine filter Ecosystem Elements

Fine filter ecosystems represent rare and unusual ecosystem types that may not be captured under the umbrella of the coarse filter. As such, they are separately identified as their own

Plan target. Fine filter ecosystem targets are extracted from the list of USNVC associations that are known to occur in Washington (Ramm-Granberg and Weber 2022). Using the Global and Subnational (state) ranks identified for each association in that list, Table 4 is used to assign a State Conservation Status to each association. Then, using Table 5, a Natural Area Representation Priority is assigned to each of the state endangered and threatened fine filter ecosystem targets. Natural Area Representation Priorities were not assigned for fine filter ecosystems considered sensitive or no concern—they are assumed to be capture through the coarse filter targets. Fine filter associations that have a GNR/SNR or GU/SU rank were treated as threatened in this analysis. These elements lack a global and state rank due to a lack of information or because they are newly recognized types that have not had a conservation assessment conducted for them yet. However, these types are generally geographically restricted or imperiled. As such, a conservative approach was take to establish their priorities. As their ranks are updated, their State Conservation Status and Natural Areas Representation Priorities will be adjusted accordingly. For a fine filter ecosystem target to be considered "represented", the occurrence at the site must meet the criteria for an element occurrence (NatureServe 2002). The presence of fine filter ecosystem elements on natural areas was determined by the intersection of Natural Heritage element occurrences with designated natural area boundaries. Natural Area Representation Priorities for fine filter ecosystems are found in Appendix E.

Status of the Statewide System of Natural Areas

Washington's designated natural areas protect critical habitat areas, provide important ecosystem services that benefit our communities, and provide opportunities for education, research, and recreation. By taking bold steps guided by science-based policy, and in partnership with others throughout the state, significant progress has been accomplished toward implementing the goals articulated in the Natural Area Preserves Act.

Since the first designation of Sand and Goose Islands as Natural Area Preserves (NAPs) in 1973, the statewide system of natural areas has grown steadily over the years (Figure 8). Today, there are 215 designated natural areas in the statewide system, including 68 in federal ownership, 110 in state ownership, and 37 in private conservancy (Figure 9). DNR alone manages 57 NAPs and 39 Natural Resources Conservation Areas (NRCAs). State Parks and Washington Department of Fish and Wildlife combine to manage an additional 11 natural areas. Washington State University manages 3 Biological Study Areas. Federal agencies manage 68 natural areas, including 51 Research Natural Areas (RNAs) and 17 Areas of Critical Environmental Concern (ACECs). Non-governmental organizations also manage 37 natural areas in Washington. The following sections provide more detail about the current status of the statewide system of natural areas.

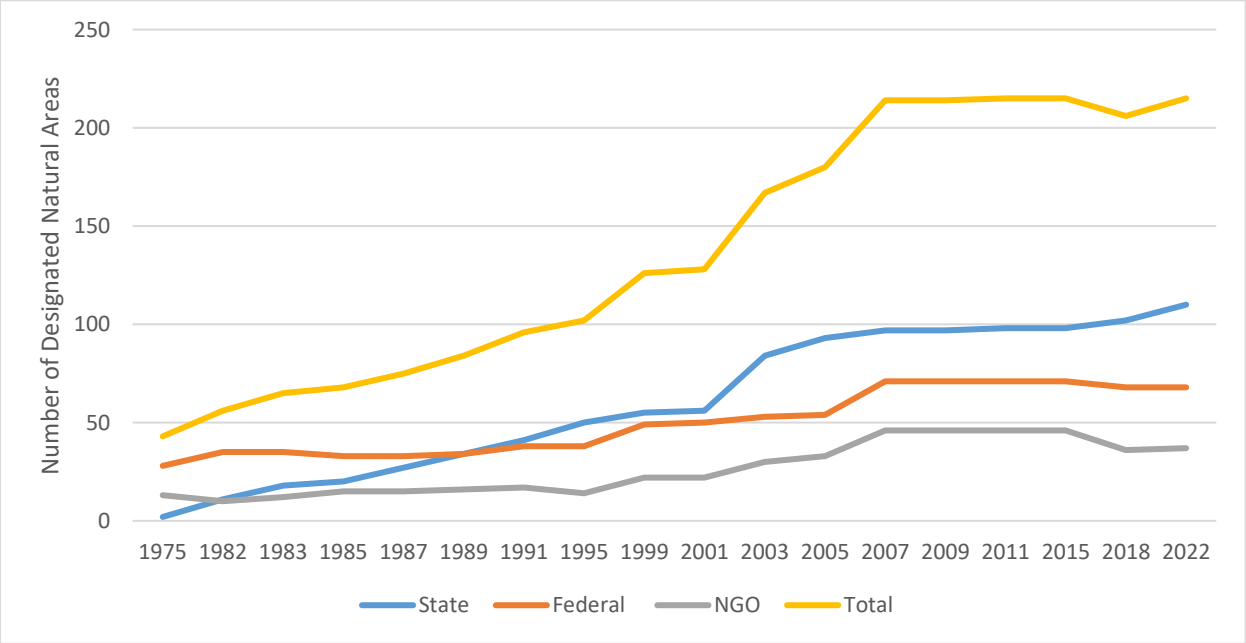


Figure 8. Number of Designated Natural Areas Over Time

Table 6. Management Status of the Statewide System of Natural Areas

Ownership	Agency / Organization	Designation*	Number of Natural Areas
Federal	Bureau of Land Management	ACEC**	17
	Bureau of Land Management	RNA	1
	National Park Service	RNA	10
	U.S. Forest Service	RNA	28
	U.S. Fish and Wildlife Service	RNA	12
	Total Federal Natural Areas		68
State	Dept. of Natural Resources	NAP	57
		NRCA	39
	State Parks and Recreation Commission	NAP	5
	Dept. of Fish and Wildlife	NAP	6
	Washington State University	BSA	3
	Total State Natural Areas		110
Non-governmental Organizations	Columbia Land Trust	NAP	3
	Center for Natural Lands Management	NAP	2
	Palouse-Clearwater Environmental Institute	NAP	1
	San Juan Preservation Trust	NAP	2
	Skagit Land Trust	NAP	2
	The Nature Conservancy	NAP	27
	Total NGO Natural Areas		37
	Total Sites		**215**

*ACEC = Area of Critical Environmental Concern; BSA = Biological Study Area; NAP = Natural Area Preserve; NRCA = Natural Resources Conservation Area; RNA = Research Natural Area
**Hot Lake ACEC is also designated an RNA.

Geographic Distribution of Natural Areas

The Natural Heritage Program uses the concept of ecoregions to help identify conservation priorities within Washington. Ecoregions reflect broad ecological patterns occurring on the landscape. In general, each ecoregion has a distinctive composition and pattern of plant and animal species distribution related to the ecoregion's climate, landforms, geology, soils, and hydrological patterns. As such, compared to using politically derived lines, ecoregions provide an ecologically logical framework for partitioning the state into subunits for conservation planning. Figure 9 and Table 7 show the statewide distribution of the 215 natural areas recognized in this Plan. Several factors have influenced the number of natural areas in each ecoregion, including the size of the ecoregion and how much of it occurs within Washington, the pattern of land ownership (public vs. private), the degree to which lands within each ecoregion have been converted or degraded to non-natural land cover, the biotic richness of the ecoregion, and how well the ecoregion has been inventoried.

Table 7. Natural Areas within Washington Ecoregions

Ecoregion	DNR	Other State Agencies	Federal	Private	Total
Blue Mountains	0	0	4	0	4
Canadian Rockies	2	1	7	0	10
Columbia Plateau	12	6	14	11	43
East Cascades	6	1	7	2	16
North Cascades	8	1	10	6	25
Northwest Coast	24	1	9	5	39
Okanogan Highlands	6	0	5	1	12
Puget Trough	29	4	5	11	49
West Cascades	9	0	7	1	17
Total	**96**	**14**	**68**	**37**	**215**

Species & Ecosystems Represented in Natural Areas

The statewide system of natural areas protects more than 158 rare vascular plant species, 22 rare nonvascular species, 176 animal species, 113 fine filter ecosystem types, and 49 coarse filter ecosystem types. Many of these species and ecosystem types are found in multiple natural areas (Appendix F) and in numerous ecoregions (Table 8).

