



Southern Resident Orca Task Force

Draft Report and Potential Recommendations

DRAFT FOR PUBLIC REVIEW, SEPT. 24-OCT. 7

About this draft report

The potential recommendations in this draft report, released on September 24, 2018, are possible actions identified and recommended by the three working groups (prey, contaminants and vessels) but have not been identified as the final recommendations of the task force.

The task force has the opportunity to delete, recraft or add recommendations over the next two months. The task force may also choose to discuss some of the action ideas in 2019 for potential inclusion in the second report.

Public comment is invited on this draft report. Please submit comments at governor.wa.gov/orcareport by midnight on October 7. Public comments received on this draft report will be provided directly to the task force for consideration at the October 17-18 meeting.

There will be another opportunity for public comment on just the updated draft recommendations after the Oct 17-18 task force meeting. That public comment period will be from Oct 24-29, 2018.

The timeline of next steps is available on the governor's [Southern Resident Killer Whale Recovery and Task Force](#) website.

The final task force recommendations will be listed in the final report on November 16, 2018.

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Vision

We envision a self-sustaining and resilient population of Southern Resident orcas, thriving in healthy waters, inspiring our descendants with their majesty.

Goals

Our ultimate goal is to ensure the ecosystem is healthy and resilient enough to support a thriving Southern Resident orca population.

We align ourselves with the [Recovery Plan for Southern Resident Killer Whales \(Orcinus orca\)](#) by the National Marine Fisheries Service (2008) and its goal of an average population growth rate of 2.3 percent per year for 28 years.

Between now and 2022, our goal is to witness evidence of consistently well-nourished whales and the survival of several thriving young orcas. By 2028, our goals are to see the primary indicator of body condition of the whales (the ratio of head width to body length) remain high and stable between seasons and across years, regardless of fluctuations in the West Coast abundance of Chinook, and to see an increase in the population to 84 whales (10 more whales in 10 years).

To achieve our goals, we commit to:

- Restoring sustainable, harvestable Chinook populations across Washington state in accordance with federally approved salmon recovery plans.
- Reducing the impacts of vessel noise and disturbance so that the Southern Residents are able to effectively forage, rest and socialize.
- Reducing the toxicity of the ecosystem to improve the health of whales and their prey.

Introduction

Executive order

On March 14, 2018, Gov. Jay Inslee signed Executive Order 18-02: Southern Resident Killer Whale Recovery and Task Force (see Appendix 1 for the full text). Through this executive order, the governor directed state agencies to implement nine immediate actions to benefit Southern Resident orcas (refer to the “Ongoing and Immediate Actions” section of this report for details). He also established the Southern Resident Orca Task Force to identify, prioritize and support the implementation of a longer-term action plan for the recovery of Southern Resident killer whales (hereafter in this report “Southern Resident orcas”) so that the Salish Sea has a healthy and sustained population for the future.

The governor charged the task force with preparing a comprehensive report with recommendations for recovering Southern Resident orcas. The executive order outlines prey abundance, toxic contaminants and disturbance from noise and vessel traffic as the major threats that must be addressed. The governor directed the task force to identify needed policies and programs, recommend priority actions to support recovery efforts, highlight budget needs and recommend any legislation necessary to support the executive order. To inform the development of legislative and budget proposals for the 2019-21 biennium, the governor directed the task force to submit its first

comprehensive report and recommendations for recovering Southern Residents by November 2018 and a second report by October 2019.

Southern Residents and the Salish Sea

The Southern Resident orca population is composed of the J, K and L pods. Travelling in these pods, orcas range from central Southeast Alaska to central California but spend most of the year in the Salish Sea near the San Juan Islands and on the outer coast of Washington and southern Vancouver Island. In pursuit of migrating salmon, Southern Residents are known to forage farther south in Puget Sound during the fall and spend time near the Columbia River mouth in winter (Wiles, 2016).

Urgency

The first population census in 1973 identified 66 Southern Residents. The population has experienced periods of growth, increasing to a high of 98 in 1995. However, between 1995 and 2003, the population dropped by 16 percent, down to 82 orcas, and prompted their listing as an endangered species (EPA, 2017). Southern Resident orcas were classified as endangered in Washington and surrounding waters under the U.S. Endangered Species Act in 2005 and in Canada under the Species at Risk Act in 2003. In response, the National Marine Fisheries Service Northwest Regional Office prepared the [Recovery Plan for Southern Resident Killer Whales](#). The plan details and analyzes potential threats affecting Southern Residents and outlines an adaptive management approach to recovery strategies addressing each threat, based on the best available science.

Since Executive Order 18-02 was signed in March of 2018, the population of Southern Resident orcas has dropped to 74, the lowest number in over 30 years. Experts believe that, overall, the orcas are in poor condition and struggling to raise calves. In a study published in 2018, researchers from the Center for Conservation Biology at the University of Washington, the National Oceanic and Atmospheric Administration's Northwest Fisheries Science Center and the Center for Whale Research noted that up to two-thirds of Southern Resident orca pregnancies from 2007 to 2014 failed (Wasser, et al., 2017). None of the Southern Resident calves born in the past three years have survived.

As the task force convened in 2018, tragedies in the Southern Resident population put a spotlight on the urgency of taking effective action. Crewser, or L92, was not with his pod when it returned to Puget Sound in June and was presumed dead. Tahlequah, or J35, had a calf that lived for only a half hour; she carried her newborn for 17 days over more than 1,000 miles in what was widely seen as a display of deep mourning. Three-year-old Scarlet, or J50, was presumed dead in September after showing signs of severe emaciation; the National Oceanic and Atmospheric Administration (NOAA), tribes, and other partners had worked to diagnose and treat her but were unsuccessful. It is assumed that J50 fell victim to a combination of starvation, stress, immune deficiency and disease.

The extinction of these orcas would be an unacceptable loss. They are an essential component of the Salish Sea and broader marine ecosystem, serving as an indicator of the health of our waters. Their extinction would also be an irreplaceable cultural loss as these orcas are loved and hold significant value as an iconic and treasured species in Washington and throughout the Pacific Northwest, particularly for tribal communities. Inaction is not an option. Swift near-term actions and effective

long-term actions are urgently needed to secure a healthy and sustained Southern Resident orca population.

If these creatures — the mammals who inhabit the top of the food chain in our Salish Sea — are unable to survive, it portends trouble for the rest of the inhabitants of this region. Action is required immediately to help not only these whales, but also the entire ecosystem we depend upon.

Process

This section describes the process undertaken to create the task force and ensure that it had the support, information and public input needed to develop recommendations to the governor.

Creation of the task force

The governor invited members of the legislature and the Government of Canada and representatives from tribal, federal, local and other state governments, state agencies, the private sector and the nonprofit sector to participate in the task force (refer to Appendix 2 for a full list of task force members). The task force held eight meetings from May through November 2018 throughout the state of Washington in Olympia, Wenatchee, Anacortes and Tacoma.

Through these meetings, the task force worked toward three goals outlined in the executive order:

- Monitor and evaluate the immediate actions undertaken by state agencies and build upon the progress and effectiveness of that work.
- Identify, prioritize and support the implementation of a longer-term action plan needed for the recovery of Southern Resident orcas.
- Where available and applicable, build upon state, tribal, regional and federal plans.

Working groups

To help the task force complete its work the task force established three working groups. The Prey, Vessels and Contaminants Working Groups were composed of relevant subject matter experts and stakeholders. Each working group had 20-35 members and one to two state agency leads (refer to Appendix 2 for a full list of working group members). The working groups supported the task force using the best available science and personal knowledge or experience to identify, research and analyze potential actions and formulate recommendations for task force consideration. Each working group met one to two times per month from May through November 2018 at several different locations throughout the state, including Ridgefield, Tacoma, Olympia, Ellensburg, Seattle and sometimes by phone.

Working groups developed initial lists of potential actions for task force deliberation and analyzed those potential actions using considerations such as:

- Effectiveness in improving Southern Resident orca survival and/or ability to reproduce.
- Ease of implementation, including technical, political/social, and regulatory feasibility and the degree to which it reinforces or leverages existing efforts.
- Estimated cost to implement.

Working groups also provided additional information related to:

- Social/cultural, community, and environmental costs and benefits of actions.
- Climate change considerations.
- Potential ways to ameliorate any negative impacts and impacts associated with equity issues.
- Where and when to implement each action.
- Links to existing programs.
- Current and potential funding sources.

These details were provided to task force members to inform their decisions. The task force responded to the working groups with questions, feedback, new action ideas and requested wording changes and the working groups used those task force inputs to refine the draft list of recommendations. The task force will deliberate and make final decisions at its next meetings.

Steering committee

In addition to the working groups, the task force was also supported by a steering committee, charged with ensuring and enabling a smooth and effective process that meets the goals and timeliness of the governor's executive order. The steering committee consists of the task force co-chairs and representatives of the Governor's Office, Office of Financial Management, Department of Fish and Wildlife (WDFW), Puget Sound Partnership and Department of Ecology (Ecology).

Information

There were five webinars in 2018 to educate task force members — many at their request — on issues where they felt they needed more information to make well-informed decisions, including topics emphasized in public comments. Webinar topics were the Lower Snake River dams, spill over the Columbia and Snake River dams, climate change and ocean acidification, the relative importance of the different threats to the Southern Resident orcas and the economic value of Southern Resident orcas. The public was also invited to attend these webinars. Peer-reviewed journal articles, briefing memos and discussion guides also provided task force members with background on issues that they may not have been deeply familiar with at the outset.

