



Center for  
**WHALE RESEARCH**



October 16, 2024

VIA Email:

sepacenter@dnr.wa.gov

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Dear Commissioner Franz, Members of the Board of Natural Resources, and Mr. Wells:

Re: Letter in Opposition to and Comments on Parched (FPA #2617912/SEPA #30-102017) timber sale in the Elwha River Watershed

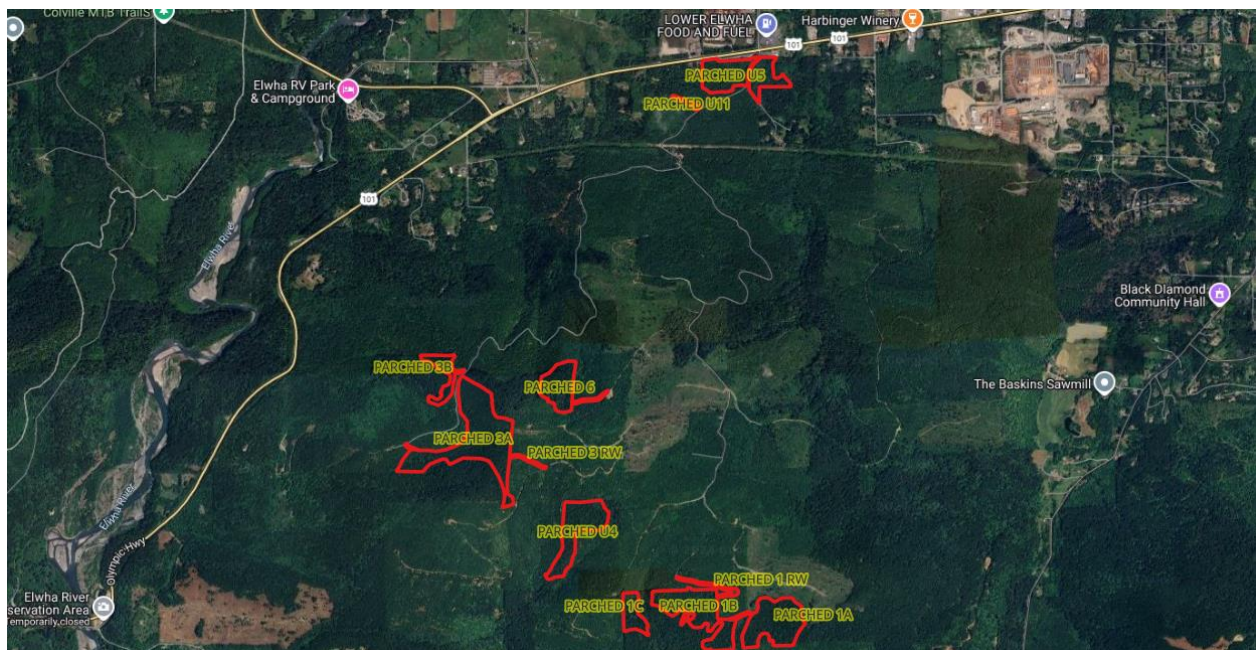
This is an historic moment. We have an opportunity to protect the remaining mature, structurally complex forests in the Elwha River Watershed and truly restore the watershed. The federal and state government have spent over \$338 million on Elwha River restoration. That includes \$11 million by the Washington State Office of Recreation and Conservation. It does not make sense to spend this money while destroying forest lands that are critical to stream flows and the watershed's overall health.

We greatly appreciate DNR's decision to cancel the "Power Plant" timber sale last year and to protect 69 acres of critical forest along the Elwha River. We ask that DNR pause any further logging of mature, structurally complex forests in the Elwha Watershed while we work toward longer term solutions. For over two years, both the City of Port Angeles and thousands of residents have asked DNR for such a pause. Meantime, we ask that DNR locate replacement sales in less critical areas.