Table 8. Distribution of Priority Elements within Natural Areas Across Ecoregions

Ecoregion	Number of Priority Elements Protected within Natural Areas			
	Coarse filter Ecosystems	Fine filter Ecosystems	Rare Plant Species*	Rare Animal Species
Blue Mountains	4	5	20	30
Canadian Rockies	18	18	17	29
Columbia Plateau	20	31	40	81
East Cascades	17	6	23	63
North Cascades	26	15	19	25
Northwest Coast	16	43	8	51
Okanogan Highlands	20	11	22	57
Puget Trough	17	52	35	60
West Cascades	22	11	16	44

*includes vascular plant and nonvascular plant species

Species Representation

A total of 345 vascular plant species are targeted for inclusion in the statewide system of natural area (Table 9). Of those, 154 vascular plant species are protected within at least one natural area. No species are considered to be adequately represented and 190 currently have no representation (Table 9).

A total of 52 nonvascular plant species are targeted for inclusion in the statewide system of natural area (Table 9). Of those, 22 nonvascular plant species are protected within at least one natural area. No species are considered to be adequately represented and 30 currently have no representation (Table 9).

A total of 185 animal species are targeted for inclusion in the statewide system of natural areas (Table 9). Of those, 22 nonvascular plant species are protected within at least one natural area. Of those, 61 species are Priority 1, 43 Priority 2, and 81 are Priority 3. (Table 9).

Table 8 shows the number of species occurrences that occur within designated natural areas in each ecoregion. Appendix F lists the rare species that are included within designated natural areas.

Table 9. Natural Area Representation Priority Summaries for Biodiversity Elements

	Number of Targeted Elements	Priority 1	Priority 2	Priority 3	Adequately Represented
Coarse Filter Ecosystem Types	74	4	11	44	15
Fine Filter Ecosystem Types	615	563	30	22	1
Rare Vascular Plant Species	345	228	100	17	0
Rare Nonvascular Plant Species	52	36	16	0	0
Rare Animal Species	185	61	43	81	0

Ecosystem Representation

Coarse filter Ecosystem Representation

A total of 74 coarse filter ecosystems are targeted for inclusion in the statewide system of natural area (Table 9). Of those, 49 coarse filter ecosystems are protected within at least one natural area. To date, 11 coarse filter ecosystems are considered to be adequately represented, 63 remain targets for inclusion, and 25 currently have no representation (Table 9). shows the number of coarse filter ecosystem occurrences that occur within designated

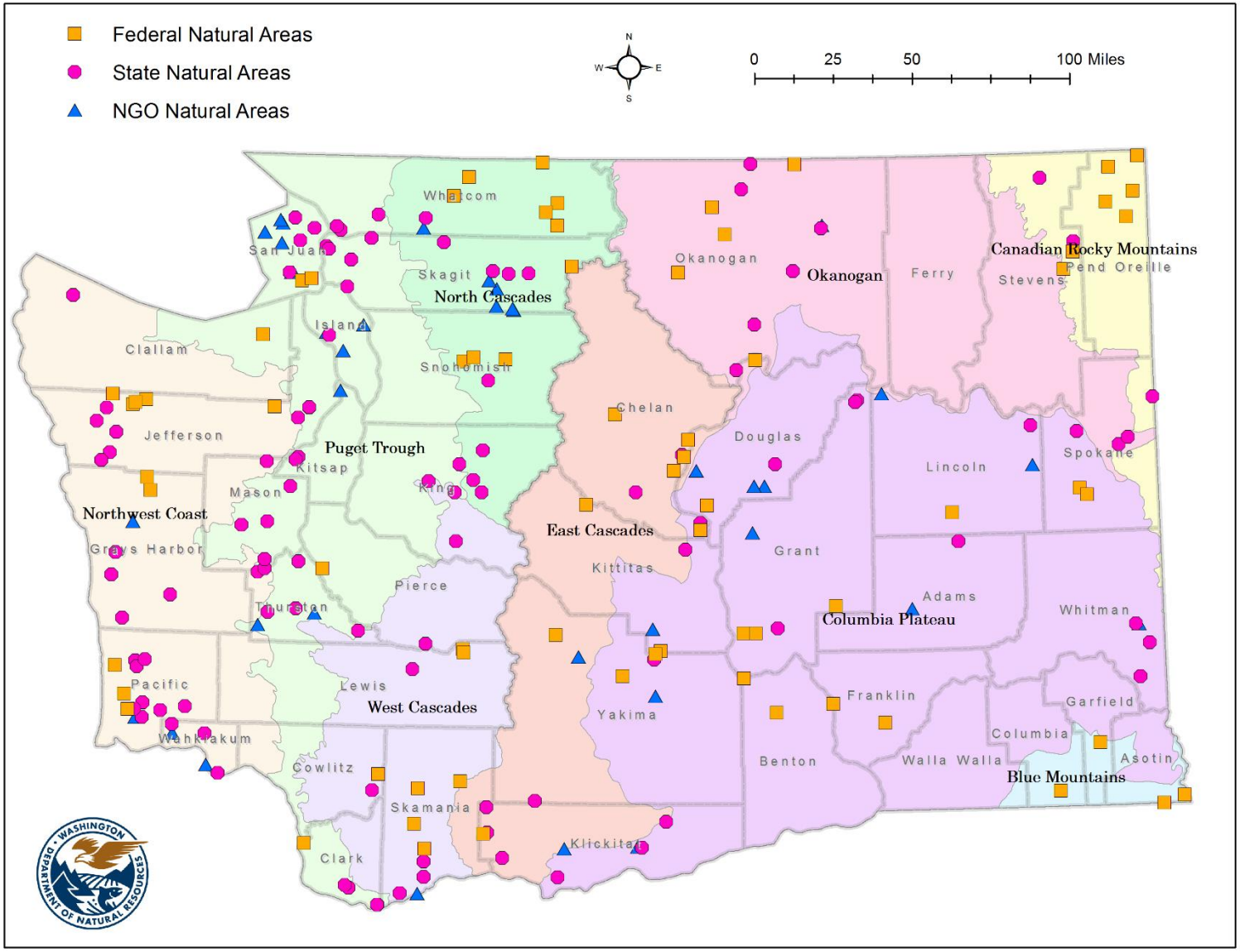


Figure 9. Ecoregions and the Statewide System of Natural Areas

natural areas in each ecoregion. Appendix F lists the coarse filter ecosystems that are included within designated natural areas.

Fine filter Ecosystem Representation

Out of the 1,055 natural plant communities occurring in Washington, a total of 616 fine filter ecosystems are targeted for inclusion in the statewide system of natural area (Table 9. Of those, 112 fine filter ecosystems are protected within at least one natural area. To date, one fine filter ecosystems is considered to be adequately represented and 458 (74%) currently have no representation (Table 9). Appendix F lists the fine filter ecosystems that are included within designated natural areas.

Washington Department of Natural Resources, Natural Areas Program

DNR manages the largest number of sites within the statewide system of natural areas, with 57 Natural Area Preserves and 39 Natural Resources Conservation Areas (Table 10). DNR's 96 designated natural areas protect more than 166,400 acres of native rare and high-quality ecosystems and habitat for rare species in Washington.

DNR's designated natural areas provide significant contributions toward the goals of the Natural Area Preserves Act. The objectives of DNR Natural Areas Program are to conserve Washington's native species and ecosystems, today and for future generations by focusing on:

- **healthy ecosystems** through the use of science-based management and restoration techniques to prevent damage to healthy ecosystems and restore degraded ecosystems;
- **protecting native biodiversity** by controlling invasive species, monitoring rare native species, and managing for the recovery of rare species populations;
- **valuing nature** by strengthening public appreciation of nature by promoting environmental education, exploration, and scientific research on natural areas; and
- **fostering partnerships** through innovative ways to care for designated natural areas through community engagement and partnerships.

Besides protecting representative examples of Washington's most imperiled species and ecosystems, DNR's natural areas also provide contributions to our overall quality of life, providing clean air and water, recreational opportunities, scenic diversity, etc. For example, DNR manages several large natural areas that contribute to municipal water supplies, such as Morning Star NRCA in Snohomish County's Sultan Basin.

