



Research and Monitoring Strategy

.....
For the Olympic Experimental State Forest
.....

Draft August 2009



WASHINGTON STATE DEPARTMENT OF
Natural Resources

Acknowledgements

Principal Author

Mark Teply

former OESF Research and Monitoring Manager at DNR

Principle Contributors

Scott Horton

Weikko Jaross

David Christiansen

Richard Bigley

James Hotvedt

Teodora Minkova

Contributors and Reviewers

Washington State Department of Natural Resources thanks the following organizations, the members of which have provided substantive input during the development of this document and insightful reviews on earlier drafts:

National Oceanic and Atmospheric Administration Fisheries

USDA Forest Service Pacific Northwest Research Station

North Olympic Timber Action Committee

USDI Fish and Wildlife Services

Olympic National Park

Olympic National Forest

Olympic Forest Coalition

Conservation Northwest

Rayonier Inc.

Green Crow

American Forest Resource Council

City of Forks

Clallam County

Jefferson County

Makah Tribe

Hoh Tribe

Lower Elwha Clallam Tribe

Quileute Tribe

Quinault Indian Nation

University of Washington

Washington State University

University of British Columbia

The Evergreen State College

Peninsula College

The Department acknowledges the effort of agency staff of the Olympic Region and Divisions for their reviews and comments on drafts of this document.

Technical Editor

Jane Chavey

Cover Photo Credits (left to right clockwise):

Steve Curry; Peter Harrison (photos 2-4)

Suggested Citation

Teply, M. 2009. Research and Monitoring Strategy for the Olympic Experimental State Forest. Draft. WADNR, Olympia, Washington.

All contributors are DNR staff unless otherwise indicated.

Copies of this document may be obtained from DNR website www.dnr.wa.gov

Research and Monitoring Strategy

.....
For the Olympic Experimental State Forest
.....

Draft August 2009

Prepared by
Land Management Division



WASHINGTON STATE DEPARTMENT OF
Natural Resources



United States Department of Commerce
National Oceanic and Atmospheric Administration
National Marine Fisheries Service
United States Department of the Interior
Fish and Wildlife Service



National Marine Fisheries Service
510 Desmond Drive SE, Suite 103
Lacey, Washington 98503

U.S. Fish and Wildlife Service
510 Desmond Drive S.E., Suite 102
Lacey, Washington 98503

July 21, 2009

Tami Miketa
Ecosystem Services Manager
Land Management Division
Washington Department of Natural Resources
PO Box 47014
Olympia, WA 98504-7000

Dear Ms. Miketa,

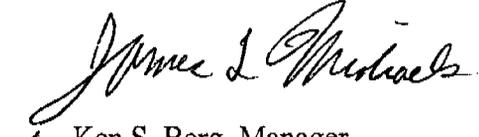
Thank you for the recently drafted Research and Monitoring Plan for the Olympic Experimental State Forest (OESF). When our agencies signed the Habitat Conservation Plan (HCP) for State Trust Lands in 1997, the HCP highlighted the OESF as the location where conservation, production, research and monitoring would be combined with innovative silvicultural techniques, communication and education in a unified effort. One of the objectives of the OESF is that "DNR will acquire knowledge to enhance trust land management through active monitoring, a targeted research effort, and the promotion of cooperative research projects." But the OESF was also recognized to have broader research objectives than just the HCP, and since the HCP was signed, DNR has continued to make the OESF the focus for experimentation.

In the interest of coordinating with the Services, DNR is now seeking our support for the OESF Research and Monitoring Plan. Yes, the Services indeed support this Plan, which was implicit in the HCP and which provides strategic guidance for research and monitoring activities in the OESF. DNR developed this document in consultation with our two agencies, as well as research institutions, local and tribal governments, and other stakeholders. The plan synthesizes the research and monitoring commitments in the HCP and identifies priorities, near-term goals, potential projects, and current and future partners. We agree the HCP will benefit as DNR follows through on the Research and Monitoring Plan for the OESF.

Please continue to coordinate with our respective staff, Matt Longenbaugh (National Marine Fisheries Service), and Mark Ostwald (United States Fish & Wildlife Service).

Sincerely


Steven W. Landino
Washington State Director
For Habitat Conservation


Ken S. Berg, Manager
Washington Fish and Wildlife Office
U.S. Fish and Wildlife Services

Contents

	Page
Introduction	1
Background	2
Landscapes	5
Areas of Management Uncertainty	6
Projects	9
Priorities	13
Goal for the Next Five Years	13
Adaptive Management	14
Relationship to Forest Land Planning	16
Management and Coordination	17
Contact	17
References	18

DRAFT

Olympic Experimental State Forest Research and Monitoring Strategy

Introduction

The Olympic Experimental State Forest (OESF) is part of the state’s trust lands, managed by the Washington State Department of Natural Resources (DNR) as a sustainable commercial forest to provide funding—mostly for the counties’ public services and state’s public schools and universities. The ecological health and diversity of these forests is maintained through innovative integration of forest production activities with habitat conservation. Establishment of the OESF was recommended by the *Commission on Old Growth Alternatives for Washington’s Forest Trust Lands* in 1989. Of the 1.8 million acres of forested state trust lands managed by the DNR statewide, the OESF is unique. DNR’s vision for the OESF is for it to be the focal point for experimentation. It was created as a place where DNR, universities, and other research organizations can test ideas and learn about the effects of natural and human-caused changes on the forests—and about alternative ways of growing, managing, and harvesting trees that support healthy habitat and commercial gain.

This Research and Monitoring Strategy provides strategic guidance for information gathering activities in the OESF. As discussed later in this document, it will be integrated with the OESF Forest Land Plan process, and refined and expanded as direction evolves in that plan. The document was prepared in consultation with research institutions, federal and state agencies, local and tribal governments, and other stakeholders interested in the OESF. It largely synthesizes guidance originally laid out by a 1997 trust lands *Habitat Conservation Plan* (HCP) agreement (DNR 1997), described in greater detail below. It reflects the on-going vision of the OESF, held by many, as a center for sustainable forest research. Topics, priorities, and goals are developed, providing focus for development of research and monitoring projects by DNR and its research partners.