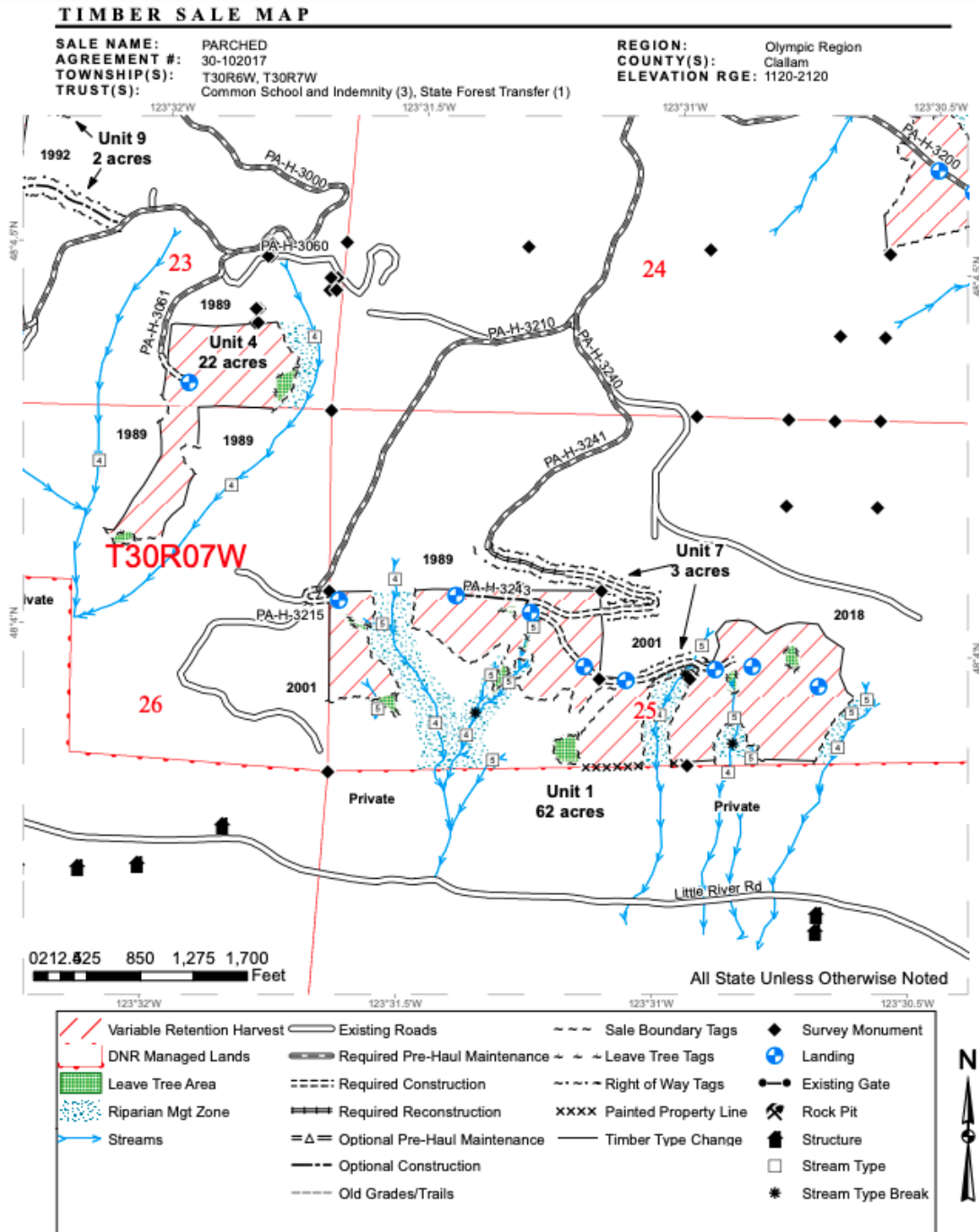
The DNR's plans to resume logging, as exemplified by the Parched timber sale, are in direct opposition to conservation efforts. The Parched timber sale would log 200 acres of higher elevation forest east of the Elwha River. Parched, along with three additional proposed sales for 2024 (totaling 555 acres), would destroy nearly 50 percent of the remaining Elwha legacy forests. This would have detrimental effects on watershed hydrology and ecosystem integrity. Slope stability is of particular concern as discussed in the Geotechnical Review prepared by Glen Wade, attached hereto, and submitted in response to the Forest Practices Application for Parched.

DNR did not adequately review the environmental impacts of the Parched timber sale. The effects of this sale must be examined extensively and cumulatively, for the overall health of the watershed and the last remaining legacy forests.

Parched would log 200 acres North and South of Little River, Unit 6 to the west is less than a mile from the Elwha River.



Map of some of the Units of Parched, illustrating the number of streams running through the area



The Earth Law Center (ELC) is a non-profit organization whose mission is to align our laws with Nature's laws. ELC advocates for new laws and policies to promote resilience, reciprocity, and holistic ecosystem restoration for the well-being of all life on this planet.

The Center for Whale Research (CWR) is dedicated to the study and conservation of the Southern Resident killer whale (orca) population in the Pacific Northwest. In October 2020, the Center for Whale Research took a leap into conservation to preserve salmon habitat by purchasing a ranch (named Balcomb Big Salmon Ranch after world renowned orca researcher Ken Balcomb) bordering both sides of the Elwha River, in a stretch of the mainstream river where most of the remnant native Chinook salmon now spawn. In doing so, it recognized that the Chinook salmon abundance from the Elwha River ecosystem can provide a healthy food source for the critically endangered Southern Resident Orca Whales and a sustainable, nearshore artisanal fishery.

The Orca Network is a Washington based non-profit that connects people with whales of the Pacific Northwest. The Orca Network advocates for river restoration. As Executive Director, Susan Berta explains on its website: "We are all intricately connected, from tiny plankton to forage fish. Salmon, orcas, tall firs and cedars. Mountains. Rivers and the ocean. It is time to reflect, to reconnect. And to respond as better caretakers of our planet."

We have a substantial interest in enhancing salmon habitat by protecting watershed health of which healthy forests are integral. The Indigenous-led movement to create Salmon parks ([salmonparks.ca](http://salmonparks.ca)) highlights the importance of managing forests to enhance salmon health.

The effects of this sale must be examined extensively and cumulatively, for the overall health of the watershed and the last remaining legacy forests. We submit the following comments in opposition to, and regarding the SEPA for, the Parched timber sale in the Elwha River Watershed. Our general comments followed by our more specific comments are below.