Designated Natural Areas

DNR Natural Area Preserves

DNR's 57 Natural Area Preserves were acquired for the protection of priority species and ecosystems and management of these sites is focused on ensuring the viability of those species and ecosystems. These natural areas protect some of the most significant populations

of rare species and exemplary examples of the state's ecosystems that remain in the state. For example, Upper Dry Gulch NAP in Chelan County protects the largest known population of Whited's milkvetch, a state-listed endangered plant species that is only found within a 3-square-mile area; it is found nowhere else in the world. DNR's management is focused on protecting the viability of this globally imperiled species. Crowberry Bog NAP, the states' newest natural area, protects the only raised bog known to occur in the western conterminous United States.

Bald Hill NAP protects a high diversity of priority elements, including grasslands, oak woodlands, wetlands, rare plants, and a rare butterfly.

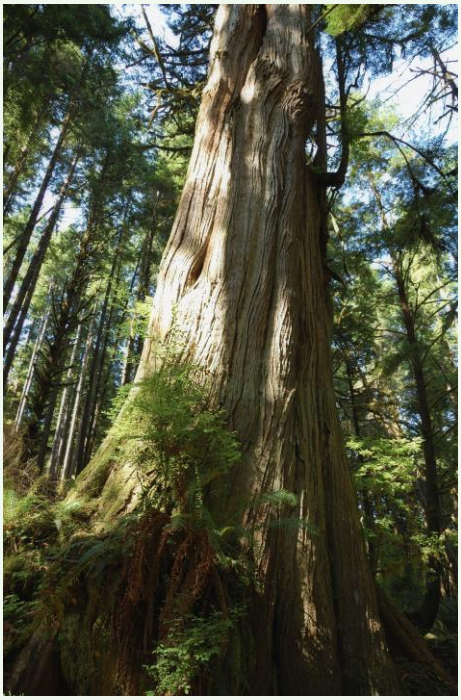
Research and education are other primary intended uses of Natural Area Preserves. Since the first Natural Area Preserves were established, more than 580 research projects and other studies have taken place on DNR natural areas. Natural Area Preserves offer baseline reference sites to document environmental change and to learn how ecosystems function. Research conducted at natural areas has provided information regarding management of invasive species, use of prescribed fire, and documentation regarding what an ecosystem in reasonably natural condition looks like. Many of DNR's natural areas are included in the statewide list of reference standard wetlands compiled by the Natural Heritage Program (Rocchio and Ramm-Granberg 2017). Reference standard wetlands provide baseline conditions from which wetland mitigation and restoration goals and standards can be developed.

Some Natural Area Preserves have limited access opportunities for the public to appreciate Washington's natural heritage. For example, the Chehalis River Surge Plain NAP in Grays Harbor County now has two parking areas serving interpretive trails, viewpoints and hand-carry watercraft access to the river and sloughs that support exemplary examples of forested tidal wetlands.

DNR Natural Resources Conservation Areas

Natural Resources Conservation Areas, a conservation land designation unique to DNR, protect priority species or ecosystems, and offer opportunities for research and education. They also often provide opportunities for low-impact recreation such as hiking, backcountry camping, and scenic photography. For example, Table Mountain NRCA contains relatively undisturbed examples of upland and wetland forests, mountain meadows, and rare plant populations, including the largest known population of Howell's daisy, a state threatened plant that is only found in a small part of the Columbia River Gorge. A segment of the Pacific Crest Trail traverses the site, offering amazing vistas of both Washington and Oregon.

Some sites have both Natural Area Preserve and Natural Resources Conservation Area status. Cypress Island, one of the first sites established under the Natural Resources Conservation Areas Act, has both types of natural areas. These natural areas protect more than 5,200 acres — about 95 percent of the island — of high quality forest, wetland and grassland communities, state-owned tidelands, and low-elevation serpentine forest. The areas on the island designated as Natural Area Preserve comprise about 1,100 acres, and protect rare examples of grasslands underlain by basalt bedrock, and other plant communities and wetlands underlain by serpentine bedrock. The areas of the island designated as Natural Resources Conservation Area also protect important ecological elements, and additionally provide low-impact recreation opportunities such as hiking, wildlife viewing, and shoreline camping.



South Nemah NRCA supports one of the last uncut drainages in the Willapa Hills. The site protects old growth upland and swamp forests and critical habitat for numerous priority birds, fish, and amphibian species.

Since 2018, two Natural Resources Conservation Areas were added to the statewide system of natural areas, one of which is Kennedy Creek Natural Resources Conservation Area. This new NRCA protects more than 900 acres and 8 stream miles along Kennedy and Fiscus creeks and their associated riparian habitats. The NRCA is adjacent to and supports the previously conserved Kennedy Creek NAP, providing persistent, clean and healthy stream flows to the NAP's high quality salt marsh communities and the abundant fish and wildlife at the site. The NRCA also is host to a popular salmon trail, since the abundant fall chum run is visible along the creek corridor. It is not uncommon to have 5,000 visitors to the salmon trail each October through December, including approximately 3,000 local students from 40 area schools.

DNR Natural Area Management

DNR Natural Areas Program staff based in Olympia provide guidance and scientific expertise and ensure consistency of natural area management across all of DNR's natural areas. Natural Areas Managers based in DNR regions are critical for ongoing monitoring and implementation of management activities on natural areas. When significant management issues arise (e.g., reintroduction of a rare species to a site, introducing management techniques to mimic historical disturbances), they are brought before the Natural Heritage Advisory Council for guidance.

Many natural areas, both NAPs and NRCAs, are managed under the goals and actions determined through development of site-specific land management plans, while management actions at other sites are guided by the conservation objectives of the Plan or the NRCA

Statewide Management Plan (DNR 1992). You can learn more about DNR's natural areas at http://www.dnr.wa.gov/managed-lands/natural-areas.

Registration of Natural Areas

The majority of registry sites were established many years ago and the status of each site has not been recently updated. As such, a current list of registry sites is not producible at this time.

Washington Department of Fish and Wildlife Natural Area Preserves

The Washington Department of Fish and Wildlife (WDFW) manages six Natural Area Preserves (Table 10). WDFW NAPs are registered and committed as natural area preserve through a cooperative agreement with DNR pursuant to chapter 79.70 RCW and chapter 332-60 WAC. Collectively, these NAPs were established to conserve species, communities, and ecological systems considered important by the Natural Heritage Program and important to fish and wildlife. For example, WDFW's White Island NAP was acquired to protect a riparian forest community as it is critical for the long-term conservation of Columbian white-tailed deer (*Odocoileus virginianus leucurus*), a federally threatened (and Priority 1) species. Other priority target species and communities conserved through WDFW's NAPs include various shrub steppe ecosystem types, dry forest communities, peatlands, and several rare species including twayblade (*Liparis loeselii*), Adder's tongue (*Ophioglossum vulgatum*), Peregrine Falcon (*Falco peregrinus*), Pileated Woodpecker (*Dryocopus pileatus*), and Bald Eagle (*Haliaeetus leucocephalus*).

Washington State Parks and Recreation Commission's Natural Areas Preserves

Washington State Parks and Recreation Commission (State Parks) manages five Natural Area Preserves (Table 10). State Parks designates NAPs to preserve rare or vanishing flora, fauna, and other geological, natural historical or similar elements of scientific or educational value. State Park NAPs are registered and committed as a natural area preserves through a cooperative agreement with DNR pursuant to chapter 79.70 RCW and chapter 332-60 WAC.

Federal Natural Areas

Federal agencies such as the Bureau of Land Management, National Park Service, U.S. Forest Service, and U.S. Fish and Wildlife Service manage a total of 68 natural areas (Table 11). These sites are designated as either Research Natural Areas or Areas of Critical and Environmental Concern.

Research Natural Areas (RNAs) are designated for research, observation, and study. RNAs protect rare and/or undisturbed examples of plant communities and rare species. The

primary focus of RNA management is the maintenance of unmodified conditions and natural processes. The USFS manages 28 RNAs, U.S. Fish and Wildlife Service manages 12, the National Park Service manages 10, and Bureau of Land Management manages a single RNA.