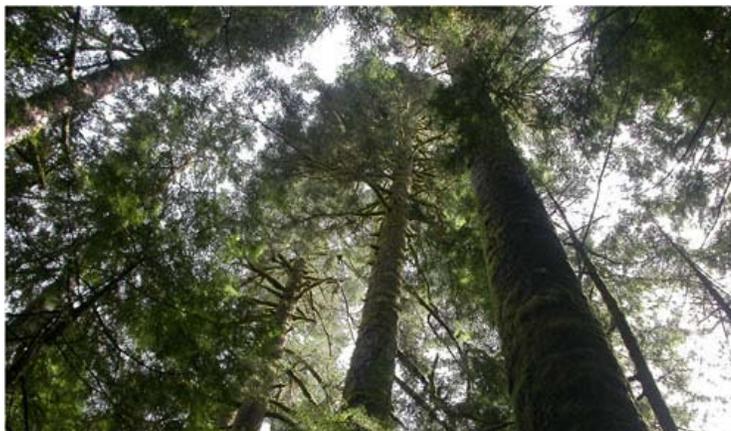


Photo: DNR/ Sabra Hull

Background

The DNR was established in 1957 with the consolidation of several state agencies, boards, and commissions and serves, in part, as the manager of state trust lands. In addition to forested state trust lands, there are trust lands in agriculture and grazing production, and some commercial properties. DNR also is steward of the state's aquatic lands and natural areas. All together, DNR cares for 5.6 million acres of state-owned lands.

DRAFT

DNR also administers several regulatory programs that protect the public's natural resources such as water quality and quantity, slope stability and soils. DNR also acts as the state's principle wildfire control agency.

The agency is led by the Commissioner of Public Lands, a statewide-elected official.

Policy and broad land management guidance is provided by the Board of Natural Resources, made up of representatives from the trust beneficiaries—Governor (or a designated representative), Washington's land grant universities, the Superintendent of Public Instruction, a representative from the state forest trust counties, and the Commissioner of Public Lands, who generally serves as chair.

The 3 million acres of state trust lands that DNR manages provide substantial revenue to specific trust beneficiaries (the trusts) to benefit the people of Washington. State trust lands help fund construction of Washington's public schools, universities, prisons and state office buildings. Other state trust lands help fund county public services such as fire departments, libraries, and hospitals in the counties in which the lands are located, and contribute to the state general fund, earmarked for education.

State trust lands also provide clean water, wildlife habitat, jobs, commodities, and myriad recreational opportunities.

The OESF, and its experimental mission, are rooted in the 1989 recommendations made by the *Commission on Old Growth Alternatives for Washington's Forest Trust Lands (1989, p.1-2)*:

The purpose of creating an experimental forest on Department of Natural Resources trust lands in the Olympic Region is to produce a level of timber harvest comparable with contemporary forest practices and simultaneously provide for ecological values. The intent of this recommendation is to recognize that the Department of Natural Resources lands are a commercial forest within which there is special opportunity to experiment with harvest techniques. These techniques are intended to enhance habitat characteristics and commodities production and to provide opportunities for research into forest harvest and habitat management.

This recommendation has provided the vision for management of the OESF. The OESF is treated as a unique planning unit in DNR's multispecies HCP for management of forested state trust lands (DNR 1997). This agreement, signed with the U.S. Fish and Wildlife Service and National Oceanic and Atmospheric Administration, serves several purposes for DNR. It allowed DNR to develop a forward-looking strategy to protect habitat for species listed by the federal services as at some level of danger of extinction, while meeting the financial obligations to the trusts. It ensures that DNR will mitigate the

DRAFT

effects of ‘take’ – that is, harming a listed animal or its habitat. The OESF is included as a separate planning unit in order to fulfill one of the stated purposes of the HCP (p. I.15):

To enable DNR to conduct management and research opportunities within the OESF in areas currently occupied by listed species in order to build knowledge relevant to trust management obligations and species conservation. There are three components to this experiment: a) habitat conservation strategies based on an experimental concept of an “unzoned” forest, that is, a forest without areas deferred from timber management; b) a commitment to research, monitoring, and information sharing as the basis for experimental management; and, c) creation of a process for integrating intentional learning with management decision making and course adjustments.

The OESF is also guided by DNR’s 2006 *Policy for Sustainable Forests* “to conserve and enhance natural systems and resources of forested state trust lands managed by DNR to produce long-term, sustainable trust income, and environmental and other benefits for the people of Washington” (DNR 2006). The document, approved by the Board of Natural Resources, guides broad policies regarding the state trust lands and state-owned aquatic lands managed by DNR. The *Policy for Sustainable Forests* recognizes the role of the OESF in shaping DNR forest policies:

Through the OESF, DNR actively questions its knowledge about the relationships between forest ecosystem functions and forest management activities. DNR explores these questions through monitoring and research and sharing knowledge with and seeking insights from other professionals and publics. As the research provides new information, management activities will be adapted accordingly. Ultimately, what is learned in the OESF can be applied, where appropriate, to other DNR-managed forested trust lands.

In fulfilling these visions, “the goal of maintaining an unzoned forest will guide management activities and research.” (DNR 1997, p. IV.81) Through an unzoned approach, DNR intends to achieve the integration of commodity production and habitat conservation across the OESF landscape. Integration is achieved through stand- or site-level management to accomplish landscape-level objectives. All management options are available to all acres. Activities are selected through evaluation of the physical and biological potential of sites relative to the competing and complementary landscape-level objectives, such as habitat conservation and commodity production. Under DNR’s vision for OESF as an unzoned forest, no areas are pre-designated as off-limits to active management, although an outcome of the unzoned approach may be selection of passive management to achieve multiple objectives. An over-riding principle of the unzoned approach is that multiple objectives can and will be met within any acre. These experimental concepts have guided development of this OESF Research and Monitoring Strategy.

Overall, the OESF provides a unique opportunity to conduct experimentation, at a scale rarely matched, that supports sustainable forest management. Results will have benefits beyond the OESF. Through implementation of this strategy, DNR seeks to fulfill the on-going and widely-held vision for the OESF as an experimental forest.