Communication

Individual actions taken by members of the public will be a critical part of recovering the Southern Residents. Public awareness is therefore essential. The executive order mandates that the Puget Sound Partnership, the Department of Fish and Wildlife, the Department of Licensing, Washington State Parks Commission and the Governor's Salmon Recovery Office collaborate with the Governor's Office to inform and educate the public. In addition, because the task force process seeks to involve the public, these agencies also agreed to provide public outreach in support of the task force public process. Communication staff from the Washington Department of Ecology and the National Oceanic and Atmospheric Administration (NOAA) volunteered to participate in the public outreach effort as well. Communication directors from the agencies named in the executive order and from NOAA West Coast Fisheries have been meeting twice monthly with the governor's communication staff to align communication efforts and support the communication needs of the task force co-chairs.

This group also meets periodically with nongovernmental communicators who are interested in helping to educate and inform the public about Southern Resident orcas. The purpose of these meetings is to:

- Identify resource-sharing opportunities.
- Exchange ideas and insights.
- Request sharing of communication initiatives and resources.
- Develop strategies for funding communication campaigns.
- Collaboratively develop and implement communication campaigns.

Continued communication will help to ensure broad understanding of the science and rationale behind the task force recommendations, as well as who is most affected by the actions.

Public comment

Oral and written public comments were accepted throughout the first year of task force work. Public comment was heard at all task force meetings. As interest in the task force and the urgency of orca recovery efforts grew, public attendance at task force meetings increased to more than 330 people at the August 28 meeting in Anacortes. The task force moved to larger venues and adjusted its agendas, extending the length of its meetings and the time allocated for public comment. Written public comments were also accepted via the comment portal on the governor's [Southern Resident Killer Whale Recovery and Task Force](#) website.

As of late August 2018, individuals and organizations had also submitted over 2,000 written comments to the task force. Members of the public expressed their concerns and ideas around a wide range of issues, including salmon recovery, habitat restoration, salmon harvest, boating restrictions and the removal of the Lower Snake River dams. Special public comment surveys were also set up to gather public feedback on the draft report and recommendations. **Public comments received on this draft report will be provided directly to the task force for consideration at the October 17-18 meeting.**

Public comment will be accepted through the end of the task force process in late 2019. Along with a review of the best available science and input from experts, public input is a key element informing this process and task force decisions.

Key threats

The task force focused on the major threats to Southern Resident orcas identified in the 2005 Endangered Species Act or ESA listing and Gov. Inslee's executive order: lack of prey, disturbance from noise and vessel traffic and toxic contaminants. Each of these is summarized in turn below.

Prey

The Southern Resident diet is almost entirely composed of salmon, with adult orcas eating approximately 385 pounds of fish each day. Although their diet tends to vary slightly throughout the year, feeding on smaller amounts of salmon species like coho, chum, and steelhead, about eighty percent of their total diet comes from Chinook salmon (Center for Whale Research, n.d.). Chinook are dense in calories and the largest of the Pacific salmon species, but they are also the least abundant and many populations are experiencing long-term reductions in size (Wiles, 2016). Several

runs of Chinook salmon in the Salish Sea are listed as threatened or endangered under the Endangered Species Act. In addition, recent studies have shown that wild and hatchery Chinook are becoming smaller throughout most of the Pacific coast (Ohlberger, et al., 2018).

The abundance of salmon declined in the 1800s, when the impacts of logging, agriculture, dams, human development and water withdrawal compounded the overharvest of salmon. These activities reduced the number of salmon so significantly that hatcheries were constructed to artificially produce salmon to the levels that the natural environment historically produced. Today, native and nonnative salmon-eating predators that benefit from artificial habitats can also have significant negative effects on local salmon populations. In addition, some forage fish populations, which are important food for Chinook, have diminished in recent years.

Efforts to restore salmon populations are done in an integrated manner, commonly referred to as an all-H approach (habitat, hatcheries, hydropower and harvest). The working group and task force also considered predation and forage fish. Reversing the decline of salmon and improving their status will require commitment, sacrifice, significant investments and time. Immediate actions to increase salmon for Southern Resident orcas are necessary but should also be viewed in context of longer-term salmon recovery. Successfully increasing prey abundance to the levels needed for Southern Resident and salmon recovery and sustainability will require adequately considering addressing all of these factors, described in more detail below.

Habitat

Productive and protected habitat is critical for naturally spawning salmon to be abundant, diverse and sustainable. Adequate and functional habitat is also essential for supporting young hatchery salmon.

Threats to healthy salmon habitat include:

- **Water withdrawals.** Water withdrawals for irrigation, residential/commercial use, fish hatcheries and other purposes can reduce the amount of useable habitat for salmon. Unscreened withdrawal points can trap small wild salmon in the conveyance structures that pump water from its source to its final destination.
- **Development.** As the human population grows, land use policies that allow development in or near floodplains and along shorelines can lead to degradation and loss of functioning habitat necessary to support salmon. Habitat is directly lost through the conversion of habitat to homes, buildings or other structures. Habitat is indirectly lost through non-point impacts from contaminated stormwater, groundwater withdrawal and alteration in stream flow due to water running off impervious surfaces quickly as opposed to infiltrating slowly through the soil. Often, structures built to protect or support development like dikes, bridges, bulkheads, culverts and stormwater systems further impact salmon habitat.
- **Habitat loss and degradation.** In addition to experiencing impacts from urbanization, transportation, agriculture, logging, mining and other forms of land use, many rivers have been straightened, diked and cleared of complex habitat features. Converting natural habitats into lands and rivers that support human uses often degrades the health of the habitat and the salmon that depend upon it.

- **Fish passage barriers.** Human-made barriers such as culverts, dams, bridges, fords, levees, erosion control structures, tide gates, flumes and pipeline crossings limit salmon's ability to swim upstream into cool, productive spawning and rearing habitat (WDFW, 2009).
- **Marine water quality.** Water quality is an essential component of a functioning ecosystem necessary to support the complex food web that orcas depend upon. As we work to address contaminants in stormwater, there is emerging science showing reduced dissolved oxygen levels in Puget Sound caused by excess nitrogen that could be negatively affecting the food web. Stormwater runoff is addressed in more detail in the "Contaminants" section of this report.

Although the threats to habitat described above affect all salmon species, there are additional considerations specific to Chinook salmon habitat. Chinook salmon typically spawn in larger rivers and their tributaries, utilizing deeper water and larger gravel for egg burial. They have highly variable life history strategies, reflected in their body size and timing of outmigration from rivers to salt water. An important strategy for Chinook fry involves feeding, growing and seeking refuge in natal freshwater streams for up to a year (Fresh, 2006). Adult Chinook return to their natal rivers and tributaries to spawn after an average of three to four years in the ocean. However, returning rates for adults (escapement) is a small percentage of total egg production (Bradford, 1995).

Ocean-type Chinook out-migrate from their freshwater habitat on their way to the ocean at smaller sizes and as such, are most dependent on estuarine and nearshore habitat for rearing. By contrast, stream-type Chinook rear in their natal streams for one year prior to out-migrating to the ocean. During this year, they depend on clean, cool water with complex habitat with multiple channels, large wood, boulders, side channels, healthy riparian area and connected flood plains. Floodplains provide refuge from high stream flow, calm feeding waters and space for Chinook to avoid predators. Chinook that rear in rivers with ample floodplains are larger than those that rear in rivers with no floodplain habitat and have higher survival rates (Sommer, et al., 2001).

For both ocean-type and stream-type Chinook, tidal wetlands found in both natal and non-natal river deltas and marine shorelines provide refuge from predation, feeding opportunities and brackish habitats that facilitate the physiological transition from fresh to saline waters (Fresh, 2006). Puget Sound has experienced 77 percent loss of vegetated estuarine tidal wetlands from natal Chinook deltas, and in some cases as much as nearly 100 percent loss (Simenstad, et al., 2011). Many of the large deltas in Puget Sound have lost freshwater tidal wetland habitat at disproportionate rates (Simenstad, et al., 2011). The lower Columbia River has lost 68-70 percent of its tidally influenced floodplain wetlands that provide critical foraging and rearing habitats for migratory Chinook (Marcoe & Pilson).

Hatcheries

Hatchery production could play an important role in increasing prey abundance for Southern Residents, especially in the intermediate term (three to 10 years), as increasing natural Chinook stocks will take more time.

Although hatchery salmon production can be beneficial for increasing prey abundance for orcas in the near term, hatcheries can also pose genetic and ecological risks to wild populations if not properly operated. Hatchery fish often have lower reproductive fitness than wild fish, so when adult hatchery fish interbreed with wild fish it can lower the overall reproductive success of the wild

population. Hatchery fish can decrease genetic and life history diversity (for example, run timing) in wild populations, in turn decreasing population resiliency and depressing wild population growth rates. Hatchery salmon can have ecological impacts and compete with juvenile salmon for food or habitat resources in rivers, estuaries and nearshore marine environments. Releasing exceptionally large volumes of juvenile hatchery salmon near to wild populations can exacerbate these effects and decrease juvenile survival or population growth rates. Hatchery release strategies or timing can inadvertently attract predators and increase predation rates on both hatchery and wild fish, especially if hatchery releases are large, releases are compressed over a short period of time, and predators have been behaviorally conditioned (WDFW and Puget Sound Treaty Tribes, 2004).

Decades of research and monitoring have identified the general risks to hatchery programs described above. The specific risks need to be evaluated on a case-by-case basis for individual hatchery programs. These risks vary across programs depending on hatchery size, location, operation and release strategies, as well as the underlying habitat condition and health of the affected wild populations. As a result, general risks are roughly proportional to the number of fish released, so the risks to wild salmon will generally increase with larger hatchery releases (Waples, 1991).

Reductions to hatchery production that have occurred over the years are mainly attributable to reforms in production plans and policies, lessons learned around optimizing hatchery production to yield more surviving adults and/or funding constraints.