Areas of Critical and Environmental Concern (ACECs) highlight areas where special management attention is needed to protect important values that may be biological, geological, cultural, historic, scenic, or safety-related. ACEC designation outlines special management measures to protect those values. The Bureau of Land Management has designated 17 ACECs in Washington. The Hot Lakes ACEC is also designated a RNA.

Non-Governmental Organizations Preserves

Non-governmental organizations manage 37 designated areas (Table 12). The Nature Conservancy manages 27 preserves. In the past, The Nature Conservancy was the only non-governmental organization managing sites included in the statewide system of natural areas. However, other non-governmental organizations now contribute toward the goals of the Natural Area Preserves Act. Columbia Land Trust manages three natural areas preserves. Center for Natural Lands Management, and San Juan Preservation Trust, and Skagit Land Trust each manage two designated natural areas. The Palouse – Clearwater Environmental Institute manages a single designated natural area. Many of these sites were previously managed by The Nature Conservancy who then transferred them to these other land trusts. Land trust participation is critical to achieving the goals of the statewide system of natural areas.

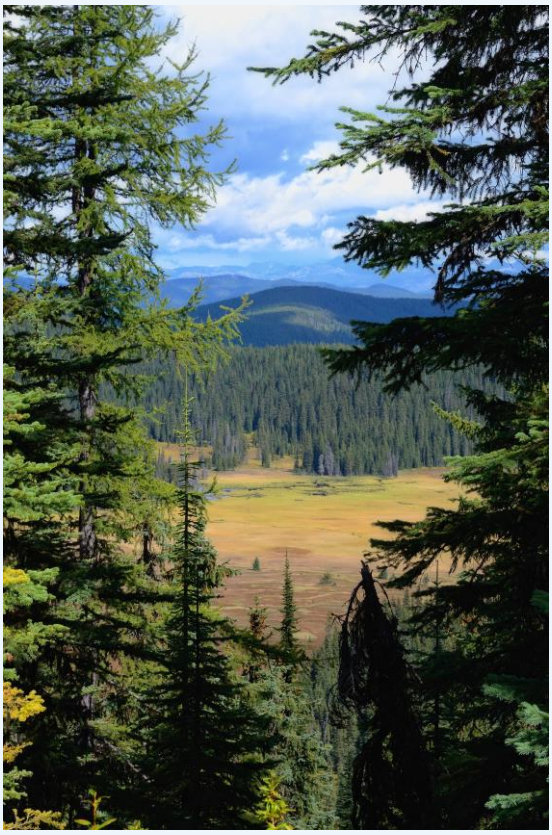
Pierce Island Preserve, owned by Columbia Land Trust, protects a population of the State Threatened Columbia yellowcress (*Rorippa columbiae*)

Pacific Northwest Interagency Natural Areas Network

Over the past 40 years, the Pacific Northwest Interagency Natural Areas Network has promoted the recognition, establishment, and management of natural areas in Oregon and Washington. The network is comprised of federal, state, county, and city agencies and non-governmental organizations that manage natural areas within Oregon and Washington (Wilson et al. 2009). One of the network's first projects was to identify key components of a multiagency, natural areas program (Dyrness et al. 1975). This led to the development of state heritage plans (such as this one) that use statewide inventories of biodiversity elements to identify missing representations of ecosystems across the various natural areas programs (e.g., ONAP 2020, DNR 2018). As a result of these and other efforts, natural areas across the

Pacific Northwest region have grown to over 400 sites spanning over 900,000 acres (367 000 ha), eclipsed only by wilderness and national parks for areas set aside to protect wildlands (Wilson et al. 2009). This growing collection of sites is now unmatched in its diversity and representation of both common and unique natural ecosystems found throughout this region.

DNR Natural Heritage and Natural Areas Program staff are active participants on the Pacific Northwest Interagency Natural Areas Network. Our programs will continue to coordinate with this network to ensure the Washington statewide system of natural areas not only achieves the goals set out in the Natural Area Preserves Act but also helps achieve the regional goals of the Pacific Northwest Interagency Natural Areas Network.



Bunchgrass Meadows Research Natural Area supports numerous priority species and ecosystems, including the only location for a patterned fen n the Washington State.

Table 10. State Natural Areas.

State Natural Areas			
Site Name	**Organization**	**Site Name**	**Organization**
Admiralty Inlet NAP	DNR	Lower Crab Creek NAP	WDFW
Ashford NRCA	DNR	Lummi Island NAP	WDFW
Badger Gulch NAP	DNR	Lummi Island NRCA	DNR
Bald Hill NAP	DNR	Marcellus Shrub Steppe NAP	DNR
Barker Mountain NAP	DNR	Merrill Lake NRCA	DNR
Blanchard Core NRCA	DNR	Methow Rapids NAP	DNR
Bone River NAP	DNR	Middle Fork Snoqualmie NRCA	DNR
Camas Meadows NAP	DNR	Mima Mounds NAP	DNR
Campus Prairie BSA	WSU	Monte Cristo NAP	DNR
Carlisle Bog NAP	DNR	Morning Star NRCA	DNR
Castle Rock NAP	DNR	Mount Pickett NAP	STPK
Castle Rock NAP	STPK	Mount Si NRCA	DNR
Cattle Point NRCA	DNR	Naselle Highlands NRCA	DNR
Charley Creek NAP	DNR	Niawiakum River NAP	DNR
Chehalis River Surge Plain NAP	DNR	North Bay NAP	DNR
Chopaka Mountain NAP	DNR	Oak Patch NAP	DNR
Clearwater Bogs NAP	DNR	Olivine Bridge NAP	DNR
Clearwater Corridor NRCA	DNR	Pinecroft NAP	DNR
Cleveland Shrub Steppe NAP	DNR	Point Doughty NAP	DNR
Colockum Spur NAP	WDFW	Queets River NRCA	DNR
Columbia Falls NAP	DNR	Ragged Ridge NAP	STPK
Columbia Hills NAP	DNR	Rattlesnake Mountain NRCA	DNR
Crowberry Bog NAP	DNR	Riverside Breaks NAP	DNR
Cypress Highland NAP	DNR	Rocky Prairie NAP	DNR
Cypress Island NRCA	DNR	Schumacher Creek NAP	DNR
Dabob Bay NAP	DNR	Selah Cliffs NAP	DNR
Dabob Bay NRCA	DNR	Shipwreck Point NRCA	DNR
Dailey Prairie NAP	DNR	Skagit Bald Eagle NAP	DNR
Davis Canyon NAP	DNR	Skagit River Bald Eagle NAP	WDFW
Devils Lake NRCA	DNR	Skamokawa Creek NRCA	DNR
Dishman Hills NRCA	DNR	Skookum Inlet NAP	DNR
Elk River NRCA	DNR	Smoot Hill BSA	WSU
Ellsworth Creek NRCA	DNR	Snoqualmie Bog NAP	DNR
Entiat Slopes NAP	DNR	South Nemah NRCA	DNR
Granite Lakes NRCA	DNR	South Nolan NRCA	DNR
Hamma Hamma Bald NAP	DNR	Spring Creek Canyon NAP	DNR
Hat Island NRCA	DNR	Stavis NRCA	DNR
Hendrickson NRCA	DNR	Stevenson Ridge NRCA	DNR

State Natural Areas			
Site Name	**Organization**	**Site Name**	**Organization**
Hope Island NAP	STPK	Table Mountain NRCA	DNR
Ink Blot NAP	DNR	Tahoma Forest NRCA	DNR
Kahlotus Ridgetop NAP	DNR	Teal Slough NRCA	DNR
Kennedy Creek NAP	DNR	The Two-Steppe NAP	DNR
Kennedy Creek NRCA	DNR	Trombetta Canyon NAP	DNR
Killebrew Lake NAP	WDFW	Trout Lake NAP	DNR
Kings Lake Bog NAP	DNR	Upper Deep Creek NAP	STPK
Kitsap Forest NAP	DNR	Upper Dry Gulch NAP	DNR
Klickitat Canyon NRCA	DNR	Washougal Oaks NAP	DNR
Kramer Palouse BSA	WSU	Washougal Oaks NRCA	DNR
Lacamas Prairie NAP	DNR	West Tiger Mountain NRCA	DNR
Lacamas Prairie NRCA	DNR	White Island NAP	WDFW
Lake Louise NRCA	DNR	White Salmon NRCA	DNR
Little Pend Oreille River NAP	DNR	Willapa Divide NAP	DNR
Loomis NRCA	DNR	Woodard Bay NRCA	DNR

DNR=Dept. of Natural Resources; NAP=Natural Area Preserve, NRCA=Natural Resources Conservation Areas. STPK=State Parks and Recreation Commission; WDFW=Dept. of Fish and Wildlife

Table 11. Federal Natural Areas.