### **DNR Has Not Met its Duty to Future Generations or its Duty to Respect and Advance the Right to a Healthful Environment**

The Washington State Legislature, when it enacted SEPA, recognized that "each person has a fundamental and inalienable right to a healthful environment and that each person has a responsibility to contribute to the preservation and enhancement of the environment." Consistent with this, SEPA states that agencies, including DNR, have the responsibility "to use all practicable means" so that the state and its people may:

- (a) Fulfill the responsibilities of each generation as trustee of the environment for succeeding generations;
- (b) Assure for all people of Washington safe, healthful, productive, and aesthetically and culturally pleasing surroundings;
- (c) Attain the widest range of beneficial uses of the environment without degradation, risk to health or safety, or other undesirable and unintended consequences;
- (d) Preserve important historic, cultural, and natural aspects of our national heritage;
- (e) Maintain, wherever possible, an environment which supports diversity and variety of individual choice;
- (f) Achieve a balance between population and resource use which will permit high standards of living and a wide sharing of life's amenities; and
- (g) Enhance the quality of renewable resources and approach the maximum attainable recycling of depletable resources.

To realize these responsibilities, under SEPA,

- (1) The policies, regulations, and laws of the state of Washington shall be interpreted and administered in accordance with the policies set forth in this chapter, and (2) all branches of government of this state, including state agencies, municipal and public corporations, and counties shall: (a) Utilize a systematic, interdisciplinary approach which will insure the integrated use of the natural and social sciences and the environmental design arts in planning and in decision making which may have an impact on the environment . . . (d) Preserve important historic, cultural, and natural aspects of our national heritage; [and] (h) Initiate and utilize ecological information in the planning and development of natural resource-oriented projects.

This means that SEPA's substantive and procedural mandates overlay all regulatory and nonregulatory activities of Washington's governmental entities, including its agencies.

These mandates touch on all aspects of the environment, including the management of the state's trust lands. Although DNR must consistently provide some support to beneficiaries, it does not have a duty to maximize revenue from logging, or even rely on extractive sources of funding at all. Instead, it must manage to ensure this support while serving all the people of the state at the same time. It must implement these duties consistent with its duties under SEPA as trustee of these lands for future generations and the right of the people of the state to a healthy environment. DNR should have, but has not, considered alternatives to extractive, industrial-style logging at this site.

### **Extractive Logging in Elwha River Watershed Forests is Incompatible with Elwha River Restoration**

We urge the DNR to work with the larger scale restoration effort rather than at cross-purposes by destroying critical forest habitat. The Washington Supreme Court has made

clear that DNR has wide discretion to determine how best to manage, make productive, and generate revenue from the approximately 2 million acres of forests it currently manages. An integrated approach that accounts for the health and well-being of all species is compatible with the State Environmental Policy Act (SEPA) which identifies the following purposes: “(1) To declare a state policy which will encourage productive and enjoyable harmony between humankind and the environment; (2) to promote efforts which will prevent or eliminate damage to the environment and biosphere; (3) and [to] stimulate the health and welfare of human beings; and (4) to enrich the understanding of the ecological systems and natural resources important to the state and nation.” RCW § 43.21C.010.

The City of Port Angeles and many community members have expressed concerns about logging, particularly of older, structurally complex forests, in the Elwha River Watershed. The growing movement to protect Elwha Forests was sparked by DNR’s decision to log a forest by the sale name “Aldwell.” On March 5, 2023, many people gathered to support the City’s request for a pause on logging in the Elwha Watershed as covered by the Peninsula Daily News in “[Protesters Rally Against Aldwell Logging](#)”, by public news service “[Post-dam Elwha Thriving, but Logging Threatens Gains](#)”, and other media outlets. Although Aldwell was logged, opposition continued with regard to the very next timber sale in the Elwha Watershed called “Power Plant” (see [Controversial WA timber sale near Elwha River rankles conservationists, Port Angeles leaders](#)), which DNR eventually cancelled. Cancellation of the “Power Plant” timber sale was widely celebrated by the community along side local and state elected officials and politicians, including Rep. Mike Chapman, City Councilmember Latrisha Suggs, and Republican politician Bill Bryant. (see [Cancellation of power plant timber sale celebrated](#)).

### **DNR has failed to consider the adverse hydrological impacts of industrial logging**

A science synthesis produced by the US Forest Service Pacific Northwest Research Station provides perhaps the most comprehensive compendium of how industrial logging practices contribute to hydrologic impairments in the region ([Grant et al. 2008](#)). The synthesis surveys over 100 peer-reviewed scientific studies spanning the last five decades and identifies a direct correlation between industrial logging and increases in peak flows. Peak flows—a term to describe the maximum rate of water discharge in rivers and streams during storms—are associated with landslides, mass wasting, channelization, streambed scour, and other forms of erosion and deposition that detrimentally affect fish. By causing water to move faster through the hydrologic system, industrial logging practices not only can contribute to the degradation of salmonid habitat, but also can endanger communities downstream by elevating the risks of floods and landslides. Increasing the “flashiness” of the hydrograph should be seen as a high priority to public agencies, especially in the aftermath of the unprecedented flood event of November 2021, which displaced hundreds of people, resulted in loss of life, and contributed to over \$50 million in damages.

Additionally, recent research has found clearcut-plantation silviculture reduces summer streamflows when compared to adjacent unlogged forests. Recently, researchers at Oregon State University published a study that drew conclusions about the role forest management plays in streamflow levels in summer months ([Segura et al. 2020](#)). Dr. Catalina Segura and

her colleagues analyzed 60 years of data collected on paired stream basins in the Alsea Watershed, in Oregon's Coast Range. Some basins were logged according to the rules laid out by Oregon's current forestry regulations, while others were left standing and allowed to mature to over 100 years of age. The researchers found that streams in logged basins produced 50% less water during summer months than streams in unlogged basins. These streamflow deficits persisted for more than half of the year, being most pronounced in late summer. The researchers suggest that the high evapotranspiration rate of young Douglas-fir plantations is the primary cause of this deficit. In other words, younger trees use water less efficiently than older forests, which means young timber plantations draw more water out of the system and release it to the atmosphere, thereby contributing to less water flowing in streams and rivers.