Hydropower

Hydroelectric and water storage dams have significant but varied impacts on fish that migrate up rivers from the sea to spawn, including Chinook. In the Columbia River Basin, dams completely block passage to over 55 percent of the spawning and rearing habitat historically used by salmon (Northwest Power and Conservation Council, n.d.). Many dams in Puget Sound and the Columbia River Basin have made substantial progress in providing fish passage structures; refer to the text box at right for examples of fish passage structures (NOAA Fisheries, n.d.). Dams can still pose a threat to fish passage, slow the migration rate of juveniles and alter riverine ecosystems and function, which negatively affects salmon survival.

In particular, it can be difficult for juvenile salmon to pass dams to downstream habitat on their migration to the sea. When the current draws juvenile fish into a dam's turbines, cavitation (formation of bubbles in the water from turbine propeller movements) and substantial pressure differentials associated with the turbine blades, along with the blades themselves and surrounding concrete walls, can injure or kill fish. When fish need to pass multiple dams on their way to the sea, it increases the likelihood of injury or death, especially if fish passage alternatives are limited.

In addition to fish passage structures at dams to get juvenile salmon downstream, "spill" (water routed through spillways) is used to improve survival rates of migrating fish. Spill is generally acknowledged as the safest route past a dam for juvenile salmon because it allows fish to avoid dam powerhouses and bypass systems. This may result in lower direct mortality and decreased "delayed mortality," which occurs when fish have a weakened condition after traversing a river. There are tradeoffs from spilling too much water and causing water quality issues (total dissolved gas) and benefits to survival from spilling the water.

Harvest

Harvest may reduce the number of adult fish available to Southern Residents in areas where the orcas forage. Chinook that originate in Washington may be harvested in fisheries in Alaska, British Columbia, off Washington's coast or in Washington's inland waters before they reach their natal spawning grounds.

Examples of fish passage structures include:

- **Fish screens.** Fish screens allow water to flow from its source to its end destination while preventing fish from becoming trapped in pipes and other human-made structures.
- **Fish ladders.** Fish ladders resemble staircases filled with water that allow adult fish to 'climb' up and over the dam step by step. Water currents flowing from the fish ladder attract migrating salmon to the base of the stairway.
- **Trap and haul.** Migrating salmon climb a small fish ladder into a holding pool/tank where fish are 'trapped'. Vehicles then 'haul' and release the fish upstream to the other side of the dam.
- **Floating surface collectors.** Floating surface collectors have pumps that attract fish and nets that guide the fish towards the collection entrance. Once fish enter the collector they are piped out of the dam downstream or trapped and hauled.
- **Spillway weirs.** Spillways control the flow release from dams and can be a safe exit for juvenile fish. Raised weirs draw water from the surface and make spillways easier for fish to find and navigate.
- **Fish-friendly turbines.** Improved turbine design allows for safer fish passage with curved walls and edges, fewer gaps for fish to get wedged into, reduced turbulence and blades that reduce strikes.
- **Juvenile bypass systems.** Juvenile bypass systems use fish screens to discourage juvenile fish from approaching conventional turbines and direct them instead into dam gateway pipes that carry fish into collection channels where they can safely exit the dam.
- **Improved culverts.** Culverts are large pipes that allow water to pass under roads. Fish-friendly culverts have lower water level entrances and larger upstream openings, making it easier for fish to enter and exit than conventional culverts. They also provide a less steep angle inside with deeper and slower moving water for fish to pass through.
- **Improved tide gates.** Tidelands drained for agriculture use tide gates to prevent water from flooding the area during high tide. Streams and marshes surrounding the tide gates provide habitat for small fish. Fish-friendly tide gates use floating mechanisms to hold the gates open, allowing fish to move freely between tide land and drained land.

Harvest levels, seasons and fishing methods are established each year through the North of Falcon process. This process recognizes the multiple federal, tribal, and state jurisdictions, authorities and obligations, including:

- The Pacific Salmon Treaty between the United States and Canada, with fishery obligations for Canada, southeast Alaska, Washington, Oregon and Idaho.
- The Pacific Fishery Management Council, with the responsibility to implement the federal Magnuson-Stevens Act in the exclusive economic zone off the coasts of Washington, Oregon and California.
- Twenty-four tribes who have usual and accustomed fishing places recognized in Washington state through the Stevens-Palmer treaties.
- Nine federally recognized tribes who are not party to one of the Stevens-Palmer treaties.
- The states of Washington, Oregon and Idaho.

The overlapping nature of these jurisdictions requires state, federal and tribal fishery managers to cooperate in the discharge of their respective authorities. Each year the managers gather for the North of Falcon salmon season setting process to plan recreational and commercial salmon fisheries in the ocean along coastal Washington and northern Oregon to freshwater rivers and inland marine waters including Puget Sound, Grays Harbor and Willapa Bay. Fisheries that may impact ESA-listed species, including Southern Residents, are reviewed by NOAA Fisheries to ensure that the fisheries are conducted in a manner consistent with ESA obligations.

An estimated 1,337,301 Chinook were caught in Pacific Salmon Treaty fisheries in 2017. Approximately 62 percent of these Chinook were taken in US fisheries and 38 percent were taken in Canadian fisheries (Pacific Salmon Commission, 2018).

Predation

Predation could affect the abundance of Chinook and other salmon available to the Southern Residents. Salmon predators can benefit from artificial habitat features such as piers, pilings, buoys and boat docks that serve as advantageous resting and feeding structures. Where artificial haul-outs or other structures coincide with Southern Resident foraging hotspots or salmon “pinch points,” predators may be eating the same prey that the orcas depend upon.

The predators of salmon that are of most interest and/or study are:

- **Pinnipeds** such as sea lions and seals.
- **Fish** such as walleye, northern pikeminnow, northern pike, catfish and smallmouth bass.
- **Birds** such as cormorants and terns that feed on juvenile salmon.

Pinnipeds

Since the adoption of the Marine Mammal Protection Act in 1972, west coast seal and sea lion populations have increased, and with increasing pinniped populations they have consumed more salmon. California and Steller sea lions prey on adult salmon and steelhead before they move up the fish ladders at Bonneville Dam and areas downstream in the lower Columbia River. Both nonlethal and lethal control actions have been undertaken near Bonneville Dam since 2008. Even with these actions, pinnipeds at the dam consumed 6,663 fish per year on average between 2013 and 2017. This

represents between 2.1 and 5.8 percent of the adult salmon run (the average is 3.8 percent) (Tidwell, et al., 2017).

Fewer datasets are available to evaluate the impact of seal and sea lion predation on salmonids in other geographic areas, particularly the Puget Sound, Strait of Juan de Fuca and outer coast. However, recent bioenergetics modelling work using information from the broader Salish Sea suggests that the increase in abundance of harbor seals may also adversely affect Chinook, and consequently, Southern Residents (Chasco, et al., 2017). Both Canada and Washington are in the process of collating new pinniped population and diet information and updating models to determine more recent and geographically specific levels of Chinook consumption.

Fish

Northern pike are a nonnative invasive predator in Washington state that can restructure aquatic fish communities in some cases and lead to decimation of native fish communities including salmon and steelhead. Over the last several decades, illegal introductions of northern pike led to an expansion of their range. In Washington, they have been confirmed in the Spokane River and Lake Roosevelt. There is concern that they will continue to increase in abundance in the blocked area above Chief Joseph and Grand Coulee Dams and expand their distribution into the areas of the Columbia River where salmon and steelhead populations migrate up from the sea to spawn.

Northern pikeminnow, walleye and bass also pose predation risks to salmon. Northern pikeminnow, a native species, is managed for salmon recovery purposes under a sport reward program administered by the Bonneville Power Administration. Walleye and bass are nonnative to Washington. They prey on juvenile salmonids and compete for habitat in the Columbia River Basin and in most rivers in Puget Sound. A recent report estimated that 24 million juvenile salmon are consumed annually by piscivorous fish between McNary Dam and Priest Rapids Dam on the Columbia River (McMichael and James, 2017).

Birds

Artificial islands, piers, pilings, and other features have led to high reproductive success and growing populations among predatory birds such as cormorants and terns. A variety of management actions have been implemented with the goal of reducing salmon predation by birds, including controlling the size of breeding populations on the lower Columbia estuary and some interior stretches of the Columbia River.

Forage fish and marine productivity

Salmon and salmon predators such as pinnipeds, birds and piscivorous fish feed heavily on forage fish such as sardines, anchovies, herring, smelt and sand lance. In Puget Sound, Chinook salmon primarily target herring and Pacific sand lance. Low abundance of forage fish limits the food available for salmon. Factors affecting the abundance of forage fish include loss of submerged vegetation, shoreline hardening, predation, water quality degradation, contaminants, climate variability and change, noise and light. Nearshore habitat restoration and protection is crucial, and assessment work is required to inform these and other actions to address limiting factors (WDFW, 2011).

There is commercial and recreational harvest of both herring and surf smelt in Puget Sound. Commercial harvest of both species is relatively well monitored, but the harvest rate of smelt is unknown because there is no estimate of smelt biomass. The impacts of herring fisheries on individual herring stocks have not been assessed because movement patterns of herring away from the spawning grounds are not well understood. Recreational harvest of surf smelt does not require a license and is poorly monitored, but recreational harvest may be similar in scale to commercial harvest. Better understanding of the stock composition of herring encountered in fisheries and an assessment of recreational harvest of smelt would help determine the potential impacts of these fisheries.

Healthy marine forage fish and salmon populations also require appropriate quantity and quality of zooplankton prey, which is dynamic in time and space. Monitoring zooplankton in Puget Sound is critical to identifying how marine and local waters are responding to changing ocean conditions and to illuminate any underlying patterns in prey base composition, abundance and nutritive value that drive forage fish population dynamics and thus influence other species higher up on the food chain like salmon and orca.