Federal Natural Areas			
Site Name	**Organization**	**Site Name**	**Organization**
Baird Basin RNA	USFWS	Maitlen Creek RNA	USFS
Big Beaver RNA	NPS	McCoy Canyon ACEC	BLM
Blackwater Islands RNA	USFWS	Meeks Table RNA	USFS
Boston Glacier RNA	NPS	Monte Cristo RNA	USFS
Brewster Roost ACEC	BLM	Nisqually Delta RNA	USFWS
Bunchgrass Meadows RNA	USFS	North Fork Nooksack RNA	USFS
Butter Creek RNA	NPS	Pataha Bunchgrass RNA	USFS
Butter Creek RNA	USFS	Perry Creek RNA	USFS
Cedar Flats RNA	USFS	Pine Creek RNA	USFWS
Cedar Grove RNA	USFWS	Point Colville ACEC	BLM
Chewuch RNA	USFS	Pyramid Lake RNA	NPS
Coal Creek ACEC	BLM	Quinault RNA	USFS
Colockum Creek ACEC	BLM	Rainbow Creek RNA	USFS
Cowiche Canyon ACEC	BLM	Rattlesnake Hills RNA	USFWS
Diamond Point RNA	USFWS	Rock Island Canyon ACEC	BLM
Drumheller Sagebrush Steppe RNA	USFWS	Roger Lake RNA	USFS
Earthquake Point ACEC	BLM	Ronald J. Taylor RNA	USFS
Eldorado Creek RNA	USFS	Round Top Mountain RNA	USFS
Fish Lake Bog RNA	USFS	Salmo RNA	USFS
Goat Marsh RNA	USFS	Sentinel Slope ACEC	BLM
Grande Ronde ACEC	BLM	Silver Lake RNA	NPS
Graveyard Spit RNA	USFWS	Sister Rocks RNA	USFS
Hades Creek RNA	NPS	Steamboat Mountain RNA	USFS
Halliday Fen RNA	USFS	Stetattle Creek RNA	NPS
Higley Creek RNA	NPS	Thompson Clover RNA	USFS
Hot Lakes RNA	BLM	Thorton T. Munger RNA	USFS
Iceberg Point ACEC	BLM	Turnbull Pine RNA	USFWS
Jackson Creek RNA	NPS	Twin Creek RNA	NPS
Joseph Creek ACEC	BLM	Varline Grove RNA	USFWS
Juniper Forest ACEC	BLM	Wet Weather Creek RNA	USFS
Keystone Point ACEC	BLM	Wolf Creek RNA	USFS
Lake Twenty-Two RNA	USFS	Yakima and Columbia River Islands ACEC	BLM
Leadbetter Point RNA	USFWS	Yakima River Canyon ACEC	BLM
Long Creek RNA	USFS	Yakima River Cliffs - Umtanum Ridge ACEC	BLM

ACEC=Area of Critical and Environmental Concern, BLM=Bureau of Land Management, NPS=National Park Service, RNA=Research Natural Area, USFS=U.S. Forest Service, USFWS=U.S. Fish and Wildlife Service.

Table 12. Non-governmental Organization Natural Areas.

Non-Governmental Organization Natural Areas	
Site Name	**Organization**
Arlecho Creek Preserve	TNC
Badger Mountain Preserve	TNC
Barker Mountain Preserve	TNC
Beezley Hills Preserve	TNC
Boots Satterlee Preserve	CNLM
Copalis River Preserve	TNC
Deadman Island Preserve	TNC
Ebey's Landing Preserve	TNC
Ellsworth Creek Preserve	TNC
Foulweather Bluff Preserve	TNC
Goose Island Preserve	TNC
Grays Bay Wetland Preserve	CLT
Klickitat Oaks Preserve	TNC
Lake Hancock Preserve	TNC
Lind Shrub Steppe Preserve	TNC
Magnuson Butte Preserve	TNC
McCartney Creek Preserve	TNC
Moses Coulee Preserve	TNC
Moxee Bog Preserve	TNC
Pierce Island Preserve	CLT
Port Susan Bay Preserve	TNC
Puget Island Preserve	TNC
Rose Creek Preserve	PCEL
Sauk River Preserve	TNC
Seaton Canyon Preserve	TNC
Sentinel Island Preserve	TNC
Skagit River Bald Eagle Preserve	SLT
Skagit River Bald Eagle Preserve	TNC
South Puget Prairies Preserve	CNLM
Suiattle River Preserve	SLT
Suiattle River Preserve	TNC
Tieton River Preserve	TNC
Wahkiacus Oaks NAP	CLT
Waldron Head NAP	SJPT
Waldron Island NAP	SJPT
Yakima River Canyon Preserve	TNC
Yellow Island Preserve	TNC

CLT=Columbia Land Trust, CNLM=Center for Natural Lands Management, PCEL= Palouse-Clearwater Environmental Institute, SKL=Skagit Land Trust, SJPT=San Juan Preservation Trust, TNC=The Nature Conservancy

Accomplishments Since the 2018 Natural Heritage Plan

Data Collection and Distribution of Biodiversity Data

Since 2018, both the Natural Heritage Program and Natural Areas Program have made considerable advances toward achieving the goals of the Natural Area Preserves Act. The Natural Heritage Program continues to advance the state of knowledge concerning which species and ecosystems are priorities for conservation, growing the database of priority species and ecosystem locations, and improving ways to distribute these critical data to inform conservation decisions. The Natural Areas Program's ongoing restoration and management of DNR natural areas has both improved ecological conditions in many sites and maintained excellent condition on others.

Rare Species and Ecosystem Data Collection

As noted previously, the Natural Heritage Program manages information on more than 7,000 individual records of rare species and ecosystems in the state. This information is stored in the program's Biotics database. These data are continuously updated as new information becomes available.

Since 2018, Natural Heritage Program staff have completed numerous projects, primarily supported by external grants and contracts, and received data from external partners that have added 452 additional records, modified 648 existing records, and deleted 16 records in the Biotic database. Many of the projects that fund Natural Heritage Program staff activities also result in the collection of classification data, life history information, distribution data, ecological integrity assessments, and other information that doesn't necessarily populate the Biotics database but still has immense value for informing biodiversity conservation decisions. In addition to staff survey work, the Natural Heritage Program also receives data from external sources including the University of Washington Rare Plant Care and Conservation Program ("Rare Care"), environmental consultants, federal and state agency staff, students, and other members of the public. (Table 13).

Distribution of Natural Heritage Data

Twice a year, the Natural Heritage Program distributes a geodatabase of element occurrences from the Biotics database (Table 13). This data set represents the core of Natural Heritage Program information concerning the location of rare species and ecosystems. The entities listed in Table 14 receive biannual updates of our database, providing them with the up-to-date locational information regarding the location of rare species and ecosystems.

Table 13. Natural Heritage Program Primary Data Sources

Project / Data Source	Funding Source*	Status	Rare Species Data	Ecosystem Data
BLM Data Exchange	BLM	Ongoing	Y	
Columbia Land Trust	CLT	Completed		Y
Crowberry Research	DNR / CSU	Completed	Y	Y
Environmental consultants	n/a	Ongoing	Y	Y
EPA Wetland Program Development Grants	EPA	Ongoing	Y	Y
NatureServe	n/a	Ongoing	Y	Y
Puget Sound Partnership / Near Term Actions	WDFW (EPA)	Ongoing	Y	Y
Rare Care	n/a	Ongoing	Y	
State Trust Lands Surveys	DNR	Ongoing		Y
USFS Data Exchange	USFS	Ongoing	Y	
USFS Climate Change Vulnerability Assessments	USFS	Ongoing	Y	
USFWS Section 6 Grants	USFWS	Ongoing	Y	Y

*BLM=Bureau of Land Management, CLT=Columbia Land Trust, CSU=Colorado State University, DNR=Washington Dept. of Natural Resources, EPA=Environmental Protection Agency, USFS=U.S. Forest Service, USFWS=U.S. Fish and Wildlife Service, and WDFW=Washington Dept. of Fish and Wildlife.