Another related study conducted by Dr. Julia Jones and her colleague Timothy Perry studied data collected in eight paired basins over a six decade period to inquire into the streamflow consequences of industrial forest practices ([Perry & Jones 2016](#)). The researchers studied forestlands that were set aside over 70 years ago for the purpose of research located within the H.J. Andrews Experimental Forest (east of Eugene, Oregon) and the South Umpqua Experimental Forest (east of Roseburg, Oregon). Half of the basins studied were clearcut according to current legal standards, while the others were left standing.

The research produced a clear and powerful conclusion that young Douglas-fir plantations diminish summer streamflow by 50%, a finding corroborated by Segura et al. 2020. Perhaps more importantly, these streamflow deficits caused by industrial logging practices lasted for long periods of time. According to the six decades of data, low flows in clearcut and-replanted basins persisted and intensified for over a half century after the initial harvest of the basin. This means that clearcutting today will produce diminished water levels well into the late-21st century. Notably, scientists predict that climate change will dramatically alter hydrologic systems and lead to a water shortage crisis in the Pacific Northwest during the latter half of this century ([Climate Impacts Group, University of Washington 2015](#)). While the study did not research forests in Washington, the findings linking tree plantations to diminished summer streamflows are highly applicable to our state's productive westside forests ([Frissell 2017](#)).

Similar research regarding the impact of industrial forest practices in the Nooksak Watershed in WA have also been documented in research by Oliver Grah, Nooksak Indian Tribe's water resources program manager (now retired), using computer simulations developed in partnership with Western Washington University professor Bob Mitchell and Washington-based environmental engineering firm Natural Systems Design. (see [Logging forests takes this toll on already-strained Nooksack River, new research suggests](#)). These studies have important implications for forest management in Washington because they suggest that industrial forest practices—especially when conducted on a watershed-scale—can greatly diminish water quantity in the summer months, when farmers and salmon need it most.

The attached Declaration from hydrologist Matt Rosener, MS, PE illustrates the importance of considering the cumulative effects of logging in the watershed. Mr. Rosener's Declaration states in part:

(11) Based on my professional experience and as is standard in advising local governments or other entities about the impacts of certain activities on watershed health, it is best practices to avoid or defer activities that may have a measurable impact on in-stream flows until there is an acceptable degree of certainty that such activities will not have an unacceptable impact. This is particularly important as climate change introduces greater uncertainty as to our ability to predict the severity of impacts and availability and reliability of fresh water sources are expected to be greatly compromised.

(12) It is important to consider the cumulative effects of past, present, and future planned logging, both on public and private land, in the Elwha River Watershed.

(13) It is also important to consider the recent dramatic changes to the Elwha River that have occurred as a result of dam removal, including the effects such changes have had on the river channel, sedimentation, high flow events, and slope stability of the river bluffs.

(14) Based on my professional experience and review of the above cited studies, it is my opinion that industrial logging poses a threat to the health of the Elwha River Watershed, and, in particular, will reduce in-stream summer flows to at least some degree and in a potentially significant amount. Logging also presents other hazards to the River such as landslides and erosion.

The precautionary principle applies here, particularly given the fact that DNR has not done any studies to determine the impacts of its logging activities on the Elwha Watershed. When DNR has previously responded to concerns regarding hydrological impacts of other timber harvests (not within the Elwha Watershed), DNR has:

- admitted that it does not know what the impacts of industrial logging on watershed health are and has said only that it will respond to new science if/when it comes out;
- is not able to cite any scientific basis for whether its current forest practices remedy the findings of the Segura and Perry/Jones findings (summarized in Matt Rosener's Declaration); and
- has not expressed any commitment to doing the research/studies necessary to see if DNR forest practices will not negatively impact summer streamflow, as it is hoping might be the case.

We have also attached the Declaration of Adelaide C. Johnson, a hydrologist and climate change vulnerability specialist, submitted in the appeal of Sure Wood and Plumb Bob timber sales in Mason County. Ms. Johnson points out inadequacies in the SEPA checklist of general applicability – including the failure to consider cumulative watershed impacts.



## **Extractive Logging in the Elwha River Watershed Threatens the Well-being of its Non-Human Inhabitants**

DNR relies heavily on operating under an “Incidental Take Permit” (a permit that allows it to kill or harm endangered or threatened species) based on the idea that it is complying with its obligations under a multi-species Habitat Conservation Plan (HCP) with the US Fish and Wildlife and the National Marine Fisheries service concerning threatened and endangered species and their habitats. (SEPA checklist p. 7). Under that plan DNR is obligated to set aside a certain amount of forest to meet its older-forest targets (those forests being recognized as critical habitat for endangered species).