DRAI

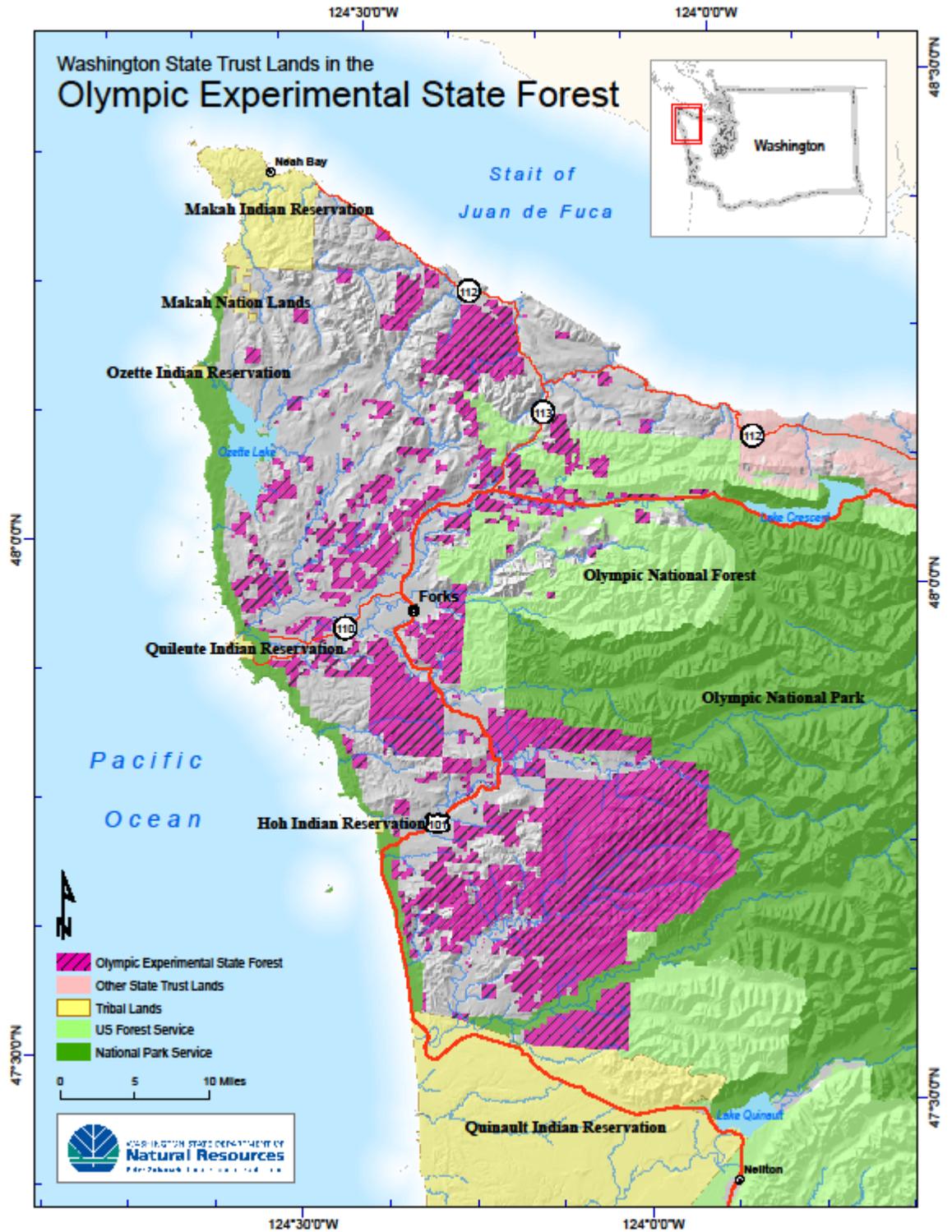


Figure 1. Map of the Olympic Experimental State Forest

DRAFT

Landscapes

The OESF covers about 264,000 acres of DNR-managed forested state trust lands in western Clallam and Jefferson counties on Washington's Olympic Peninsula (Figure 1). The precipitation in western Olympic Peninsula averages 140 inches per year and some locations receive more than 200 inches per year. Several major coastal river systems drain watersheds in the OESF, with associated forested wetlands and riparian areas. Steep, erodible terrain and the heavy annual precipitation promote relatively high stream densities. Watersheds are largely rain-dominated and streams exhibit seasonal fluctuations in flow. Streams crossing state trust lands here are mostly lower order and most have the potential for unstable channel banks and upslope mass-wasting.

DNR-managed lands in the OESF are generally within the western hemlock zone. In Washington, western hemlock tends to be the climax species where climate is mild and wet. Douglas-fir climaxes are limited to drier, fire-prone sites. Western redcedar climaxes can be found in wetter areas. DNR-managed lands are also in the Sitka spruce zone along the coast and extending inland up river valleys. The Pacific silver fir zone extends from about 2,000 to 4,000 feet in elevation, between the hemlock zone and the subalpine forest. Douglas-fir is a seral component in all zones; red alder is a seral component in lower elevations.

Periodic, high-intensity wind storms combine with numerous factors to influence stand structure and pattern across the OESF. Episodic mass-wasting and flood events are evident influencing vegetation patterns, especially along stream networks. Naturally occurring wildland fire is infrequent and typically of low severity. Harvest activities prior to the HCP led to an age-class distribution currently predominated by younger, second-growth forests. Most of the OESF is accessible by an extensive road network.



Photo: DNR/ Scott Horton

Areas of Management Uncertainty

As is the case with many forest ownerships, portions of DNR-managed forested state trust lands on the OESF currently are not considered for active forest management—they are treated as if they were “zoned,” or options being considered for management are limited. This situation exists for several reasons, but uncertainty is a major factor.