Table 14. Organizations that Request Regular Natural Heritage Data Updates.

Organization Type	Organization
County	Clark County
County	Skamania County
Federal	Bonneville Power Administration
Federal	Bureau of Land Management
Federal	Columbia River Gorge Commission
Federal	Joint Base Lewis-McChord (Yakima Training Center)
Federal	Mount Rainier National Park
Federal	Natural Resources Conservation Service
Federal	U.S. Fish and Wildlife Service
Federal	U.S. Forest Service
Private	NatureServe
Private	Weyerhaeuser
State	Washington Department of Ecology
State	Washington Department of Fish and Wildlife
State	Washington Department of Natural Resources
State	Washington Department. of Transportation
State	Washington State Parks and Recreation Commission
University	Rare Care (University of Washington)

Online access to Natural Heritage Program data is a significant way in which critical biodiversity information is distributed into the hands of decisions makers. The Natural Heritage Program's "Data Products & Requests" web page (https://www.dnr.wa.gov/NHPdata) had 7,178 page views between 2018 and 2021 and the Program's Wetlands of High Conservation Value map viewer, an online, interactive mapping tool that allows users' to determine the location of rare plants and rare / high-quality wetland ecosystems (https://www.dnr.wa.gov/NHPwetlandviewer), had 14,081 page views in the same time frame. The Natural Heritage Program also shares technical reports and publications on their website.

Another significant source for distributing is LandScope America, an online resource for the conservation and land-protection community. LandScope was developed in collaboration by NatureServe, the National Geographic Society, and other partner organizations to increase the effectiveness of conservation action and investment throughout the United States. Washington was one of five pilot states when LandScope was initially developed. Between November 2019 and November 2020, LandScope Washington (http://www.landscope.org/washington/) received 13,526 page views, a number that is significantly higher than the next highest tally—California had 1,406 page views (Lori Scot, NatureServe, personal communication). Most of the interest on LandScope Washington appears to be ecosystem and ecoregion information provided by the Natural Heritage Program.

DNR Natural Area Designations

Since 2018, DNR added one new Natural Area Preserve and two new Natural Resources Conservation Area.

Crowberry Bog NAP was designated by the Commission of Public Lands in 2016 but the site was acquired by DNR Natural Areas Program in 2019. This site protects the only known raised, plateau bog in the western conterminous United States. The site protects four rare species targets, three fine filter ecosystem types, and one coarse filter ecosystem type.

Crowberry Bog, Washington's newest NAP, protects the only known raised bog in the western, contiguous United States.

Two new registry sites were added: SHADOW Lake Nature Preserve and Cheney-Spangle Eyebrow. SHADOW Lake Nature Preserve protects numerous bog associations while the Cheney-Spangle site protects a small remnant of Palouse prairie.

DNR Natural Area Acquisitions

As of June, 2021, a total of 5,340 acres have been acquired and added to 18 of DNR's designated natural areas, bringing total natural area acreage to 166,622. Significant additions include 1,469 acres added to the Chehalis River Surge Plain NAP, 863 acres added to the new Kennedy Creek NRCA, 662 acres added to the new Blanchard Core Natural Resources Conservation Area, and 236 acres added to the new Crowberry Bog Natural Area Preserve (Table 15).

SHADOW Lake Nature Preserve–a recent addition to the Registry Program–protects numerous priority bog ecosystem types.

Table 15. DNR Natural Area Acquisitions Since 2018.

Site	Acres Acquired
Blanchard Core Natural Area (NRCA)	662 acres transferred from DNR trust lands to create a NRCA within a recreation landscape
Bone River NAP	80 acres acquired
Chehalis River Surge Plain NAP	1,469 acres acquired
Cypress Island Natural Area	22 acres of NRCA
Crowberry Bog NAP	236 acres transferred from DNR trust lands and 85 acres acquired
Dabob Bay Natural Area	124 acres of NRCA acquired
Kennedy Creek Natural Area	863 acres of NRCA and 41 acres of NAP acquired
Middle Fork Snoqualmie NRCA	26 acres transferred from DNR trust lands and 53 acres acquired
Mount Si NRCA	289 acres acquired
Naselle Highlands NRCA	290 acres transferred from DNR trust lands
Rattlesnake Mountain Scenic Area (NRCA)	24 acres acquired
Skamokawa Creek NRCA	290 acres transferred from DNR trust lands
Stavis NRCA	52 acres acquired
Steptoe Butte Natural Area	447 acres acquired; designation as NAP/NRCA pending (because the site's designation is pending, it is not included in previous tallies of DNR natural areas)
Stevenson Ridge NRCA	401 acres transferred from DNR trust lands
Washougal Oaks Natural Area	27 acres of NAP and 27 acres of NRCA acquired
West Tiger Mountain NRCA	8 acres acquired
Woodard Bay NRCA	21 acres acquired

DNR Natural Areas Management Activities

DNR Natural Areas Program staff have implemented various management activities such as prescribed burning, invasive species control, hydrological restoration, ecological thinning, and planting native species at numerous natural areas. A few examples include the restoration of shrub steppe habitat at four Natural Area Preserves located in the Columba Plateau, extensive restoration of oak forest and wet prairie ecosystems at Lacamas Natural Area Preserve, and prescribed burning of 70 acres, followed by seeding and planting of native species, to restore prairie habitat at Mima Mounds Natural Area Preserve (Table 16).

Table 16. DNR Natural Area Management Activities Since 2018.

Natural Area	Management Actions.
Mima Mounds NAP	Conducted prescribed burns on 70 acres followed by seeding and planting native species to aid in restoration of prairie ecosystem restoration.
Cattle Point NRCA	Controlled invasive plant species and planted native species, including host plants for Island marble butterfly (*Euchloe ausonides insulanus*).
Dabob Bay NAP/NRCA	Planted several previously impacted acquisition sites and conducted forest thinning combined with native tree species replanting on two parcels.
Woodard Bay NRCA	Planted several previously impacted acquisition sites.
North Bay NAP	Partnered with DNR Aquatic Resources Division staff to conduct extensive knotweed control.
Ink Blot NAP	Planted a variety of tree species at Ink Blot NAP following removal of Scot's broom (*Cytisus scoparius*)
Stavis NRCA	Planted a variety of tree species at Stavis NRCA following removal of Scot's broom (*Cytisus scoparius*)
Shipwreck Point NRCA	Controlled invasive holly (*Ilex aquifolium*) and ivy (*Hedera helix*) throughout the forested upland area.
Lacamas Prairie NAP	Conducted extensive restoration of oak forest and wet prairie habitats, including hydrologic improvements, weed control, and native planting and seeding.
Bone River NAP and Elk River NRCA	Conducted ecological thinning in previously planted forests to create structural and species diversity.
Two Steppe NAP, Methow Rapids NAP, Davis Canyon NAP, and Riverside NAP	Restored 75 acres of shrub steppe habitat that had been previously impacted by wildfire.

DNR Education & Outreach Activities

Natural Heritage Program staff are regularly invited to share their knowledge of rare species and ecosystems to many different organizations. Natural Heritage and Natural Areas Program staff routinely provide presentations to various professional and conservation groups such as Washington Botanical Symposium, Washington Butterfly Association, Invasive Plant Control groups, and Cascadia Prairie-Oak Partnership. Natural Heritage and

Natural Areas Program staff regularly lead field trips to DNR natural areas for a variety of organizations, including Washington Native Plant Society, professional groups and societies (wetland scientists, geologists, etc.), and school groups, ranging from elementary to university. Some of these groups are also authorized to visit certain natural areas, without DNR staff, for educational activities.

Table 17. DNR Natural Area Education Activities Since 2018.