DNR has been sued over its failure to comply with its own policies and the HCP and lost in court. DNR states that as of September 2024, it has revised a document titled “Landscape Assessment to Identify and Manage Structurally Complex Stands to Meet Older-Forest Targets in Western Washington, May 2024”. (p. 7). DNR admits, as it must, that the Straits HCP Planning Unit does not currently contain 10 to 15 percent older-forest conditions. Indeed, there is evidence based on data obtained from DNR’s Public Disclosure Office that DNR has only set aside 5,846 acres of structurally complex forests in the Straits HCP planning unit for conservation, which represents less than 5% of the Straits HCP planning unit that has protected, structurally complex forests that are excluded from commercial timber harvest. DNR appears to justify logging the older, structurally complex forests that are part of Parched on the grounds that it is managing other stands “projected to develop into older-forest structure that meets or exceeds [the 10 to 15 percent] threshold by 2090.” (p. 7). We submit that this violates the HCP, DNR’s own policies, and runs contrary to the very intent of these agreements which is to protect threatened and endangered species. From the rapid decline of endangered species, such as the marbled murrelet, we know that there is insufficient habitat to ensure their survival. Even if accurate, the creation of more structurally complex forests 66 years from now will not save the endangered species of today. This proposed harvest would result in the loss of forest that should be set aside to meet older forest targets as required by law.

### **DNR has failed to adequately consider impacts of extractive logging on species that depend upon the health of the Elwha River Watershed, in particular, the Southern Resident Orcas**

DNR has failed to adequately consider impacts of extractive logging on the Elwha River Watershed and its inhabitants including salmon, marbled murrelet, northern spotted owl, bears and cougars. Moreover, the SEPA Checklist makes no mention of the logging activities’ impact on endangered or threatened species outside the forest or the immediate vicinity thereof, in particular, on the critically endangered Southern Resident Orca population. As an apex predator in the waters, Southern Resident orcas are keystone species that indicate the ecosystem’s health. Due to the failure of habitat protection, the Southern Resident orcas are now in a compromising position with insufficient prey. Southern Resident orcas feed exclusively on salmon, and prefer Chinook salmon, which

makes up at least 80% of their diet. The demise of salmon in the waters negatively impacts the whales' natural cycle.

During a July 24, 2018 informational webinar, Rob Williams, PhD (Pew Fellow in Marine Conservation, Co-founder, Oceans Initiative) presented on the "*Interdisciplinary effort to rank threats to SRKW recovery: salmon availability, noise & contaminants*". Dr. Williams unequivocally stated that when looking at the three threats to SRKW, recovering Chinook salmon will have the greatest single impact on recovering SRKW.

Research shows Southern Resident Orcas consume a portfolio of Chinook salmon that originate from many watersheds along the California coast to British Columbia, Canada. Chinook runs from Puget Sound/Salish Sea (which themselves are listed as threatened) are in the Southern Resident Orcas' critical habitat. A Southern Resident Killer Whale Priority Chinook Stocks Report by NOAA Fisheries West Coast Region and WA Department of Fish and Wildlife, recognizes the Salish Sea and coastal WA as areas of highest use by the Southern Resident Orcas. "In summer, the whales feed mainly on Chinook salmon returning to the Fraser River in British Columbia and Puget Sound." Research shows that the death rate for the Southern Resident Orcas correlates with coast-wide Chinook salmon abundance. Salmon deficiency reduces females' ability to carry a fetus full term or to lactate sufficiently to keep the offspring alive. "Fecundity—the ability to produce an abundance of offspring—is highly correlated with salmon availability. Currently, 69% of SRKW pregnancies end in miscarriage." These scientific studies underscore the importance of promoting Chinook salmon recovery to enhance population growth of Southern Resident killer whales. "Historically, Chinook salmon were legendary in the Elwha River." Prey from Puget Sound are an important food source for the Southern Residents, with the Elwha River's restoration and its returning fish populations, a beacon of hope for the starving whales.

Moreover, salmon and forests enjoy a symbiotic relationship. Salmon bring nutrients to the forest. On the Alaska Department of Fish and Game website you will find an article called "Why Fish Need Trees and Trees Need Fish" by biologist Anne Post that paints a vivid description of this relationship. The article describes how salmon bring nutrients to the forest and also how important trees are to salmon.

Impacts to the river and watershed from industrial logging practices, including as contemplated by the Parched timber sale, threaten salmon recovery and survival, and, in turn, threaten the Southern Resident Orcas. At the very least, DNR must study and consider such impacts, which it has failed to do. This is particularly important as recovery of the Southern Resident Orcas has been a stated priority by the executive branch including Governor Inslee, who signed the Executive Order 18-02 recognizing the urgent need to take bold action and creating the orca recovery task force.

## **The State's Review and Assessment of the Parched Sale is Wholly Inadequate**

The state's review of the Parched timber sale raises a number of questions and concerns, including:

- (1) The project area is close to Dry Creek, Little River, and the Strait of Juan de Fuca, which are vital water bodies for local ecosystems. The SEPA checklist indicates that road maintenance, timber felling, and yarding will take place within 200 feet of streams, yet it lacks specific information on how erosion and runoff will be managed to prevent sedimentation and degradation of water quality. The checklist acknowledges some erosion risk, but the proposed mitigation measures are insufficient for a site with steep slopes and unstable soils (p. 9, B.3). Further study is needed to assess the true impact of road construction and logging on water bodies, particularly during peak flow events and wet weather conditions.
- (2) The checklist references regional carbon sequestration benefits from DNR-managed lands but does not provide a specific analysis for how this timber sale will contribute to or offset carbon emissions (p. 13). With an estimated harvest volume of 7,393 MBF, this sale will likely release significant carbon into the atmosphere. More detail is needed to show how this project aligns with Washington's broader climate goals, particularly regarding carbon emissions and long-term climate resilience. Climate change planning, including the [City of Port Angeles Climate Resiliency Plan](#), recognizes the importance of proforestation for climate resilience, mitigation and adaptation.
- (3) The project area includes unstable slopes and areas prone to shallow landslides, which the SEPA document briefly acknowledges (p. 9). The mitigation strategies proposed, such as restricting operations during heavy rainfall, are not enough to ensure long-term slope stability, especially with the extent of new road construction (over 10,000 feet). Given the steep terrain and history of landslides in the area, a more detailed geotechnical study is needed to assess the true risks of increased landslides and erosion.
- (4) The proposal identifies critical habitats for species like the Northern Spotted Owl and Marbled Murrelet, both of which are listed as endangered (p. 15). While buffers and timing restrictions are mentioned, the project does not provide adequate assurance that these protections will fully safeguard habitat integrity, especially given the proximity to sensitive areas. Further analysis of the