Vessels

Vessels transiting near or through Salish Sea can disturb and displace Southern Resident orcas from preferred areas. The primary source of underwater noise is cavitation (the formation and collapse of vapor cavities or bubbles) from vessels' propellers. Propellers can produce underwater noise that masks or impairs orca echolocation (emitting sound waves that reflect off objects like salmon) and communication. Vessels — including virtually silent ones like kayaks — can also induce orcas to switch to energetically costly behaviors, such as traveling instead of foraging (Williams, et al., 2006; Williams, et al., 2011). Models suggest that Southern Resident orcas lose several hours of foraging time per day from May to September due to vessel noise and avoidance behaviors associated with ships and boat presence (Tollit, et al., 2017).

Key concerns include:

- **Small vessels.** Small vessels, defined as those under 65 feet in length, produce relatively high-frequency underwater noise that can mask echolocation, making it more difficult for Southern Resident orcas to find and capture prey. Small vessels include recreational boats and whale-watching boats. Although small vessels must keep a 200- to 400-meter buffer distance from orcas per state and federal law, noncompliant vessels and those operating at moderate or high speeds still emit loud noises, produce greater masking effects and can prompt energetically costly evasive behaviors by Southern Residents (Houghton, et al., 2015). In addition, faster speeds increase the risk of ship-strikes and longer exposures raise the potential for temporary and permanent hearing changes.
- **Ships.** Large ships tend to produce intense low-frequency noise that interferes with Southern Resident orca communication, leading orcas to compensate by making louder calls (Holt, et al., 2009). Production of louder calls has been shown to have modest metabolic costs in dolphins (Holt, et al., 2015). Furthermore, in coastal areas near busy ports, such costs may magnify the adverse effects of prey scarcity on reproduction and lactation (Holt, et al., Williams, 2015). Ships also emit noise at higher frequencies that overlap with Southern Resident orca echolocation (Veirs, et al., 2016). Washington state ferries are by far the largest contributor to the underwater noise levels across Puget Sound because of the sheer volume

of multi-daily transits throughout the region. Due to the growth of ports in British Columbia, shipping traffic is on the rise and likely to climb further. A relatively small percentage of ships (about 15 percent) are responsible for about half of related noise near the San Juan Islands (Veirs, S., et al., 2018), leading to optimism that targeted mitigations for such vessels would be effective (Williams, et al., 2018).

- **Echo sounders.** Underwater transducers such as echo sounders and depth finders use 200 decibel pulses of sonar to transmit sound waves into the water for navigational or commercial and recreational fishing purposes (National Research Council, 2003). Sonar noise from such devices near orcas, especially at commonly used frequencies of 50 and 80 kHz, overlaps with prime echolocation frequencies (Au, et al., 2004). Such pulses can travel more than one kilometer before substantially weakening (Zhou, et al., 2017). Preliminary results from NOAA suggest that Southern Residents near the San Juan Islands are exposed to transducer noise more than one-third of the time (Holt, et al., 2014). This level of exposure could impair the orcas' ability to locate and hunt for prey. Outputs from such devices have induced avoidance behavior in other toothed whales (Quick, et al., 2016). Many modern echo sounders are dual-frequency and can be switched to the 200-kHz setting to avoid overlap with orcas' hearing; this setting tends to be used in shallower waters to detect the bottom and ensure safe navigation.

In addition to the threats related to the disturbance and noise from vessels, major oil spills represent a persistent, low-probability/high-impact risk to Southern Residents. Because there are so few females of reproductive age in the population and pods often aggregate off the San Juan Islands near portions of the international shipping lanes that show greater relative oil spill risk than much of the Salish Sea (van Dorp and Merrick, 2017), the population's vulnerability to oil spills is magnified (National Marine Fisheries Service, 2016). Researchers recently simulated a four million gallon diluted bitumen oil spill north of the San Juan Islands and estimated that it would cover between 22 and 80 percent of the Southern Resident orcas' critical habitat (Jarvela Rosenberger, et al., 2017). Alaska has witnessed the vulnerability of local orcas to major spills, including the loss of reproductive females in one population (Matkin, et al., 2008). The recent population viability analysis by Lacy et al. suggests that a catastrophic oil spill of two to four million gallons would kill between 12.5 and 50 percent of the Southern Resident orca population (Lacy, et al., 2017).

Contaminants

Southern Resident orcas and their prey are exposed to an ever-increasing mixture of pollutants in the marine environment. As contaminants enter the Salish Sea through stormwater, wastewater, air deposition, direct water contamination and/or groundwater, they inevitably enter the food web. Contaminant concentrations continue to increase further up in the food chain and persist or accumulate over time in long-lived species such as orcas. Primary contaminants of concern are summarized in Table 1.

Table 1: Contaminant threats to Southern Resident orcas

Contaminant	Acronym	Threat to orcas	Where contaminants are found
Polychlorinated biphenyl	PCB	Most Southern Residents tested for PCBs have had levels that exceed a health effects threshold extrapolated from studies on seals, otters and mink (Krahn, et al., 2007). PCBs may reduce prey survival as well.	PCBs are commonly found in caulks, paints and dyes in old buildings, at toxics clean-up sites and inadvertently, in low levels in some new paints and dyes.
Polybrominated diphenyl ether	PBDE	PBDEs are associated with altered thyroid hormone levels (a hormone important for growth and metabolism). In the Southern Resident community, PBDEs have been shown to be highest in J pod, attributed to their time spent in Puget Sound and closer proximity to urban environments relative to the other pods (Krahn et al., 2009). PBDEs have also been measured in high levels in Southern Resident prey species.	PBDEs are found in many products (furniture, mattresses, hard plastics like television casings, foam nap mats and gym mats and car seats) and are commonly used as flame retardants.
Polyaromatic hydrocarbon	PAH	PAHs are toxic to Southern Resident prey and have been linked to developmental deformities, impaired immunity, liver toxicity and a dysfunctional adrenal system (Mongillo, 2016). In marine mammals, oil exposure can make hair and fur less water-resistant and insulating, stress fetuses or give them pneumonia and lead to neural and liver damage, emphysema and lung lesions, stomach ulcers, immune system impairment and reduced reproductive success (Mongillo, 2016).	PAHs are commonly found in creosote-treated wood (marine pilings, utility poles, etc.), vehicle emissions and leaks, wood smoke and industrial emissions.
Chemicals of emerging concern	CEC	Many CECs are known or suspected endocrine or metabolic disruptors, among other adverse physiologic effects, and could affect Southern Residents and their prey.	CECs are found in everyday items such as personal care products (soap, lotion, makeup), detergents, plastics, water-resistant clothing, pharmaceuticals and some pesticides. They include toxic flame retardants (including new variants of PBDEs), phthalates, bisphenols, nonylphenols and highly fluorinated or per- and polyfluoroalkyl substances, or PFAS.

Although many of these contaminants have been banned in manufacturing and are considered “legacy pollutants,” chemical-laden products created before chemical bans or regulations were enacted are still present in products and they can persist in the natural environment for decades. For example, PCBs were banned from production in the United States in 1979 but because they do not break down easily in the environment, PCBs still persist in the air, water and soil as well as in widely available commercial products like toothpaste, dyes and plastics. PCBs are still released into the environment through improper disposal, incineration and poorly maintained hazardous waste sites (EPA, n.d.).

Southern Resident orcas have unhealthy levels of PCBs in their blubber from eating contaminated salmon. They draw on this blubber when food is scarce, releasing the contaminants into their system. Female orcas also pass these contaminants to their offspring when they give birth and nurse (NOAA Fisheries, 2014). In most Southern Resident orcas that have been sampled, PCB levels are at concentrations exceeding a health effects threshold for marine mammals (extrapolated from

effects in seals, otters and mink) (Krahn, et al., 2007).

PCBs may also reduce prey survival. Toxics may be impacting prey survival in forage fish and juvenile Chinook rearing habitat hotspots, or sensitive areas, including the Duwamish estuary and river, Commencement Bay, Snohomish estuary, Anacortes, Portland Harbor, Hanford Reach, Sinclair/Dyes Inlet and Lake Union. Hotspots in British Columbia include Victoria Harbor and the Fraser Delta.

There are also several contaminants of emerging concern. Many of these contaminants are suspected endocrine (or hormone) disrupters. Endocrine disrupters can have developmental, neurological, reproductive and immune impacts. In most cases there is little information on their specific toxicity to Southern Resident orcas or their prey. Under existing law, many of these contaminants of emerging concern are not regulated or assessed for toxic impacts before they are introduced into commerce or industrial processes.

Other threats to Southern Residents and their prey include:

- **Discharges of toxic contaminants.** Current National Pollutant Discharge Elimination System regulations for many wastewater, stormwater and industrial facilities allow discharges of toxic contaminants that can impact Southern Resident orcas and their prey. It can be very expensive to clean up or provide stormwater and wastewater treatment at these “end of pipe” locations.
- **Stormwater runoff.** Extensive monitoring data shows that stormwater runoff from land used for commercial, industrial and transportation purposes contains the highest concentrations of toxic chemicals. Toxic stormwater hotspots include commercial and industrial lands, adjacent roadways and parking areas, and high traffic areas throughout the region as well as known geographic hotspots, including but not limited to the Snohomish River and Duwamish River basins. Although new and redeveloped land must meet stricter standards, retrofitting existing land with modern stormwater controls is delayed because of funding gaps, lack of a corrective imperative and the slow pace of redevelopment.
- **Contaminated sediments.** Clean-up of legacy sources of toxic contaminants in sediment is slow, not always prioritized and underfunded. These contaminants — specifically PCBs, PAHs and PBDEs — pose threats to Southern Resident orca and their prey survival, including early marine survival of juvenile Chinook salmon and forage fish.
- **Toxics in consumer products.** A common pathway for some contaminants of emerging concern to enter the environment is through use of a variety of consumer products. For example, some CECs (for example, toxic flame retardants, phthalates, PFAS and alkylphenols) are flushed or poured down the drain. Contaminants of emerging concern in consumer products such as couches, bedding, electronics and personal care products can break down as fine dust or particles. That dust is picked up on clothing, rinsed off in washing machines and transported into the wastewater stream. The contaminants eventually make their way to wastewater treatment plants where some may be poorly removed.
- **Pharmaceuticals.** Other contaminants of emerging concern such as pharmaceuticals are excreted by people and animals and enter Puget Sound via stormwater and wastewater.