Natural Area	Education Activity
Mima Mounds NAP	Continued a long-standing annual, two-day field class focused on prairie and butterfly habitat restoration with students from the University of Washington--Tacoma Restoration Ecology course.
Kennedy Creek NAP, Woodard Bay NRCA	Led field trips for the South Sound Chapter of the Washington Native Plant Society.
Lacamas Prairie NAP	Working with the Clark County Master Gardeners who are helping collect seed, propagate prairie plants, and plant them. Also provided a presentation to the group about prairie and oak forest restoration methods.
Trout Lake NAP	Continued a partnership with Cascade Mountain School to host 10 days each summer for outdoor learning and service projects at Trout Lake NAP.
Columbia Hills NAP	Continued partnership with Oregon State University Master Naturalist Program to host a grasslands workshop, in which students learn plant identification, characteristics of grassland plant communities, and plant monitoring techniques, as well as contributing service hours at the site.

Research Activities on DNR Natural Areas

Since 2018, the Natural Areas Program has authorized 40 research projects on natural areas, ranging from measurements of thermal tolerance in songbirds, to assessing fire effects on seed predation of a rare plant, to investigating climate change effects on coastal wetlands (Table 18). A number of natural areas were selected as baseline reference standard sites for two recent studies: the National Wetland Condition Assessment conducted by the EPA (https://www.epa.gov/national-aquatic-resource-surveys/nwca) and a global study on grassland diversity and productivity (https://nutnet.org/).

Natural Heritage Program staff completed a multi-year research project at Crowberry Bog Natural Area Preserve with colleagues from Colorado State University. Their research was recently published in the journal *Ecohydrology* and describes the ecological characteristics that make this site of national and continental significance (Rocchio et al. 2021). Natural Heritage Program staff are nearing completion of a multi-year study looking at how surrounding land use may impact the ecological integrity of Puget lowland bogs. This work is being conducted in collaboration with colleagues from Colorado State University and funded with a U.S. EPA Wetland Program Development grant.

Table 18. DNR Natural Area Research Activities Since 2018.

Natural Area	Research Activity
Bald Hill NAP, Cypress Island NAP/NRCA, Elk River NRCA, Bone River NAP	The EPA National Wetland Condition Assessment included several high-quality natural areas as reference standard sites for this recurring 10-year monitoring effort, including Bald Hill NAP, Cypress Island Natural Area, Elk River NRCA, and Bone River NAP.
Columbia Hills NAP, Methow Rapids NAP, Marcellus Shrub-steppe NAP, The Two Steppe NAP, and Camas Meadows NAP	Reference standard sites for a global study on grassland diversity and productivity (https://nutnet.org/).
Crowberry Bog NAP	Natural Heritage Program staff and Colorado State University researcher completed a multi-year study of the hydro-chemical and biological characteristics of this raised bog. Results were published in *Ecohydrology*: https://onlinelibrary.wiley.com/doi/full/10.1002/eco.2287.
Camas Meadows NAP	Natural Areas Program staff and partners, including the U.S. Fish and Wildlife Service, a study assessed levels of seed predation on Wenatchee Mountains checkermallow (*Sidalcea oregana* var. *calva*) at Camas Meadows NAP, as well as the effects of burning in preparation for future prescribed fire treatment.
Kings Lake NAP	This site was included in a research project by Natural Heritage Program staff and Colorado State University researchers studying the effects of adjacent land use on the ecological integrity of bogs.
Lacamas Prairie NAP	Pollinator use of Lacamas Prairie Natural Area was the focus of two graduate student projects.
Columbia Falls NAP, Table Mountain NRCA	A long-term study that has included citizen science surveys assessed pika distribution at Columbia Falls NAP and Table Mountain NRCA in preparation for conservation actions throughout the Columbia River Gorge.

Near-term Actions to Further Advance Natural Area Preserves Act Goals

Natural Heritage Program Data Map Viewer

The Natural Heritage Program was recently awarded a National Estuary Program grant to expand the scope and functionality of their Wetlands of High Conservation map viewer (https://www.dnr.wa.gov/NHPwetlandviewer). The funding is tied to the Puget Sound Partnership's Action Agenda, Habitat Strategic Initiative. This map viewer will be updated to include all species and ecosystems currently tracked in the Natural Heritage Program's Biotics database. The updated map viewer will also include additional layers and functionality to provide users with a more effective and efficient tool to explore and access critical biodiversity information. The map viewer is expected to be live and accessible to the public by December 2022.

Identify Essential Conservation Areas

Essential Conservation Areas (ECAs) are sites that contain rare species and rare and high-quality ecosystems. Identifying *sites* of conservation significance is another way to direct partners to places on the landscape that have biodiversity significance. The Natural Heritage Program is seeking funding to develop a map and database of ECAs for Washington. The end result would be a statewide list of sites of biodiversity significance to guide landscape and site-scale conservation. This information would inform a renewed conservation vision for the state and is necessary to develop priorities to ensure strategic investments are targeted at areas of high biodiversity value.

Using existing Natural Heritage Program data, ECAs will be delineated so that each element occurrence is located within an ECA. Some ECAs may only have a single element occurrence while others may have multiple element occurrences. Based on the conservation status of the elements found within an ECA, a Biodiversity Rank will be assigned to each ECA reflecting the overall conservation significance of the site. Two additional ranks will also be assigned to each ECA: (1) Management Urgency rank and (2) Protection Urgency rank. Together, these three ranks will be used to prioritize where conservation actions are most needed on the landscape in order to protect Washington's most imperiled species and ecosystems. ECAs will also provide an efficient way to identify potential natural areas.

Identify New Natural Area Recommendations

Natural Heritage Program staff will continue to identify potential new natural areas to capture additional representation priorities identified in this Plan. Potential new natural

areas are identified through a variety of resources including project work, input from DNR region staff, site leads from the Natural Heritage Advisory Council, recommendations from land trust partners and colleagues from other state and federal agencies, and input from the public. ECAs would also be a significant resource to help identify new natural areas. As potential sites come to light, Natural Heritage Program staff will assess whether the site supports species and ecosystems with Natural Area Representation Priorities and whether the site is currently in adequate ecological condition. This process also includes coordination with Natural Areas Program staff to determine manageability of the site and other potential obstacles to long-term stewardship.

Natural Areas Management Actions

DNR Natural Areas Program staff will continue to identify and implement management actions needed for DNR natural areas throughout the state. Following are several recently-identified priorities and actions for natural areas management in the near term. Forest health and resilience activities, such as forest thinning, prescribed burning, and invasive species control are planned at five natural areas. Forest restoration and hydrological restoration are planned for Camas Meadows Natural Area Preserve. Grassland restoration and habitat enhancement for two rare invertebrates is planned at Cattle Point NRCA. Forests at two Puget lowland sites, Dabob Bay NRCA and Schumacher Creek NAP, will be restored through thinning, planting, and invasive plant control (Table 19). Unforeseen management needs on natural areas will undoubtedly arise over the next few years. Management response to these needs will be prioritized and implemented as capacity and funding allows.

Table 19. Examples of Planned Management Activities on DNR Natural Areas.

Trout Lake NAP, Monte Cristo NAP, Klickitat Canyon NRCA, White Salmon Oaks NRCA, and Stavis NRCA.	Recently approved funding for DNR forest health and resiliency activities will support site assessments and help implement forest restoration projects such as thinning, prescribed burning, and invasive species control.
Camas Meadows NAP	Planning forest restoration to thin 100 acres, and working in partnership with Chelan County to assess hydrology for meadow restoration.
Cattle Point NRCA	Planned restoration of grassland habitats, including habitat enhancements for the Island marble butterfly and sand verbena moth.
Dabob Bay NRCA and Schumacher Creek NAP	Forest restoration planned, including thinning of young, recently-harvested and planted stands, invasive species control, and tree planting to increase diversity.

DNR's Climate Resilience Plan

In 2020, DNR developed a plan that assessed agency activities to address and respond to climate change. This plan identified priority responses for each program and, at a statewide level, actions needed to achieve climate resilience on DNR managed lands (DNR 2020b). Because the conservation work of both the Natural Heritage Program and Natural Areas Program are integrated throughout the agency's programs and operations, the conservation efforts of these programs were identified as a significant contribution to DNR's goals for achieving climate resilience objectives (DNR 2020b).