cumulative impact on these species and their recovery is necessary.

- (5) The project includes the use of chemical herbicides for site preparation after logging (p. 2). The potential environmental impacts of herbicide application, including contamination of nearby water bodies, disruption of native plant species, and harm to wildlife, are not fully explored in the checklist. Herbicides such as glyphosate and imazapyr, commonly used in forestry, pose risks to aquatic ecosystems and can persist in the environment. Which herbicides are to be used should be specified and accompanied by a detailed study on the potential impacts of herbicide runoff, as well as an assessment of alternatives to chemical use, is necessary to ensure the protection of local water quality and biodiversity.
  
- (6) The checklist claims that there are no known Tribal or historical resources on or near the site (p. 19). Given Indigenous history and presence in the region, this claim seems questionable. A more thorough investigation involving consultation with local Tribes and historical experts is essential to ensure that culturally significant areas are not overlooked or harmed by the logging activities.
  
- (7) The construction of new roads and reconstruction of existing roads (p. 6) will have lasting effects on the landscape and increase human access to sensitive forest areas, which can lead to unintended consequences like illegal dumping, off-road vehicle use, and further habitat disruption. The checklist does not adequately assess the long-term impacts of these new roads on wildlife corridors and the potential for increased human activity in previously undisturbed areas.
  
- (8) The state failed to adequately discuss the cumulative effects of the Parched sale beyond simple carbon sequestration and emissions. The cumulative impacts of herbicide use and clearcutting on watershed hydrology need to be extensively examined. With the last remaining legacy forests at hand, this could be a tipping point. It is absolutely irresponsible to continue to log legacy forests without thorough investigation into the potentially irreversible impacts on hydrology.

The SEPA for Parched is further inadequate in a number of ways, including:

On p. 2, the document states that herbicide application may be used to ensure successful replanting, yet it lacks details on which herbicides will be applied and their environmental impact. A study of the toxic effects of herbicides on ecosystems, specifically their impacts on non-target species and soil health, is essential.

On p. 7, the claim that harvested timber will be used for "climate-smart forest products" is vague. The document should explain how this aligns with climate resilience and what specific practices or certifications are being followed.

On p. 8, the timeline for replanting and natural regeneration following the variable retention harvest is unclear. Given the urgent threat of climate change, the document should assess whether the recovery process can keep pace with rapidly shifting environmental conditions.

On p. 10, the document briefly mentions potential erosion from road construction, but there is little detail on how this erosion will affect watershed hydrology. A deeper analysis of the long-term effects on water quality is necessary.

On p. 11, harvest activities within 200 feet of water bodies could pose significant risks to watershed hydrology. The document should elaborate on the extent of these risks and propose stronger safeguards to protect water resources.

On p. 12, the temporary diversion of water during culvert installations could have significant ecological impacts, yet the document lacks a detailed evaluation of these effects. More research is needed to understand the consequences of altering natural water flow patterns.

On p. 12, although the risk of lubricant spills into surface waters is acknowledged, there is little discussion on the potential severity of contamination. A more comprehensive analysis of potential spill impacts and mitigation strategies is needed.

On p. 12, while erosion control measures are outlined, the document admits that erosion won't be fully eliminated. Even minor erosion can have harmful effects on water quality, which calls for a more rigorous assessment of these risks.

On p. 13, the potential for groundwater contamination due to equipment-related spills is understated. A detailed study of the possible contamination pathways and risks to groundwater quality is necessary.

Also on p. 13, the risk of sediment or slash entering surface waters during the project is concerning. Further research into surface water contamination from construction activities is critical to understanding the full scope of environmental impacts.

On p. 14, the disturbance of understory vegetation from logging and road-building activities may have lasting effects on biodiversity. The document should provide a more

in-depth evaluation of these impacts.

On p. 15, the absence of any mention of fish species near the project site raises concerns. Given the proximity to water bodies, the potential impacts on aquatic ecosystems need further investigation.

On p. 19, the document claims no evidence of tribal or historic use within the harvest boundaries, but this conclusion seems questionable given the strong presence of Tribes in the area. A more thorough cultural and archaeological review should be conducted to ensure no significant sites are overlooked.