Climate change

Climate change is an overarching threat that will affect the Southern Residents primarily through the food web. Climate change exacerbates existing stresses on the Chinook salmon populations that Southern Residents rely on. Observed and projected changes in climate include increased air and water temperatures, lower summer streamflows, more severe heavy rainfall events in the winter and rising sea levels (Mauger, et al., 2015). Climate change will continue to affect salmon habitats and salmon populations at each life stage.

In the Salish Sea and Pacific Northwest, observed and projected impacts include the following:

- **Warmer stream temperatures** deplete energy reserves, decrease growth rates and make salmon more vulnerable to predation and disease. They can also alter migration timing and duration. One study of fall Chinook salmon in the lower Columbia River found that their average migration rates slowed when water temperatures rose, as the fish waited in cooler tributaries (Gonia et al., 2006). Warmer streams can also favor warm-adapted nonnative fishes that can outcompete or prey on salmon (Mauger, et al., 2015).
- **Lower summer streamflows** impede upstream and downstream migration.
- **Heavier winter rainstorms** lead to high-flow events that can scour deposits of salmon eggs on river beds. More heavy precipitation events may also increase contaminant runoff into salmon-bearing streams.
- **Warmer ocean temperatures** increase metabolic demands, reduce salmon size and reduce return rates, as shown in a study of juvenile salmon along the coasts of Washington and Oregon (Daly and Brodeur, 2015).
- **Sea level rise** reduces habitat and spawning grounds available to forage fish, a key food source for salmon. Impacts will be seen sooner and more dramatically on hardened beaches where there is shoreline armoring, due to their inability to adjust to sea level.

Abdul-Aziz et al. projected that by 2100, under a moderate greenhouse gas emissions scenario, summer habitat for Chinook salmon in the North Pacific will decrease by 86 percent compared to 1980 levels as a result of warmer temperatures (Abdul-Aziz, et al., 2011).

A 2017 report by the University of Washington Climate Impacts Group and the Puget Sound Partnership concluded that the orca recovery goal was at high risk from climate change impacts because the projected decline in Chinook abundance will lead to increased nutritional stress and disease susceptibility for the orcas. It noted that warmer waters may also bring new pathogen and disease vectors that could be harmful for orcas (Siemann and Whitely Binder, 2017).

Increasing levels of carbon dioxide in the atmosphere are contributing to both climate change and ocean acidification, which will also adversely affect many marine species. There have been few studies on the direct effects of ocean acidification on Pacific salmon species; however, studies on tropical reef fish showed reduced growth, behavioral changes and decreased survival (Haigh, et al., 2015). Salmon are likely to be impacted through food web changes, as ocean acidification will negatively impact organisms like copepods that are a primary food source for forage fish such as sand lance, herring and surf smelt (Robards, et al., 1999; WDFW).

The Prey Working Group analyzed the relevance of climate change to the potential prey actions presented for task force consideration. They noted that:

- Summer and fall Chinook are expected to be more resilient than spring Chinook to climate change impacts than due to their late run timing, spawn timing and sub-yearling migrant life history.
- Many of the most important Chinook habitat areas for acquisition and protection are also the most susceptible to climate change (sea level rise and floodplain inundation due to floods).
- In the long term, removal of dams combined with fish passage into formerly blocked areas can offer access to cooler water in high-elevation headwater areas and eliminate heating behind dams. Where dams remain, they can help store water to mitigate against low water years. Some reservoirs behind dams provide cool water in the summer and flow improvements when needed. Both can buffer against climate change.
- Climate change should be considered in prioritizing habitat restoration projects.

In addition to the state taking actions to meet its greenhouse gas reduction goals, anticipated changes in the climate must be considered in determining how to approach habitat restoration and other actions intended to help recover Chinook salmon and Southern Resident orca populations. Implementing agencies and partners must monitor changes in climate as well as the effectiveness of projects and actions so that approaches can be adjusted as needed to maximize the benefit to salmon and orcas. At the same time, some of the recommended actions can also help build broader ecosystem resilience and therefore have benefits for other species and human communities in addition to benefiting salmon and orcas.

Ongoing and immediate actions

As part of Executive Order 18-02, Gov. Inslee directed the following state agencies to take immediate actions to support Southern Resident orca recovery:

- Washington Department of Fish and Wildlife (WDFW)
- Governor's Salmon Recovery Office (GSRO)
- Puget Sound Partnership (Partnership or PSP)
- Washington State Parks and Recreation Commission (WSPRC)
- Washington State Department of Ecology (Ecology)
- Washington State Department of Transportation (WSDOT)
- Washington State Department of Licensing (DOL)

The nine immediate actions that the governor directed these state agencies to take are outlined in Table 2. Progress updates on these immediate actions are available on the governor's [Southern Resident Killer Whale Recovery and Task Force](#) website. Full progress updates will be provided in Appendix 3 of the final report.

Table 2: Summary of immediate actions and responsible agencies

Action	Deadline	Responsible Agencies						
		WDFW	GSRO	PSP	WSPRC	Ecology	WSDOT	DOL
Develop implementation plans for increased enforcement, outreach and education of vessel regulations as well as enforcement of Chinook fisheries regulations in areas frequented by orcas.	04/30/18	X			X			
Review 2018 recreational and commercial fishing regulations prioritizing protection of key areas and fish runs for Southern Resident recovery.	04/30/18	X						
Explore options and develop a proposal to alter fish food used in state hatcheries to limit the amount of PCBs in Southern Resident prey.	04/30/18	X						
Create a curriculum to improve and increase the number of trainings for vessels in the whale watching industry to become “vessels of opportunity” to assist in the event of an oil spill	04/30/18					X		
Develop strategies for quieting state ferries in areas most important to Southern Residents.	05/31/18						X	
Prioritize existing outreach resources to support Southern Resident recovery. Collaborate with the Governor’s Office to develop a public education program and identify needed resources.	07/01/18	X	X	X	X			X
Identify the highest priority areas and watersheds for Southern Resident prey to focus or adjust, as needed, restoration, protection, incentives, hatcheries, harvest levels, and passage policies and programs.	07/31/18	X	X	X				
Develop criteria to prioritize financial assistance beginning in the 2019-21 biennium for storm water projects that benefit Southern Resident recovery	07/31/18					X		
Demonstrate how Chinook recovery projects benefit Southern Resident recovery, beginning in the 2018 grant round, for the Pacific Coast Salmon Recovery Fund, the Puget Sound Acquisition and Restoration Program, the Estuary and Salmon Restoration program and the Washington Coastal Restoration Initiative.	12/15/18	X	X	X				

Draft recommendations

Note: The potential recommendations in this draft report are possible actions identified and recommended by the three working groups (prey, contaminants and vessels) but have not been identified as the final recommendations of the task force. The task force is receiving public comment as well as additional information through webinars that will be part of task force discussions as it makes final recommendations. The task force has the opportunity to delete, recraft or add recommendations over the next two months, and may choose to discuss some of the action ideas in 2019 for potential inclusion in the second report. See additional potential actions in Appendix 4. The final task force recommendations will be listed in the final report on Nov. 16.

Prey recommendations

The working group has included in the Year 1 category potential recommendations that (1) would have immediate benefit to the orcas or need to start immediately to have the greatest benefit to orcas in the future, (2) received support from at least 80 percent of task force members in the August survey, or (3) had at least four working group members identifying them as highest-priority actions. As noted above, these have not been identified as the final recommendations of the task force.

Potential recommendations in Year 1 list that would require legislation

- Potential habitat recommendation 4
- Potential habitat recommendation 5
- Potential habitat recommendation 6
- Potential harvest recommendation 22
- Potential vessel recommendation 1
- Potential vessel recommendation 4
- Potential vessel recommendation 13
- Potential vessel recommendation 14
- Potential contaminant recommendation 3

Habitat

Potential habitat recommendation 1: In 2019, the governor and legislature should provide funding to the Recreation and Conservation Office to support habitat acquisition and restoration projects through existing capital budget salmon recovery accounts (Salmon Recovery Funding Board, Puget Sound Acquisition and Restoration Program, Estuary and Salmon Restoration Program, Floodplains by Design and Washington Coast Restoration and Resilience Initiative) for the subsequent round of funding with no changes to existing ranked lists. Regions should work within their existing priorities that are consistent with high priority Chinook stocks to accelerate the pace of restoration throughout the Puget Sound, Washington coast, and Columbia Basin. Regions — including state natural resource agencies — should fully exercise their technical and policy capacity to accelerate full implementation of habitat restoration projects that are currently under consideration, that have an established funding source, and that have feasibility studies indicating that the project would provide survival benefits to Chinook stocks important to the Southern Resident orcas. Additional state funding should be provided to focus specifically on high priority actions for the Chinook stocks that most benefit Southern Residents for at least 10 years (5 biennia). These programs have traditionally allocated approximately 80 percent of their funding towards projects that provide benefits to Chinook.