Generally, uncertainty is derived from the incomplete knowledge and understanding of a system; be it ecological, economic, or social. The consequence of uncertainty in the OESF is a lack of confidence in applying forest management to achieve the conservation objectives expressed in the HCP. Reducing such uncertainty, especially that about achieving an unzoned forest, provides focus for research and monitoring on the OESF. Several distinct areas of uncertainty, that currently affect management decisions in the OESF, provide near- and long-term focus. The figure below presents these areas of uncertainty as percentage break-down of OESF acreage¹:

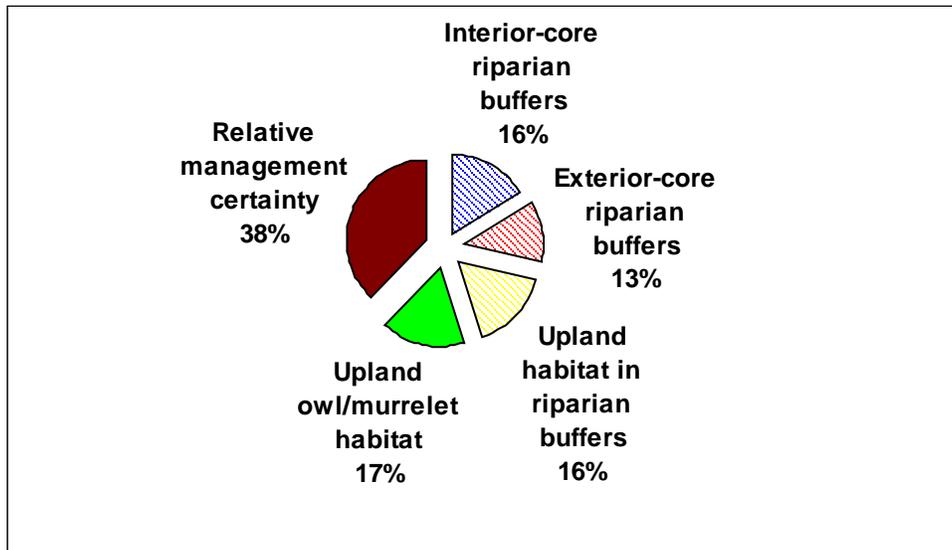


Figure 2. Key areas of management uncertainty as a percent of OESF area

These areas of uncertainty are discussed below. They reflect research and monitoring topics as articulated in the HCP; however, this breakdown provides helpful context. In the near-term, the allocation shown on the pie chart could be affected by the marbled murrelet long-term conservation strategy (in development) and the OESF Forest Land Plan (also in development). In the long-term, this allocation could be affected by stand development in these areas and its contribution to developing old-forest habitat attributes. And, of course, this allocation could be affected by knowledge gained through research and monitoring helping to reduce management uncertainty (i.e., adaptive management). The net effect is undetermined and over time these allocations need to be reassessed.

- ***Interior-core Riparian Buffers*** – About one-quarter of the OESF is managed within interior-core riparian buffers—buffers that are immediately adjacent to the stream—

¹ Preliminary estimate from OESF Forest Land Planning Large Data Overlay v20090203; percentages exclude approximately 3 percent of DNR-managed lands treated as non-forested (e.g., roads).

DRAFT

intended to minimize disturbance of unstable channel banks and adjacent hillslopes. Most of these buffers contain younger, second-growth stands. Interior-core buffers can be actively managed through the HCP conservation strategies, however, these buffers are generally not considered for active management. DNR considers that operational and environmental concerns regarding streamside management on unstable slopes are acute. Nevertheless, interior-core riparian buffers have the potential to contribute to commodity production and conservation objectives. Key uncertainties that could be addressed via research and monitoring include:

- Stand- and landscape-level characteristics of forest cover required for maintenance and restoration of riparian habitat complexity;
- Effectiveness of current management practices in interior-core buffers in helping to achieve riparian conservation objectives such as maintaining and aiding restoration of the physical integrity of stream channels and floodplains; and,
- Use of active management in interior-core buffers to achieve commodity production and riparian habitat complexity.

To “unzone” interior-core riparian buffers would mean to move away from current “one-size-fits-all” buffers and towards buffers tailored to the unique characteristics of each stream. This could happen only after the uncertainty about the effects of such approach is sufficiently reduced. The key concerns include: 1) determining how to harvest timber near a stream while aiding restoration and maintenance of its riparian functions such as stream bank integrity, shade, and large woody debris, and 2) determining how to harvest on slopes with high mass wasting potential without triggering landslides that adversely effect riparian and aquatic habitat.

- ***Exterior Riparian Buffers*** – About one-fifth of the OESF is managed within fixed-width exterior buffers that are intended to protect the integrity of interior-core riparian buffers from damaging winds. Most of these buffers contain younger, second-growth stands. Exterior buffers also have the potential to contribute to commodity production and multiple habitat conservation objectives. Whereas exterior buffers can be actively managed through the HCP conservation strategies, currently these lands are generally not considered for active management. Several reasons account for this (e.g., poor timber markets and operational feasibility), but uncertainty about use of forest management to achieve conservation objectives is a recurring issue. Uncertainties that might be addressed through research and monitoring include:
 - Stand- and landscape-level characteristics of forest cover required for maintenance and restoration of riparian habitat complexity;
 - Effectiveness of current management practices in exterior buffers to help achieve riparian conservation objectives such as protecting the integrity of interior-core buffers from damaging winds and helping to moderate riparian climate; and,
 - Use of active management in exterior buffers to achieve commodity production and riparian habitat complexity.

To “unzone” exterior buffers, key concerns include: 1) determining the extend and location of exterior buffers needed to protect interior core integrity and aid restoration and maintenance of riparian function, and 2) determining how to harvest timber in these exterior buffers without increasing vulnerability to windthrow that compromises the integrity of the buffers.

DRAFT

- ***Upland Owl/Murrelet Habitat*** – About one-quarter of the OESF is managed as habitat that meets conservation objectives for northern spotted owl and/or marbled murrelet. Most of these are older stands and most are associated with riparian buffers (those characterized above). Lands currently managed for spotted owl habitat can be actively maintained following the HCP conservation strategies, but these lands are generally not considered for active management. One of the many reasons for this is the short-term deferrals through a Settlement Agreement (*WEC v. Sutherland*). However, through careful selection of management activities these lands can contribute to sustainable harvest levels and habitat conservation goals. Key uncertainties that could be addressed via research and monitoring include:
 - Stand- and landscape-level characteristics of forest cover required for occupancy and survival of territorial spotted owls;
 - Stand- and landscape-level characteristics of forest cover required for occupancy and reproductive success of marbled murrelet;
 - Effectiveness of current management practices in achieving northern spotted owl and marbled murrelet conservation objectives; and,
 - Use of active management in upland habitat to achieve commodity production while meeting owl and murrelet conservation objectives.