Regarding the need to assess the impacts of herbicides on human health and the environment, we ask that DNR consider the following studies and sources:

- <https://www.epa.gov/caddis-vol2/herbicides>: “herbicides may contribute to other stressors (e.g., instream habitat alteration via riparian devegetation). In such cases, herbicides can be considered as part of the pathway for the proximate cause of impairment. . .Forestry management practices, agricultural operations, and urban development and maintenance are all sources of herbicides that may enter surface waters and cause impairments. Herbicides are applied to forests after harvesting to suppress brush and noncommercial trees. For that use, the rate of application may be high and exposed streams are more likely to be of higher quality than agricultural or urban streams. . .Although herbicides in general have lower toxicity to animals than other pesticides, fish or invertebrate kills may be a sign of herbicide use. For example, acrolein has been applied to irrigation ditches at levels sufficient to be acutely lethal to fish and invertebrates (see acrolein in U.S. EPA 2009), and if not properly applied to fields it can cause kills in receiving waters. Kills also may be due to low dissolved oxygen (DO) concentrations resulting from plant materials decomposing in water. . .Herbicides may reduce taxa richness and abundance of fish and benthic macroinvertebrates due to reductions of sensitive species and increased abundance of tolerant species at high concentrations (Daam and Van den Brink 2007, Dewey 1986). . .*Increased herbicides in streams can adversely affect stream flora and fauna via several mechanisms, including reduced growth, condition, and reproduction; increased mortality; and changes in behavior. These effects can result in biologically impaired macrophyte, periphyton, phytoplankton, fish and invertebrate assemblages, which in turn can contribute to changes in community structure and ecosystem function.* . . In some cases, herbicides may be transported atmospherically in spray drift. These applied herbicides may enter streams via stormwater runoff, groundwater discharges or direct atmospheric deposition.” (emphasis added)”
- <https://www.pesticideinfo.org/chemical/PRI3454>, <https://www.iarc.who.int/featured-news/media-centre-iarc-news-glyphosate/#:~:text=In%20March%202015%2C%20IARC%20classified,of%20%E2%80%9Cpure%E2%80%9D%20glyphosate>. Listing the most commonly purchased herbicide (glyphosate) as a known carcinogen with potential for groundwater contamination.
- Exposure to glyphosate has had demonstrable negative effects on tested species, such

as the American ribbed fluke snail, where “Continuous exposure across generations produced reproductive effects on the third generation including rapid embryonic development, embryonic abnormalities and increased egg laying (Tate et al. 1997)” Glyphosate: Its Environmental Persistence and Impact on Crop Health and Nutrition, states:

Glyphosate has an affinity to bind to soil particles and thus mostly accumulates in the top-soil layers. Processes like surface runoff, drift, and vertical transport in soil may transport it to groundwater, surface water, and water sediment [19,20,21]. The mobility and leaching of glyphosate have been tested in laboratory, lysimeter, and field conditions [11]. In a study on glyphosate leaching and movement conducted in a field site in Denmark, glyphosate, despite its high binding tendency on soil, was found to transport deep into the soil and leach out with drainage water. . .some studies have also shown the toxic effects of glyphosate on soil microorganisms [34]. . .Bott and coworkers [70] demonstrated glyphosate’s ability to inhibit root elongation, lateral root formation, and root biomass production in soybeans. It was even demonstrated that glyphosate released from dead weeds could be absorbed through the roots of growing citrus plants [17]. After entering the plant system, glyphosate is rapidly translocated to young growing tissues of roots, where it can accumulate and inhibit growth [71].”

<https://www.ncbi.nlm.nih.gov/pmc/articles/PMC6918143/>

- Furthermore, “the presence of glyphosate in the soil could change the balance of bacteria and fungi, in turn altering soil ecosystem functions and plant health. . .In laboratory studies, Argentinean researchers found that glyphosate-containing herbicides could also be toxic to earthworms, causing damage to cells and DNA at levels “close to the applied environmental concentrations”  
[https://www.foeurope.org/sites/default/files/press\\_releases/foe\\_5\\_environmental\\_impacts\\_glyphosate.pdf](https://www.foeurope.org/sites/default/files/press_releases/foe_5_environmental_impacts_glyphosate.pdf)
- It is commonly believed that “(b)ecause glyphosate binds tightly to most soils, it has a low potential to move through soil to contaminate groundwater” However, “long-term research in Denmark found that glyphosate could be washed down through some soil types by rain, into field drains and on to rivers and streams. . .Monitoring of Copenhagen’s sewage and storm water overflows found that glyphosate was always present. . .Micro-organisms are vital to marine and freshwater ecosystems, because they form the basis of food chains. In laboratory experiments, the growth and species composition of microbial populations from marinewaters was disturbed at levels of glyphosate typical of those caused by run-off from the land. Similar effects were found on microbial populations from freshwater systems.  
[https://www.foeurope.org/sites/default/files/press\\_releases/foe\\_5\\_environmental\\_impacts\\_glyphosate.pdf](https://www.foeurope.org/sites/default/files/press_releases/foe_5_environmental_impacts_glyphosate.pdf)
- Recent research into glyphosate indicates that this substance is much more pervasive than previously thought: “studies have presented compelling evidence that glyphosate can be readily detected in ambient air in different geographic locations, even at considerable distances from agricultural activity (Zaller et al., 2022).”
- Another popular herbicide, Imazapyr, is generally not great at absorbing into soil and

tends to runoff - Data from Grover (1977); Hay (1990); Kidd and James (1991); Pesticide Information Profiles (PIPs, <http://ace.orst.edu/info/extoxnet/pips/searchindex.html>).