Potential habitat recommendation 2: In 2019, the governor should request that the legislature create a new, large-scale, multiple-benefits estuary-specific capital program and identify revenue sources. This program would provide dedicated funding for those large-scale estuary restoration

projects that are beyond the capacity of the Estuary and Salmon Restoration Program and that would not be constrained/limited by the Puget Sound Nearshore Ecosystem Restoration Project. The program should be coordinated by the salmon recovery regional organizations with estuaries (Lower Columbia, Washington Coast, and Puget Sound) and with grant-management support from the Recreation and Conservation Office. The funds would be intended to accelerate the pace of critically important but costly estuary restoration and increase juvenile Chinook production in the very near term. Any estuary selected for restoration should be a high-priority Chinook salmon estuary, identified as being important for the Southern Resident orcas. Possible estuaries to focus on are the Nooksack, Skagit, Stillaguamish, Elwha, Dungeness, Snohomish, Green-Duwamish, Puyallup, Nisqually, Skokomish, the mouth of the Columbia, and Chehalis, all benefitting high-priority Chinook for Southern Residents.

Potential habitat recommendation 3: As soon as possible, the governor should direct Washington Department of Fish and Wildlife (WDFW) staff to develop rules to fully implement and enforce the Fishway, Flow and Screening statute (Chapter 77.57 RCW). Ask the legislature to rescind or amend appropriate portions of WDFW's Hydraulic Project Approval authority (RCW 77.55.231(1)) to enable WDFW to require mitigation for cumulative impacts over time and to implement a precautionary approach. This should be coupled with increased enforcement and possibly changes in the regulatory reform package.

Potential habitat recommendation 4: The Washington Department of Fish and Wildlife and Washington Department of Ecology should work with the Attorney General's Office and local prosecutors to increase criminal prosecution of violations related to habitat protection and water quality regulations. Increase the number of Department of Fish and Wildlife and Washington Department of Ecology administrative compliance staff to improve civil enforcement. The legislature should amend WDFW's civil penalty statute (RCW 77.55.291) to provide the department with administrative enforcement tools equivalent to those of local governments, Ecology and DNR.

Potential habitat recommendation 5: The legislature should revise the statutes granting single-family exemptions and exceptions for docks and shoreline armoring in shoreline master plans (WAC 173 26241) and for bulkheads and rock walls in WDFW's Hydraulic Project Approval authority (RCW 77.55.141).

Potential habitat recommendation 6: Working group and task force members will work with the Governor's Office, legislators, tribes, DNR, WDFW, Ecology and salmon recovery representatives to develop a habitat protection/regulatory reform legislative package to put forward for action during the upcoming legislative session. Regulatory improvements or changes that can be made via rulemaking or internal policy changes will also be identified. This will likely include changes to the single-family exemption laws and exceptions for docks.

Potential habitat recommendation 7: The legislature and federal agencies (such as the Natural Resource Conservation Service) should create an additional mechanism and increase financial assistance for cooperative conservation programs (e.g., fish screens, riparian areas, private fish passage upgrades) implemented by conservation districts, lead entities, or individual landowners. Relevant existing programs include enhanced wildlife forage in estuaries (incentives to farmers), Floodplains by Design and the Conservation Reserve and Enhancement Program. *(Details on financial needs to implement this action are needed from working group and task force members.)*

Potential habitat recommendation 8: The governor should direct Department of Ecology staff to identify how to improve Southern Resident prey availability through existing habitat and water

quality regulations and report to the task force by June 2019. At the state level, the governor and legislator must provide clear direction and support to facilitate change from the status quo (due to variable implementation). In addition, opportunities to increase voluntary compliance with existing laws and regulations and/or voluntary changes to existing local or regional laws and policies could be improved through other non-regulatory actions such as landowner incentives. Implementation gaps that are presently occurring do not require any additional authority outside of the jurisdictional body (that is, they simply require corrected actions by the jurisdictional body). This should be coupled with increasing enforcement of existing regulations.

Hatcheries

There are three options for a hatchery recommendation. The task force may select recommendation 1A, 1B, or 1C, or none. Hatchery production actions should be paired with investments in habitat protection and restoration to be most effective and protect natural Chinook stocks. The three options are as follows:

Potential hatchery recommendation 1A: Beginning in fiscal year 2020, the legislature should fund the Washington Department of Fish and Wildlife to coordinate with co-managers and other partners to increase hatchery production for the benefit of Southern Resident orcas at facilities in Puget Sound, on the Washington coast and in the Columbia River basin in a manner consistent with wild fish conservation, state and federally adopted recovery plans and the Endangered Species Act. The governor should also ask that other funders — such as the National Oceanic and Atmospheric Administration, U.S. Fish and Wildlife Service, Bonneville Power Administration and Oregon Department of Fish and Wildlife — of hatchery programs for priority Southern Resident Chinook stocks maintain or increase production levels for those stocks, so that additional state hatchery investments result in an overall increase in prey abundance.

Increasing hatchery production will require funding for the following activities:

- **Adaptive management and five-year comprehensive reviews.** To continue ongoing hatchery production with funding at the increased levels, WDFW must conduct annual adaptive management and five-year comprehensive reviews and adjust production and practices accordingly to limit impacts on natural salmon stocks if the reviews provide evidence of significant risk to the recovery of natural salmon stocks. These reviews should consider stray rates, productivity, juvenile rearing carrying capacity, smolt-to-adult ratios, genetic fitness and other appropriate metrics to determine if action is needed to ensure the health or recovery of natural stocks. Accomplishing this review will require additional state funding to WDFW and partners in future years (such as in years when hatchery-produced fish return to Washington waters).
- **Production at the 2019 level.** Although the legislature provided funding in fiscal year 2019 to increase hatchery production with existing infrastructure, continued funding is needed to continue these production increases.
- **Additional science and infrastructure to support increased production for orcas.** Additional funding is needed to expand production beyond the 2019 level driven by the Southern Residents' needs. Expanding production will require additional hatchery facility capacity upgrades as well as methods or infrastructure to manage hatchery returns. It should use the best available science around hatchery production to adaptively manage the program to consider the factors listed above.

- **Funding to WDFW, co-managers, and salmon recovery regions** to collaborate on hatchery production decisions.

Potential hatchery recommendation 1B: The governor and legislature should provide funding to WDFW to coordinate with partners and begin testing pilot actions in hatcheries in 2019. These pilots should aim to a) increase marine survival of Chinook, b) adjust return timing and locations to align with orcas' needs, c) increase size and age of return, and d) reduce potential competition with wild fish. Hatchery pilots may require additional production to ensure that existing production levels are not affected by these trials, which have uncertain outcomes in terms of fish survival. Additional hatchery increase measures should be determined based on feedback from the pilot program, impacts to wild fish, and foraging opportunities for Southern Resident orcas. WDFW should be funded to work with co-managers and other partners with ongoing funding of approximately \$650,000 annually for five years to implement the pilots and monitor their effectiveness.

Potential hatchery combination recommendation 1C (combination of options 1A and 1B, which includes hatchery production increases, pilot hatchery projects, and habitat investments): Beginning in fiscal year 2020, fund WDFW to coordinate with co-managers and other partners to increase hatchery production for the benefit of Southern Resident orcas at facilities in Puget Sound, on the Washington Coast, and in the Columbia River basin, in a manner consistent with wild fish conservation, state and federally adopted recovery plans, and the Endangered Species Act. The governor should also ask that other funders – such as the National Oceanic and Atmospheric Administration, U.S. Fish and Wildlife Service, Bonneville Power Administration, and Oregon Department of Fish and Wildlife – of hatchery programs for Chinook stocks that are a priority for Southern Resident orcas maintain or increase production levels for those stocks, so that additional hatchery investments result in an overall increase in prey abundance. Increasing hatchery production will require funding for the following activities:

- **Adaptive management and five-year comprehensive reviews.** To continue ongoing hatchery production with funding at the increased levels, WDFW must conduct annual adaptive management and five-year comprehensive reviews and adjust production and practices accordingly to limit impacts on natural salmon stocks if the reviews provide evidence of significant risk to the recovery of natural salmon stocks. These reviews should consider stray rates, productivity, juvenile rearing carrying capacity, smolt-to-adult ratios, genetic fitness, and other appropriate metrics to determine if action is needed to ensure the health or recovery of natural stocks. Accomplishing this review will require additional state funding to WDFW and partners in future years (such as in years when hatchery-produced fish return to Washington waters).
- **Production at the 2019 level.** Although the legislature provided funding in fiscal year 2019 to increase hatchery production with existing infrastructure, continued funding is needed to continue these production increases.
- **Additional science and infrastructure to support increased production for orcas.** Additional funding is needed to expand production beyond the 2019 level driven by the Southern Residents' needs. Expanding production will require additional hatchery facility capacity upgrades and should use the best available

science around hatchery production to adaptively manage the program to consider the factors listed above.

- **Funding to WDFW, co-managers, and salmon recovery regions** to collaborate on hatchery production decisions.

The governor and legislature should also provide funding to WDFW to coordinate with partners and begin testing pilot actions in hatcheries in 2019. These pilots should aim to a) increase marine survival of Chinook, b) adjust return timing and locations to align with orcas' needs, c) increase size and age of return, and d) reduce potential competition with wild fish. Hatchery pilots may require additional production to ensure that existing production levels are not affected by these trials, which have uncertain outcomes in terms of fish survival. Pilot hatchery actions should be used to gather science to adaptively manage hatchery production levels and practices, including guiding the continued increases of hatchery production over time to provide more adult Chinook for Southern Residents, while ensuring that increases are done in a manner that is under ESA limits and done in a manner that does not impact Chinook recovery. WDFW should be funded to work with co-managers and other partners with ongoing funding of approximately \$650,000 annually for five years to implement the pilots and monitor their effectiveness.

Hydropower

Potential hydropower recommendation 1: In 2019, the governor and legislature should provide funding through WDFW and regional salmon recovery organizations to coordinate with tribes, local governments, NOAA and other key partners to assess and prioritize appropriate locations, costs, management, operations and other key information necessary to implement re-establishment of salmon runs as soon as possible above the dams and in the watersheds agreed to by the parties. Provide policy support for Chinook reintroduction upstream of Chief Joseph and Grand Coulee Dams for both the near-term trap-and-haul efforts (cultural releases implemented by the Upper Columbia tribes) as well as the long-term phased approach in the Northwest Power and Conservation Council's Fish and Wildlife Program and the Columbia River Treaty. Priority will be given to those projects that can produce downstream adult Chinook.