To “unzone” upland habitat, a key concern is determining how to harvest timber in spotted owl and marbled murrelet habitat while maintaining the occupancy, survival, and reproductive success of these species. A very deliberate approach will be taken when designating research and monitoring projects in these areas.

- ***Relative Management Certainty*** – Currently, about two-fifths of the OESF is explicitly considered for active management. These “unzoned” forest lands lie outside of riparian areas and outside areas managed for northern spotted owl and/or marbled murrelet habitat (categories described above). These lands are the primary contributor to sustainable harvest levels for forested state trust lands in the OESF. Most stands in this category are less than 50-years old and as they grow, some will eventually contribute to restoring northern spotted owl habitat target levels. Though treated as if they were “unzoned”, several key management uncertainties exist that could be addressed through research and monitoring:
 - Stand- and landscape-level characteristics of forest cover required for occupancy and survival of territorial spotted owls;
 - Effectiveness of current management practices in achieving northern spotted owl habitat conservation objectives; and,
 - Silvicultural techniques employed to accelerate the development of stand- and landscape-level forest cover characteristics.

To continue operating in an “unzoned” manner, a key concern is demonstrating how timber harvest can occur while restoring spotted owl habitat.

Though characterized individually, multiple uncertainties are inevitably encountered in operations throughout the landscape. Based on the break-down presented above, about 60 percent of DNR-managed lands generally are not currently considered for active management for one or more reasons. Relative proportions vary slightly across the OESF, but their distribution is fairly uniform at multiple scales. As a consequence, the research and monitoring topics characterized above are practically considered in combination. This determines the need for integrated research and monitoring projects.

DRAFT

Projects

The Washington State Department of Natural Resources will encourage, facilitate, and, in some cases, conduct research and monitoring that can address the topics identified above. We welcome all ideas and will make every effort to accommodate research projects, if they are compatible with ongoing research efforts and our forest operations capacity.

In preparing this research and monitoring framework, DNR identified many research and monitoring projects that could help address key management uncertainties in the OESF. They are presented here to provide background about the types of projects that can help us accomplish OESF objectives.

Research projects with on-the-ground operational components will be implemented in concert with and through implementation of the Olympic Experimental State Forest Land Plan.

SHORT-TERM STUDIES

In the near term, DNR has identified several projects that take advantage of information already gathered and/or readily observed:

- ***Syntheses of Existing Research*** – Syntheses are a low cost, effective means to address many key management uncertainties. They also provide a platform for advancing several research topics. There are three desired outcomes:
 - **Research Syntheses** – in-depth analyses of management implications suggested within available research and monitoring for each research topic. More than a literature review, research syntheses help identify potential management strategies that can help us achieve our conservation objectives, and they highlight critical uncertainties that remain.
 - **Management Fact Sheets** – succinct summaries of relevant information presented in each synthesis and a starting point for the reader to drill down to obtain increasingly detailed information related to each topic.
 - **Indexed Bibliographies** – listings that allow managers to seek more information, and review fundamental research underlying each synthesis.

As funding allows, DNR will engage external research partners in conducting syntheses at DNR's direction. To the extent possible, DNR will employ a team approach, led by DNR experts, with reports subject to blind review. Several syntheses have already been developed by other organizations and could provide credible starting points for several research and monitoring projects.

- ***Retrospective Effectiveness Monitoring*** – Forest management implemented under the trust lands HCP provides an opportunity to evaluate the effectiveness of past practices in achieving conservation objectives. Credible opportunities exist to monitor the effects of passive and active management on:
 - **Forest Cover** – evaluation of stand- and landscape-level habitat changes over time across the OESF. Several data sources exist (e.g., stand inventories, aerial photos) that support coarse-resolution estimates.
 - **Hillslope Integrity** – evaluation of mass-wasting that has occurred within riparian buffers across the OESF. The OESF aerial photo record supports coarse-resolution observation that can be augmented by field observation.

- **Riparian Integrity** – evaluation of windthrow damage that has occurred in riparian buffers across the OESF. The OESF aerial photo record supports coarse-resolution observation that can be augmented by field observation.

As funding allows, pilot studies will be conducted to vet data and methods and to evaluate sampling efficiencies. Use of available information will be emphasized. From these pilots, comprehensive sample designs can be developed.

DRAFT

- **Habitat Relationships** – Several credible near-term opportunities exist to increase our understanding of stand- and landscape-level characteristics of forest cover required for functional support of the species we intend to benefit:
 - **Northern Spotted Owl Habitat** – characteristics informed by existing information (DNR owl surveys and/or Forest Service/Park Service demography surveys) augmented by field observation.
 - **Riparian Habitat** – characteristics informed by field observation in selected watersheds on state and federal lands that have a limited management footprint, augmented by past research and monitoring.
 - **Marbled Murrelet Habitat** – characteristics informed by ongoing studies being conducted cooperatively—by DNR and other state and Federal agencies—throughout the range of the marbled murrelet.

These studies are limited in that they do not document the functional response of a species to management or habitat change (i.e. they do not demonstrate cause-and-effect relationship). However, they provide an empirical basis for improving hypotheses about the conditions we seek to provide. DNR seeks to engage external research partners to conduct these studies.

- **Re-measurement of Existing Installations** – Several opportunities exist to use ongoing research to address several of our key management uncertainties. Those that address use of silviculture to accelerate restoration of habitat include:
 - **Young-Stand Thinning Trials** – installations in the OESF evaluating tree and stand responses to pre-commercial thinning techniques.
 - **Young-Stand Spacing Trials** – installations in the OESF evaluating tree and stand responses to pre-commercial thinning densities.
 - **Olympic Habitat Development Studies** – installations in the Olympic National Forest evaluating variable density thinning approaches.
 - **Rainey Ridge Habitat Development Study** – installation in the Olympic National Forest evaluating variable density thinning.