- In one study, mice were fed very large amounts of copper sulfate before and during pregnancy. Some baby mice died during gestation or did not develop normally." Further, the US EPA considers copper sulfate to be moderately toxic to birds and highly to very highly toxic to fish and other aquatic life. <http://npic.orst.edu/factsheets/cuso4gen.html>
- Another popular option, Dicamba, is moderately toxic to birds in its acid form. There is also limited research on how carcinogenic this herbicide is, but one study did find a minor link between Dicamba and lung and colon cancer. Further, "Sometimes following an application, dicamba can become airborne and cause damage to nearby plants." [http://npic.orst.edu/factsheets/dicamba\\_gen.html](http://npic.orst.edu/factsheets/dicamba_gen.html) Additionally, " in a constructed native vegetative habitat, research showed that. . . dicamba, reduced the number of seed heads and pods per plant for several plant species<sup>11</sup>."
- In a slideshow by the EPA they stated that around 100% of forest protection products (herbicides and other pesticides) are aerially applied. <https://www.epa.gov/sites/default/files/2019-04/documents/best-practices-for-aerial-application-slides.pdf> Aerial application has been shown to have a risk of spray drift. "In 2017 for example, approximately 1.5 million hectares of dicamba-injured soybeans were reported in the United States<sup>12</sup>. In 2018, off-target movement of florpyrauxifen-benzyl came to the forefront in Arkansas, prompting an advisory statement from the Arkansas State Plant Board<sup>13</sup>."

Regarding the need to assess the impacts of industrial logging on soil health, we ask that DNR consider the following studies and sources:

- Logging can affect soil health in two main ways: through increased exposure to erosion and through soil compaction. According to experts, soil compaction is associated with mechanized wood harvesting and similar industrial logging processes. This compaction can cause long-lasting damage to ecosystem function and productivity. In one study, this compaction increased soil bulk density by almost 10%, and reduced the soil's porosity by up to 40% as a result. The physical variables studied did not recover to the normal level within a period of 3-6 years. ([Impact of Logging-Associated Compaction on Forest Soils: A Meta-Analysis](#); Nazari et al.; 3 December 2021)
- This compaction and lack of porosity isn't just caused by the loss of trees itself- it can be compounded by the impact of road construction and the use of logging machines as well. As a result, roots are unable to penetrate soil, water cannot flow through the soil, nor can air enter or escape the compacted soil. These all have long-term effects on the organisms reliant on the area. ([The Environmental Magazine](#))
- This lack of porosity and water filtration in turn causes an increase in erosion, which hurts future re-planting efforts. One study found that makeshift logging roads, as well as landing areas where logs were stored after cutting, were particularly prone to compaction and erosion. ([Logging can decrease water infiltration into forest soils, study finds](#); U Missouri; 16 August 2016)



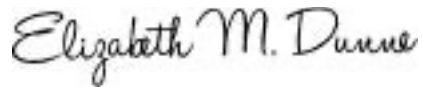
- In some case studies, researchers found that logging created the ideal “pre-conditions for the increase of soil erosion rates during high rainfall,” a phenomenon common in the Pacific Northwest. ([Sudarmadji, 2001](#)). Studies have also found that logging and harvesting practices cause a loss of nutrients (particularly Nitrogen) and organic matter content in the soil as well. ([Elliot et al.; 1999](#)) In addition, findings have demonstrated that such disturbance associated with industrial logging can influence the regrowth of vegetation and place limits on long-term forest productivity in the future as well. ([Harrington et al.; 13 June 2020](#)) Similarly, logging has been found to have impacts on fungi regrowth– critical to ecosystem health– for decades in the future. These “legacy effects” permanently hamper the area’s potential to host a number of species. ([Spencer et al.; March 2023](#)).

Regarding the need to assess the impacts of industrial logging on wildlife corridors, we ask that DNR consider the following studies and sources:

- Logging removes forests and fragment ecosystems, splitting existing forested areas into smaller and smaller pieces. Now, more than 70% of global forests are within 1 km of an “edge” – near agricultural, urban, or otherwise modified environments where wildlife is exposed to more threats. The loss of contiguous forests reduces habitat sizes for most species, curtailing access to food and water sources as well. Fragmentation as a result of logging has been found to reduce species richness of plants, arthropods, and birds by 20 to 75%. Researchers have further found that logging operations that fragment ecosystems may even have effects that are more long-term than we have been able to observe thus far. Some studies found that biological impacts of industrial logging are chronically omitted from or overlooked in environmental impact statements. Researchers recommend that biological sensitivity should be reviewed prior to permitting for industrial activities in order to minimize the amount of lines constructed that could crosscut critical wildlife corridors. [Haddad, et al. \(2015\)](#) ; [Latham & Boutin \(2015\)](#)
- Industrial logging often involves the creation of roads for the logging operations. In previous cases, like in the Sierra Nevada forests, this road construction affects ecological integrity by fragmenting and dividing the forest, barring wildlife dispersal and migration. When species were unable to cross the barriers, their range and distribution was drastically reduced. Analysis has found that there are more miles of roads in our national forest system than in the rest of the entire continent. [Sierra Forest Legacy \(2008\)](#).

We respectfully request that DNR consider these comments, properly assess the environmental impacts of proposed logging, cancel the Parched timber sale, and work with all stakeholders to protect and restore the Elwha River Watershed.

Respectfully,

A handwritten signature in blue ink that reads "Elizabeth M. Dunne". The signature is written in a cursive style with a clear, legible font.

Elizabeth Dunne, Esq.  
Director of Legal Advocacy  
Earth Law Center

A handwritten signature in blue ink that reads "Howard Garrett". The signature is written in a cursive style with a clear, legible font.

Howard Garrett  
Chairman of the Board  
Center for Whale Research  
Orca Network