To ensure these significant contributions continue, and to address the risks that climate change poses the mission and responsibilities of both the Natural Heritage and Natural Areas Programs, the following strategies and actions associated with program work have been identified:

- assess vulnerability and enhance monitoring of designated natural areas;
- incorporate climate change considerations into designated natural areas site prioritization, selection, and design; and
- fund and implement statewide inventory of rare species and ecosystems.

DNR's Forest Health Plan

Climate change, drought, increasing frequency and severity of fire, invasive species, and development pressure are impacting the health of Washington's forest ecosystems and the well-being of many Washington communities (DNR 2020a). The 2020 Washington Forest Action Plan outlines strategic goals and actions to address these threats at a meaningful scale. Natural Areas Program's forest restoration and management actions on DNR natural areas contribute to many of the forest health and landscape resilience goals identified in the 2020 Washington Forest Action Plan (DNR 2020a).

Education & Outreach

Natural Heritage and Natural Areas Program staff will continue to provide outreach to our external partners and participate in activities that expand awareness and knowledge of Washington natural heritage. Program staff will work with DNR's Education Coordinator to explore opportunities for expanding education activities on DNR natural areas.

Equity and Environmental Justice

DNR's Conservation Programs are committed to ensuring natural areas are managed with equity and environmental justice as a core value. Natural Heritage and Natural Areas Program staff are in the process of identifying actionable items that live up to values ensuring equitable engagement of education, research, and conservation related activities. Staff will work with DNR's Equity Manager to further advance these goals. Progress on these activities will be reported on in the next Natural Heritage Plan.

Research

With support of an U.S. EPA Wetland Program Development grants, Natural Heritage Program staff will be conducting the following research:

- Assigning climate change vulnerability assessment ranks to Washington's wetland ecosystems over the next few years.
- Convening the state's experts on invasive plant species to develop an assessment and ranking of the invasive risk of nonnative plants.
- Testing the ability of the Floristic Quality Assessment indices that the Natural Heritage Program previously developed (Rocchio and Crawford 2013) to track changes in ecological integrity.

With funding support from the U.S. Forest Service and U.S. Fish and Wildlife Service, Natural Heritage staff will also continue to assess climate vulnerability of rare plant species. These research efforts will result in data and ecological assessment tools that will improve the ability of DNR and external partners to conserve, restore, and manage Washington's critical biodiversity elements.

The Natural Areas Program will be partnering on and implementing the following research on DNR natural areas:

- Investigating the hydrology at Camas Meadows NAP to help identify potential actions to restore the natural hydrologic regime (project being conducted in partnership with Chelan County)
- Assessing methods for enhancing habitat for the Island marble butterfly at Cattle Point NRCA (project in partnership with WDFW).
- Monitoring long-term population trends and wildfire response of Whited's milkvetch at Upper Dry Gulch NAP

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Glossary

Biodiversity - Biodiversity refers to the genetic, species, ecosystem, and landscape diversity of a given location. Genetic diversity of a species varies between populations within its geographic range. Species diversity is the number of unique species found in an area. Ecosystem diversity reflects the variety of relationships between species and the ecological template of a region's landscapes. The diversity of landscapes in a region is dictated by the patterns of elevation, geology, soils, and climate of that region.

Coarse filter – One part of a two-component approach to conserving biodiversity which assumes that conserving the full suite of coarse filter targets coarse-scale ecological units provides protection for the majority of species and ecological processes in a given landscape. intended to provide an efficient means of protecting the full suite of species found in a given area. In this Plan, coarse filter targets include U.S. National Vegetation Classification Groups, marine and estuarine aquatic types (Dethier 1990), and freshwater aquatic habitats.

Conservation Status Rank - A ranking system developed and used across the NatureServe and natural heritage program network to a facilitate an assessment of a species' or ecosystem's rarity and degree of imperilment (Master et al. 2012). A number of factors, such as the total population size, range, the number of occurrences, ecological integrity, threats, etc., contribute to the assignment of the ranks. Each species or ecosystem type is assigned a conservation status rank across its entire range (Global or "G" rank) or across its range within a given state or province (Subnational or "S" rank). Infraspecific taxa are also assigned a conservation status rank across their entire range (Trinomial or "T" rank). Conservation status ranks are assigned on a scale of 1 to 5. A rank of G1 indicates a full species or ecosystem that is critically imperiled on a global basis and is at great risk of extinction. A T1 indicates that a subspecies or variety is critically imperiled on a global basis and is at great risk of extinction. S1 indicates critical imperilment within a particular subnational region (in our case, State of Washington), regardless of its status elsewhere.

Ecological integrity - is the structure, composition, function, and connectivity of an ecosystem when occurring within the bounds of natural or historical disturbance regimes.

Ecoregion – A geographic area that has a distinctive composition and pattern of plant and animal species distribution related to the ecoregion's climate, landforms, geology, soils, and hydrological patterns.

Ecosystem – A community of organisms that share the same ecological space on the landscape. An ecosystem is a result of the interactions between biotic (organisms) relationships and abiotic processes and disturbances. The ecosystem concept does not have a fixed scale in its general usage and has been used to characterize areas that vary in size from an individual stand of trees to large landscapes. In part because of this, and in order to better understand the diversity of ecosystems, ecologists have developed various ecosystem classification systems to fit differing objectives. The Natural Heritage Program uses several classification systems for identifying the list of ecosystem types in the state.

Fine filter - part of a two-component approach to conserving biodiversity; Fine filter targets are intended to ensure that rare species and rare ecosystems are not overlooked as part of the coarse filter approach. In this Plan, fine filter targets include rare species and rare U.S. National Vegetation Classification associations.

Invasive species – A non-native plant or animal species considered to cause significant ecological impacts to native species populations and native ecosystems. Invasive species can also economic impact to property owners, farmers and ranchers, people involved in aquaculture and fisheries, and others as a result of reduced yields and the cost of control/eradication efforts.

Natural Area Representation Priority – the Natural Area Representation Priority reflects the and urgency of representing a species or ecosystem target within the statewide system of natural areas. Natural Area Representation Priorities guide the designation of new natural areas, ensuring that efforts are not focused on just a few very rare elements and instead target those most in need of representation. Natural Area Representation Priorities range from Priority 1, Priority 2, Priority 3, and Adequately Represented. Criteria for assigning these priorities varies according to the State Conservation Status of the target and the number of natural areas the target is currently represented within.

Natural heritage program network – the collection of natural heritage programs and conservation data centers found across the United States and Canada.

Natural heritage resources – Natural heritage resources are defined in the Natural Area Preserves Act as "the plant community types, aquatic types, unique geologic types, and special plant and animal species and their critical habitat as defined in the natural heritage plan established under RCW 79.70.030."

NatureServe - NatureServe is non-profit corporation that coordinates methodology, data management, and data products across the natural heritage program network.

State Conservation Status - The State Conservation Status is a distillation of the various combinations of conservation status ranks into four categories: endangered, threatened, sensitive, and no concern. The State Conservation Status is not based on an analysis of the amount of protection needed or currently afforded to each species or ecosystems. Rather, it is a list of those species and ecosystems that are considered endangered, threatened, or sensitive due to rarity and/or imperilment. is intended to guide regulatory decisions, proactive management and conservation actions, and conservation acquisitions outside the bounds of the statewide system of natural areas.

Statewide system of natural areas – The statewide system of natural areas seeks to represent the best remaining examples of Washington's natural heritage to provide critical habitat for rare and vanishing species, conserve representative examples of the state's ecosystems, and ensure the availability of places for scientific research and education. Today, this system consists of lands managed by numerous federal and state agencies, and private conservation organizations.

Appendices

The following appendices are accessible from the Washington Natural Heritage Program's website: https://www.dnr.wa.gov/NHPconservation

Appendix A. Plant Species State Conservation Status

Appendix B. Animal Species Priorities

Appendix C. Ecosystems State Conservation Status

Appendix D. Species Natural Areas Representation Priorities

Appendix E. Ecosystems Natural Areas Representation Priorities

Appendix F. Species and Ecosystems Represented in the Statewide System of Natural Areas

Appendix G. Crosswalk Between 2018 and 2022 Ecosystem Elements

Appendix H. Land Management Designations

Appendix I. Applicable Laws and Regulations