Potential hydropower recommendation 2: In early 2019, the governor should direct WDFW, in conjunction with regional salmon recovery organizations, to compile and prioritize a list of barriers where removal would yield high benefit to Chinook and provide this list to the task force by June 2019. The legislature via the various salmon recovery accounts should ensure funding for removal of the high priority barriers in its 2020 supplemental capital budget.

Potential hydropower recommendation 3: The governor's budget should include \$200,000 per year for next three years as partial funding to support the proposed study to evaluate predatory fish population reductions through McNary Dam reservoir elevation management.

Potential hydropower recommendation 4: The Department of Ecology should move to immediately eliminate the current 115 percent standard for the forebay of the eight dams on the lower Snake and lower Columbia rivers and adjust total dissolved gas allowances to 125 percent, as measured at tail races, to create flexibility to adjust spill regimes to benefit Chinook salmon and other salmonids. The Department of Ecology should work as expeditiously as possible with the Oregon Department of Environmental Quality to align at this level.

Two actions related to the on-going operations of the Lower Snake River dams were ranked equally at three votes each by the Prey Working Group. However, several working group members voiced that due to the timing of the webinar (scheduled for Sept. 27, after the release of this draft report on Sept. 24), they did not yet feel equipped to decide if these actions should be included, and if so, which option should be selected. After the webinar and through discussions at its October and November meetings, the task force may select potential hydropower recommendation option 5A, 5B, or none or may request to move other options currently in Appendix 4 to the Year 1 list.

Potential hydropower recommendation 5A: The governor should express support for the ongoing National Environmental Policy Act or NEPA process for the federal Columbia River Hydropower System and continue to participate in evaluating alternatives. The analysis will include a range of alternatives around the 14 federal hydropower facilities that exist along the Columbia and Snake River.

Potential hydropower recommendation 5B: The governor should hire a neutral third party to initiate the development of a forum for local, state, tribal, federal and other stakeholders to begin developing a regional approach to understanding the needs of stakeholders and costs, benefits, risks and other issues related to the possible future removal of the four Lower Snake River dams. The third-party entity should report to the task force by September 2019. This stakeholder effort should be completed in time to inform decisions resulting from the ongoing development of the environmental impact statement for Snake and Columbia River dam operations.

Harvest

Potential harvest recommendation 1: The governor should direct WDFW to collaborate with tribes to analyze the feasibility, logistics and costs/benefits of developing a buyback program to remove fishing gear that has high release mortality of Chinook and/or transition to gear that has lower cumulative Chinook mortality. Complete the analysis by December 2019. Following that assessment, if appropriate, ask the legislature to allow additional gear licenses to be reissued to provide in-kind trades. One-time funding should be provided to WDFW to complete the report (estimated at \$50,000) and then the governor and legislature should provide adequate funding based on the analysis to begin implementing the program.

Potential harvest recommendation 2: The governor should direct WDFW representatives on the Pacific Fishery Management Council and North Pacific Fishery Management Council to work with regional stakeholders and manager starting in 2019 to avoid bycatch and further reduce the allowable bycatch of Chinook in Alaskan fisheries to ensure that more Chinook reach Southern Residents.

Potential harvest recommendation 3: Support the full implementation of the 2019-2028 Pacific Salmon Treaty together with the funding components that benefit Southern Resident orcas. Elements of the renegotiations included reductions in impacts on Chinook, thereby making more prey available to Southern Residents. Related funding elements should include investments in habitat and hatcheries to increase Chinook abundance. The governor should express the need for approval of the appropriations requests to the Washington federal delegation. Task force members should also reach out to the delegation for their support of the funding components.

Potential harvest recommendation 4: Fund and develop a “real-time” (within days) system to determine and communicate when Southern Residents are in an important foraging area in order to close WDFW-managed commercial and recreational fisheries for that area. The identification of the areas and development of the system should be coordinated with the appropriate tribes and local governments. To accomplish this action, WDFW needs authority under the Administrative Procedures Act to implement emergency regulations to close commercial and recreational fisheries during these days for these reasons. The system should be in place by May 1, 2019, with ongoing state funding provided to implement the system through WDFW; funding needs are estimated at \$250,000 per biennium for acoustic equipment and coordination. Funding should also be allocated for outreach and education around the establishment of this system (estimated at \$60,000 for the 2019-2021 biennium). *(The development of this system could be used to implement other actions around vessels.)*

Potential harvest recommendation 5: The governor and legislature should support and fund a buyback program for state commercial fisheries to reduce impacts on Chinook stocks important to Southern Residents. Direct state funds to WDFW to work with partners to develop the program and urge Congress to supply complementary funding.

Predation

There are two options for a combination of Puget Sound/outer coast pinniped predation actions. The task force may select recommendation option 1A or 1B or neither:

Potential predation combination recommendation 1A (combination option of Puget Sound/outer coast pinniped predation actions, which is similar to combination recommendation 1B but does not include the immediate implementation of a haul-out removal pilot project): Starting immediately, the governor, legislature and NOAA should support and fund the continued development of science to better understand the extent of pinniped predation in Puget Sound and the outer coast in order to determine and apply appropriate management actions. Analyses should help determine the extent to which pinniped predation is a limiting factor for Chinook survival in each area, where and what types of management actions are best suited to the situation, and, if needed, provide any information necessary to secure authorization to perform needed management actions. A quantitative and spatial assessment of the consumption of harbor seals by transient killer whales in Puget Sound and the effect of potential removals on transient populations should also be conducted. Both the science and assessment of the management actions should account for factors that may exacerbate or ameliorate predation, including infrastructure haul-outs, hatchery strategies, and the presence/absence of forage fish or other fish that are staple food for pinnipeds. As soon as possible, WDFW and the Puget Sound Partnership – or an appropriate board or partner designated by them – should convene a science panel to coordinate on ongoing science and deliver potential management options. Funding required to coordinate the science panel and implement the studies is estimated at \$550,000 one-time funding for this biennium and \$225,000 per biennium for ongoing coordination and monitoring activities.

At the same time, the governor should ask NOAA to expediently complete an assessment to determine the optimal sustainable populations of the harbor seal stocks of Puget Sound and then convene the Pacific Scientific Review Group to review the assessment.

The governor should also request that WDFW immediately develop a management panel of state, tribal and federal agency decision-makers to convene periodically to be updated on the state of the science on Puget Sound and outer coast predation and to discuss and coordinate potential management options. In the event that the management panel recommends a request for authorization for pinniped management through the Marine Mammal Protection Act, WDFW should receive state funding for coordination of this process (estimated at \$80,000 one-time funding), and the governor should request that the Washington federal delegation support funding capacity for NOAA to review the application expediently. Once authorization is received for any management actions, those actions should be funded through state and federal funds.

Potential predation combination recommendation 1B (combination option of Puget Sound/outer coast pinniped predation actions, which is similar to potential predation combination recommendation 1A, but includes the immediate implementation of a haul-out removal pilot project):

Starting immediately, the governor, legislature and NOAA should support and fund the continued development of science to better understand the extent of pinniped predation in Puget Sound and the outer coast to determine and apply appropriate management actions. Analyses should help determine the extent to which pinniped predation is a limiting factor for Chinook survival in each area, where and what types of management actions are best suited to the situation, and, if needed, provide any information necessary to secure authorization to perform needed management actions. A quantitative and spatial assessment of the consumption of harbor seals by transient killer whales in Puget Sound and the effect of potential removals on transient populations should also be conducted. Both the science and assessment of the management actions should account for factors that may exacerbate or ameliorate predation, including infrastructure haul outs, hatchery strategies, and the presence/absence of forage fish or other fish that are staple food for pinnipeds. As soon as possible, WDFW and the Puget Sound Partnership – or an appropriate board or partner designated by them – should convene a science panel to coordinate on ongoing science and deliver potential management options. Funding required to coordinate the science panel and implement the studies is estimated at \$550,000 one-time funding for this biennium and \$225,000 per biennium for ongoing coordination and monitoring activities.

At the same time, the governor should ask NOAA to expediently complete an assessment to determine the optimal sustainable populations of the harbor seal stocks of Puget Sound and then convene the Pacific Scientific Review Group to review the assessment.

Difference from option 1A: In the 2019-2021 biennium, the governor and legislature should also begin to fund WDFW to work with tribes and NOAA to pilot the removal or alteration of artificial haul-out sites used by pinnipeds in the Puget Sound in places that may improve Chinook survival. Funding should include implementation and monitoring components to assess the effectiveness of this approach to guide potential future haul-out removals (estimated at \$200,000 one-time funding).

The governor should also request that WDFW immediately develop a management panel of state, tribal and federal agency decision-makers to convene periodically to be updated on the state of the science on Puget Sound and outer coast predation and to discuss and coordinate potential management options. In the event that the management panel recommends a

request for authorization for pinniped management through the Marine Mammal Protection Act, WDFW should receive state funding for coordination of this process (estimated at \$80,000 one-time funding), and the governor should request that the Washington federal delegation support funding capacity for NOAA to review the application expediently. Once authorization is received for any management actions, those actions should be funded through state and federal funds.

There are two options for an action on Columbia River pinniped predation. The task force may select option 2A, 2B, or neither, but not both):

Potential predation combination recommendation 2A: Task force members and the governor should support efforts to amend the Marine Mammal Protection Act, or MMPA, to more effectively manage pinniped predation of salmonids in the Columbia River. The task force should join the governor in expressing public support for a Columbia River-specific amendment to the MMPA, which is currently under consideration in Congress.