Those that evaluate the effectiveness of management in exterior buffers include:

- **Riparian Silviculture Monitoring** – installations at two locations in the OESF evaluating the effectiveness of silvicultural practices implemented through DNR's Riparian Forest Restoration Strategy.
- **Hardwood Conversion Monitoring** – installation at one location in the OESF evaluating the effectiveness of hardwood conversion practices (converting stands with predominantly deciduous species into stands with predominantly conifer species).
- **Riparian Integrity Monitoring** – installations at multiple locations in the OESF evaluating the integrity of riparian forest buffers to windthrow.

DRAFT

These installations provide direct observations of habitat change. Unlike retrospective studies, these installations enable observation at a finer resolution. Unlike prospective studies, these studies enable observation of change today, not in five or ten years or more. As funding allows, DNR will support on-going efforts and focus their studies on DNR's key management uncertainties.

LONG-TERM STUDIES

In the long-term, DNR has identified several studies that seek to a) evaluate current practices, and b) develop and test new ways to achieve our conservation objectives:

- **Stand-level Monitoring** – Many key management uncertainties are meaningfully addressed through monitoring of stand-level management activities:
 - **Demonstration Projects** – pursuant to *WEC v. Sutherland*, testing ‘biodiversity pathways’ principles as described by Carey et al. (1996), evaluating the application of different scales of opening, scale of variation, and overstory retention to accelerate the development of northern spotted owl habitat in younger stands.
 - **Experimental Approach** – pursuant to the riparian conservation strategy, evaluating the effectiveness of current management and a number of viable silvicultural alternatives for exterior riparian buffer management.
 - **Unstable Slope Management** – pursuant to the riparian conservation strategy for interior-core riparian buffers, evaluating the ability to harvest timber on potentially unstable slopes without triggering landslides that cause adverse effects to riparian and aquatic habitat.
 - **Upland Habitat Management** – pursuant to the spotted owl conservation strategy, taking advantage of opportunities to learn new silvicultural techniques that maintain and enhance old-forest ecosystem functions.

DNR seeks to employ experimental design principles to evaluate the effects of current practices *and* experimental treatments. These studies would achieve HCP effectiveness monitoring objectives for the OESF (see HCP p. V.1-5).

- **Landscape-Level Monitoring** – When identifying stand-level monitoring projects, DNR recognizes the limitations of these studies in addressing key management uncertainties. Most often, multiple uncertainties are encountered when planning and implementing forest management activities. Tensions and conflicts—ecological, economic, and social—arise that can't be addressed at the stand level. DNR also recognizes that the patterns and processes that affect habitat—and the functional response of the species—operate over a larger area. Resolution to key management uncertainties therefore requires investigations of holistic approaches that only can be conducted at a larger scale.

To accomplish this, DNR seeks to build the organizational capacity, information systems, and level of understanding needed to design, implement and test credible landscape-level solutions. In doing so, DNR would be achieving HCP validation monitoring objectives for the OESF (see HCP p. V.1-5). Three phases are critical:

- **Scoping** – DNR and the Federal Services currently are engaged in a deliberate process to identify a set of meaningful hypotheses addressing key management

uncertainties, and to locate candidate landscapes where we can test the hypotheses at an appropriate scale. This effort will provide guidance for collaboration and pilot implementation.

DRAFT

- **Collaboration** – DNR has entered into a Memorandum of Understanding with the University of Washington, Pacific Northwest Research Station, and Olympic National Forest and has formed the Olympic Forest Research Cooperative whose focus is to pursue these landscape experiments. DNR sees that long-term collaboration with this group and other stakeholders will be essential to a successful program.
- **Pilot Projects** – Landscape monitoring is a large, complex undertaking requiring long-term commitment. DNR seeks to enjoin these projects incrementally and, at first, on a pilot landscape basis. Within landscapes identified through scoping, DNR will seek to work with its partners to test credible landscape-level solutions to our key management uncertainties.

As capacity and confidence grows, additional landscapes would be considered. At first, however, DNR will focus on developing a meaningful pilot project.

In total, these projects represent a robust program of experimentation that helps DNR address key management uncertainties articulated in the trust lands HCP. In doing so, DNR also would support investigation of other research and monitoring topics not directly mentioned in the HCP—e.g., climate change and biomass projects. Overall, these projects help DNR accomplish the OESF’s experimental mission.

Work has already begun on some of the short-term and long-term studies. For example, under syntheses of existing research, the Pacific Northwest Research Station is developing a synthesis of existing research on riparian processes and functions, focusing on extent and characteristics of interior and exterior buffers. Also under syntheses of existing research, a catalog of more than 1,000 research and monitoring citations that relate to the OESF have been compiled and posted on DNR website. Under re-measurement of existing installations on the OESF, installations of young-stand spacing trials evaluating tree and stand responses to pre-commercial thinning densities, including gaps, currently are being re-measured 10 years after treatment. Under demonstration projects pursuant to WEC v. Sutherland, research scoping papers are being prepared for discussion with Settlement Partners. Finally, under landscape-level monitoring, three internal workshops with the Federal Services have focused on scale, indicators, and possibilities for integration of northern spotted owl, murrelet, and salmonid validation monitoring, including criteria for selecting locations.



Photo: DNR/ Peter Harrison

Priorities

DRAFT

At this time, DNR does not have the organizational capacity nor the funding to conduct all of the projects outlined above. Nevertheless, DNR wants to identify potential short-term and long-term projects to inform partners and interested public. In part, partnerships can be relied upon to achieve our objectives. But DNR also must prioritize efforts to assure efficient use of limited resources. For guidance, we look to the HCP for a) expectations for the effectiveness and validation monitoring programs, and b) criteria used to prioritize research topics (see HCP p. V.3-6):

- **Priority 1** – Research that is necessary as part of a conservation strategy. DNR recognizes the interim nature of a short-term approach and has delayed management actions until new information is obtained.
- **Priority 2** – Research that is needed to assess or improve conservation strategies that are currently in place. And, research that is needed to increase management options for lands managed pursuant to the HCP.
- **Priority 3** – Research that is needed to improve the general understanding of animals, habitats, and ecosystems addressed by the HCP.

Many of the research topics outlined above are prioritized in the HCP according to these criteria (see HCP p. V.6-8). This prioritization was based on a qualitative understanding of the relative area affected by management uncertainty. The break-down presented above refines this understanding and our current priorities for research and monitoring.

Currently, DNR's priorities for research and monitoring in the OESF are a) exterior riparian buffer management; b) silvicultural approaches to accelerating development of older forest habitat; and c) experimentation with holistic, landscape approaches to management. Given acute environmental and operational concerns, research and monitoring of management on unstable slopes in interior core riparian buffers and active management in spotted owl and marbled murrelet habitat are relatively lower priority. However, over time these remain important topics to pursue in achieving the goal of an unzoned forest.

Goals for the Next Five Years

Over the next five years (through FY 2014), DNR seeks to initiate the following short-term and long-term projects, consistent with priorities and as resources are available.

- **Syntheses of Existing Research** – to provide in-depth analysis of the management implications and remaining uncertainties suggested by available research and monitoring. Considerable research and monitoring has been conducted that is directly relevant to the OESF. By examining completed studies, syntheses are an expedient and relatively inexpensive means to gain understanding that can be incorporated into research and management of the OESF. They also are a critical step in developing each of the research and monitoring projects discussed below.
- **Habitat Characterizations** – to increase understanding of stand- and landscape-level forest cover characteristics required to provide support for the species we intend to benefit. Several credible opportunities exist to use existing or readily acquired data to

provide an empirical basis for improving hypotheses about the conditions we seek to restore and maintain. Outcomes of these studies will have implications for further research and monitoring as well as for management of the OESF.

- ***Landscape Validation Monitoring Pilot Project*** – to evaluate cause-and-effect relationship between habitat created by implementation of the conservation strategies and the species these strategies intend to benefit. This is a monitoring commitment under the HCP, achievable only at a landscape scale. Through a pilot project we seek to evaluate efficiencies of multiple scales of monitoring and to document how relationships vary spatially and temporally. Information gained will provide feedback to management of the OESF, as well as provide guidance for design and implementation of future monitoring.
- ***Riparian Buffer Effectiveness Monitoring*** – to determine where exterior riparian wind buffers are needed to protect interior-core riparian buffer integrity, to provide riparian function, and to determine how to harvest timber without causing adverse effects. Several retrospective monitoring opportunities are identified above, as are several re-measurement opportunities. DNR is seeking to initiate prospective monitoring via the “Experimental Approach” (outlined in the HCP on p. IV-117), evaluating the effectiveness of current management and a number of viable silvicultural alternatives for exterior riparian buffer management. This project will help DNR meet effectiveness monitoring commitments in the HCP.
- ***Upland Habitat Effectiveness Monitoring*** – to demonstrate how timber harvest can occur in young stands to accelerate the development of older-forest habitat attributes. Several retrospective monitoring opportunities are identified above, as are several re-measurement opportunities. DNR also is seeking to initiate prospective monitoring via the “Demonstration Projects” (pursuant to *WEC v. Sutherland*) that test ‘biodiversity pathways’ principles, evaluating the application of different scales of opening, scale of variation, and overstory retention to accelerate the development of northern spotted owl habitat in younger stands. This project will help DNR meet effectiveness monitoring commitments in the HCP.

DNR looks forward to using existing capacity and engaging external research partners in developing and implementing projects that help us address these near-term goals.

Adaptive Management

The HCP outlines a focused approach to intentional learning – the Systematic Application of Knowledge Gained – that is described in the HCP (DNR 1997, p. IV.84) as:

... a program of experiments that can, over the course of the planning horizon, identify or verify potential avenues for successfully meeting targets for commodity production and ecosystem conservation within the unzoned forest context. The assumptions and hypotheses will be tested through implementation, intentional testing and learning, and making adjustments as activities are conducted and feedback loops provide new information.

This management process provides the basis for Adaptive Management on the OESF. In the adaptive management framework, research and monitoring are folded into a structured process of forest land management decision making and course adjustments

over time. The framework can be illustrated by the following diagram used in the U.S. Department of Interior Adaptive Management Technical Guide (2007):

DRAFT

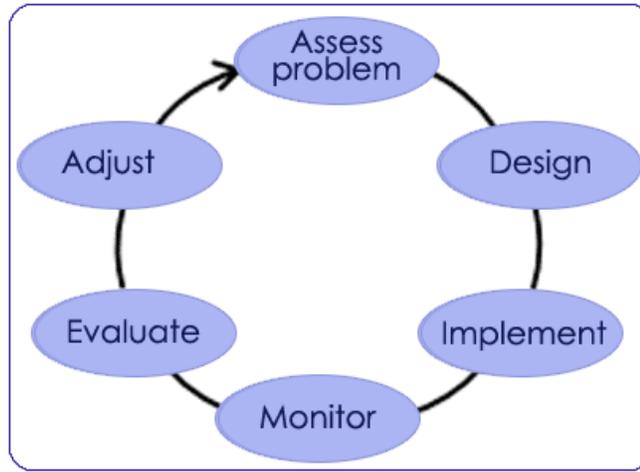


Figure 3. Diagram of Adaptive Management

The OESF Research and Monitoring Program supports the Adaptive Management process via following:

Syntheses of Science Findings are a key step in integrating intentional learning with management decision making. Syntheses provide a basis for identifying potential avenues for successfully meeting the conservation objectives. Syntheses also provide feedback from on-going activities, and provide a basis for verifying assumptions underlying the conservation strategies and for making course corrections.

Landscape Planning and Operations provide the primary mechanism for defining programs of experimentation and their evaluation via forest management activities. Within our framework, this embraces the notion that management of the OESF is the experiment. The Research and Monitoring program in turn supports development of the OESF Forest Land Plan through on-going syntheses of science findings. As the Research and Monitoring Program matures, DNR anticipates using future syntheses to inform subsequent Landscape Planning and Operations.

Research and Monitoring provide the basis for testing assumptions underlying the conservation strategies and developing and testing refined approaches to meeting conservation objectives. Research and monitoring also provide the basis for adjustments needed in Landscape Planning and Operations. Such intentional learning is integral to Adaptive Management in the OESF.

Through the OESF Adaptive Management process, knowledge gained through Research and Monitoring will be provided to local land management staff as well as agency decision-makers and federal agencies involved with HCP compliance. For example, research and monitoring summaries will be incorporated into annual reporting to the Board of Natural Resources (consistent with the Board's policy on Implementation, Reporting, and Modification of the Policy for Sustainable Forests) and in the annual HCP report to the Federal Services (consistent with the HCP Implementation Agreement). In the process of Adaptive Management, changes will likely be made in management

policies, strategies, and activities as they are applied on-the-ground. It is anticipated that Adaptive Management will be DNR-led, but will utilize a broader collaborative process to foster contribution and understanding among stake holders and research partners.

Relationship to Forest Land Planning

DRAFT

Through Forest Land Planning, DNR implements landscape management strategies that achieve Board of Natural Resources policy goals. Major guiding policies for OESF Forest Land Planning include the *HCP* (DNR 1997), the *2004 Sustainable Harvest Calculation and its 2007 Addendum* (DNR 2004), and the *2006 Policy for Sustainable Forests* (DNR 2004).

Research and Monitoring is identified as one of the six management processes required for effective implementation of the OESF vision of integrating commodity production and ecosystem conservation within an unzoned forest context (DNR 1997, p. IV.82), thus defining Research and Monitoring activities as an integral part of OESF management.

Forest Land Planning and Research and Monitoring are strongly linked via the Adaptive Management process. Research and Monitoring projects are explicitly designed to address uncertainties and answer questions arising from development and implementation of the OESF Forest Land Plan and the implementation of the HCP. In turn, on-the-ground operational aspects of research and monitoring projects will be implemented as part of Forest Land Plan implementation. While not all Forest Land Plan implementation activities are driven by Research and Monitoring, most Research and Monitoring implementation associated with on-the-ground activities will be carried out within the direction of the Forest Land Plan. That means that research projects requiring major departures from the management direction provided by the Forest Land Plan will not be entertained. It also means that the Plan will ensure opportunities for Research and Monitoring projects at both stand and landscape scale, and not preclude such opportunities.

The Research and Monitoring Strategy supports Forest Land Planning by identifying key areas of uncertainty that currently affect management decisions in the OESF and by proposing research and monitoring studies to address these uncertainties. Likewise, some management uncertainties described in this strategy were identified during earlier stages of OESF Forest Land Planning. As the planning progresses, management uncertainties will be further specified through identification of the affected environment and through analyses of the impacts from proposed management strategies. As such, the process of Forest Land Planning itself provides additional information on risk and uncertainty associated with proposed strategies and activities that can be addressed in this strategy. For this reason, the Research and Monitoring Strategy will not be finalized until after completion of a Forest Land Plan.

The OESF Research and Monitoring Strategy will be further informed through implementation of the OESF Forest Land Plan, as harvest, silviculture, and road management activities are applied on-the-ground and monitored accordingly. Because Forest Land Planning and its associated implementation over time could inform priorities for future research and monitoring, projects and priorities in the OESF Research and Monitoring Strategy will be reviewed and, if necessary, updated on a regular basis.

Management and Coordination

DRAFT

Overall research and monitoring activities are being coordinated by the OESF Research and Monitoring Manager. Project management is supported by Project Development Guidelines adopted by DNR. These guidelines provide structure and transparency for research partners wishing to engage with DNR and support the development of effective study plans that include: project scoping, initial screening, plan development, and technical review. Project Development Guidelines seek an effective integration between researchers' needs for independent study and DNR's need to meet its trust obligations and address operational considerations.

DNR recognizes that collaboration is key to a successful OESF research and monitoring program. DNR already has entered into a Memorandum of Understanding with the University of Washington through the Olympic Natural Resource Center, Pacific Northwest Research Station, and Olympic National Forest to collaboratively pursue research projects of mutual benefit. DNR also is entering into a MOU with the Pacific Northwest Research Station to designate the OESF as a 'participating forest' in the Forest Service Experimental Forest and Range Network (EF&R Network). As monitoring projects are scoped and implemented, DNR will seek additional partners (e.g., universities, federal and state agencies, local and tribal governments, and other stakeholders) in achieving a shared vision.

Finally, DNR recognizes that communication and outreach are also key to a successful program. DNR already has initiated a web site on which information can be downloaded by the scientific community and the general public. Through scoping for this research and monitoring strategy, DNR has compiled a contact list of interested researchers and stakeholders. As the OESF research and monitoring program evolves, DNR will build upon this infrastructure to provide more information through its website and keep interested parties informed of OESF activities. We also look forward to using existing information sharing technology that would be available through our affiliation with the EF&R Network. This will greatly increase our capabilities to disseminate and share information within an established research community. All these activities are in fulfillment of one of the six OESF management processes described in the HCP - "Effective communication" (DNR 1997, p.IV.85-86).

Contact

For more information on the OESF Research and Monitoring Program, or if you are interested in conducting research on the OESF, please contact Teodora Minkova, the OESF Research and Monitoring Manager, in Olympia at (360) 902-1175 or by email at teodora.minkova@dnr.wa.gov .

References

Carey, A.B. and R. O. Curtis. 1996. Conservation of biodiversity: a useful paradigm for forest ecosystem management. *Wildlife Society Bulletin*, 24(4): 610-620

Commission on Old Growth Alternatives for Washington's Forest Trust Lands. 1989. Final Report. Washington State Department of Natural Resources, Olympia, Washington.

DRAFT

Washington State Department of Natural Resources. 1997. Final Habitat Conservation Plan. Washington State Department of Natural Resources, Olympia, Washington.

Washington State Department of Natural Resources. 2004. Final Environmental Impact Statement on Alternatives for Sustainable Forest Management of State Trust Lands in Western Washington and for Determining the Sustainable Harvest Level. Washington State Department of Natural Resources, Olympia, Washington.

Washington State Department of Natural Resources. 2006. Policy for Sustainable Forests. Washington State Department of Natural Resources, Olympia, Washington.

Williams, B.K., R. C. Szaro, and C. D. Shapiro. 2007. Adaptive Management: The U.S. Department of Interior Technical Guide. Adaptive Management Working Group, U.S. Department of Interior, Washington DC.