Alternatively, or in the meantime, the governor and task force should support an application for MMPA authorization to increase effectiveness of the management program by allowing the management of Steller sea lions, increasing removal levels and altering removal requirements. In the case of an application for MMPA authorization, the governor should request that the Washington federal delegation support funding capacity for NOAA to review the application expediently. To implement increased management through either a MMPA amendment or additional MMPA authorization, the legislature should provide additional funding to WDFW to work with partners to carry out the program (estimated at an additional \$600,000 per biennium).

To monitor the effectiveness of the management program, the governor should request that NOAA provide federal funding to monitor Chinook salmon survival from the Columbia River estuary to Bonneville Dam. The governor and legislature should provide complimentary state funding for WDFW to perform pinniped distribution surveys for this same area (estimated at \$40,000 per biennium). In combination, these two analyses will greatly help to guide current and future management actions.

Potential predation recommendation 2B (increases scientific knowledge for Columbia River pinniped predation only): The governor should request that NOAA provide federal funding to monitor Chinook salmon survival from the Columbia River estuary to Bonneville Dam. The governor and legislature should provide complimentary state funding for WDFW to perform pinniped distribution surveys for this same area (estimated at \$40,000 per biennium). In combination, these two analyses will greatly help to guide current and future management actions.

Potential predation recommendation 3: The governor should consult with WDFW and the Invasive Species Council and then support reclassifying nonnative predatory fish (including, but not limited to, walleye, bass, and catfish) from game fish to invasive species to allow and encourage removal of these predatory fish in waters containing salmon or other ESA-listed species. It is currently illegal to "waste" sport fish and in many rivers/lakes the harvest of these nonnative predators is regulated by catch limits. Any increase in fishing for these species should not increase bycatch of salmonids.

Forage fish and marine productivity

Potential forage fish recommendation 1: The governor and legislature should fully fund the projects approved during the 2018 grant round by the Puget Sound Acquisition and Restoration, Washington Coast Restoration Initiative, Salmon Recovery Funding Board and Estuary and Salmon Restoration Programs that address nearshore habitat. The cost of implementing the projects focused on forage fish habitat (that is, nearshore) is estimated at \$60 million. This is a subset of the overall prioritized salmon recovery programs in potential habitat recommendation 1.

Potential forage fish recommendation 2: The governor and legislature should continue to provide funding for forage fish surveys to identify and map the expansion or contraction of critical habitat used by three species of forage fish in Puget Sound: herring, surf smelt and sand lance. These surveys provide the only index of abundance currently available for any species of Puget Sound forage fish by estimating the spawning biomass of over 20 Puget Sound herring stocks. Access to quality spawning habitat is critical to the health and persistence of forage fish stocks, so the results of forage fish surveys are updated annually and made available online to inform shoreline development, protection, and restoration decisions that affect these species. Ongoing funding should be provided to DNR's Puget Sound Corps program (\$748,000 per biennium) and to WDFW (\$296,000 per biennium) to implement the surveys.

Potential forage fish recommendation 3: The governor should fund the Puget Sound zooplankton sampling program, which leverages the work of 12 tribal, county, state, federal, academic and non-academic entities to sample the zooplankton community every two weeks at 16 sites. These data help determine the role of our restoration actions vs marine drivers of productivity and aid in the forecasting of Chinook and forage fish abundance to help make continuous management decisions for whales and fisheries. Funding should be provided through the Department of Natural Resources in the amount of \$720,000 per biennium, which will be leveraged with non-state partner funds to enable the continuation of the program.

Potential forage fish recommendation 4: The governor should provide ongoing funding for WDFW to inventory existing and future planned forage fish harvest levels and to assess impacts to forage fish populations important to Chinook. Funding should be provided to WDFW in the amount of one-time funding of \$537,000 for 2019-2021 and then approximately \$300,000 per biennium on an ongoing basis.

Vessel and noise recommendations

The working group has developed a draft “portfolio” or suite of actions/recommendations across the different vessel-related threats to the Southern Residents (noise and disturbance from small vessels and ships; sonar; oil spills), based on task force direction. The working group has included in the Year 1 category potential recommendations that (1) would have immediate benefit to the orcas, or (2) need to start immediately to have the greatest benefit to orcas in the future. As noted above, these have not been identified as the final recommendations of the task force.

Potential vessel recommendation 1: In the 2019 legislative session, the state legislature and governor should update RCW 77.15.740* to establish a statewide “go slow” bubble for vessels operating within ½ nautical mile of orcas. “Go slow” is defined as 7kt speed over ground (GPS calculation). It is intended that fish and wildlife officers and other law enforcement officers will use

discretion when enforcing this section and provide public outreach and education when they determine that it is appropriate.

**Exemptions for safe operation, shipping, tribal and commercial fishing and other activities are well-described in Section 2 of 77.15.740.*

Potential vessel recommendation 2: In the 2019 legislative session, the state legislature and governor should provide proviso funding to WDFW to create a long-term Marine Enforcement Division of at least four fish and wildlife officers or FWOs, including the two FWOs currently funded under the governor’s 2018 executive order, that will be dedicated toward the goal of providing marine-based Southern Resident orca protection on every day of the whale-watching season and at other times of need. The proposed FWOs will be based in northern Puget Sound and will be strictly focused on protection of all marine resources when not engaged in priority Southern Resident orca protection activities (such as promoting compliance with RCW 77.15.740 and any new regulations).

Potential vessel recommendation 3: By December 2018, the Puget Sound Harbor Safety Committee should establish a “standard of care” for small vessel operators to turn off or switch echo sounders and other underwater transducers from the 50-kHz (or less common 80-kHz) setting to the 200-kHz setting when within 1 kilometer of orcas except when the lower frequency is necessary for safe navigation. The adopted standard should be reported to the task force and communicated to registered vessel owners in Puget Sound counties through the Department of Licensing. The Southern Resident Orca Task Force and its Vessels Working Group should work immediately with maritime organizations with broad communications networks — such as the Northwest Marine Trade Association, Recreational Boating Association of Washington, U.S. Coast Guard Auxiliary and Boating Squadron, Washington State Ferries, State Parks, ports, marinas, Be Whale Wise — to develop and implement a complementary outreach campaign for voluntary compliance. In 2019, the task force should consult with the legislature about opportunities to phase in mandatory equipment requirements (for whale-watching vessels in the putative limited entry permit system, for example) and initiate a formal conversation with echo sounder manufacturers and suppliers.

Potential vessel recommendation 4: By May 2019, the legislature and governor should establish a Salish Sea limited-entry whale watching permit system, to be managed by the Department of Fish and Wildlife, that restricts the number of commercial whale-watching vessels and commercial kayak groups around the Southern Resident orcas each day and that sets a cap on the number of permits issued for Puget Sound with a buyback program initiated by funding in the next state biennial budget. A Salish Sea limited-entry whale watching permit would be required for Canadian commercial whale-watching vessels that enter Washington state waters. This system should be coupled with requirements such as the use of Automatic Identification Systems to promote effective monitoring and compliance. Begin discussions with Canada (Department of Fisheries and Oceans) to establish a similar system in Canada that would be required for US commercial whale-watching vessels that enter Canadian waters.

Potential vessel recommendation 5: Given the high rate of transboundary participation and compliance in voluntary, targeted trials to slow down ships and shift them away from key Southern Resident orca foraging areas near the international shipping lanes to reduce the level of shipping noise (led by the Enhancing Cetacean Habitat and Observation [ECHO] program of the Vancouver

Fraser Port Authority), the governor should continue to encourage strategic US and Washington state collaborations with ECHO — from the U.S. Coast Guard, Washington State Ferries, Puget Sound ports, the Pacific Merchants Shipping Association, the Puget Sound Pilots and others — that continue to support parallel and adaptive implementation of ECHO and related shipping noise-reduction initiatives while promoting safe, sustainable shipping practices.

Potential vessel recommendation 6: To better detect the location and movements of Southern Resident orcas in near real-time, and potentially reduce the underwater noise of nearby ships and small vessels through targeted advisories, Governor Inslee and the legislature should: (1) fund the deployment of a permanent scientific grade hydrophone near Eagle Point by San Juan County and fill in other key gaps in the underwater acoustic monitoring network of Puget Sound, and (2) support advancement of acoustic and visual mapping efforts by Orcasound, Orca Network, Washington State Ferries and others, with the goal to share Washington data with the (Southern Resident Killer) Whale Report Alert System being developed in Canada by ECHO, the Vancouver Aquarium, and others and gain access to the eventual platform so that professional mariners (pilots/public and private ferries/navies/enforcement officers) and the public can use it for potential lead-time (and real-time) ship speed and route management.

There are three options for potential vessel recommendation 7:

Potential vessel recommendation 7A: The governor and legislature should fund WDFW, outside orca experts, San Juan County and other local governments to collaborate with affected user groups and other partners to establish protection areas (no-go zones) that apply to all vessels not exempted under RCW 77.15.740, in critical areas for whales, as well as geographic areas that include but are not limited to the west side of the San Juan Islands and marine areas 4, 5 and 6 (roughly extending from Admiralty Inlet to Neah Bay). This should include the science related to foraging behavior and habitat and options for establishing geographically distinct protection areas (no-go zones); pilot closure with effectiveness monitoring; seasonal no-go zones; and no-go zones that reflect where and when whales are actively feeding. Such efforts should align with the Washington Fish and Wildlife Commission policy on marine protected areas and include formal consultation with tribes. Any emergency closures implemented in 2019 must be accompanied by adequate monitoring to measure effectiveness.

Potential vessel recommendation 7B: No later than December 1, 2018, WDFW must convene affected user groups, tribes, and governments to establish zones restricting entry of commercial whale-watching vessels and recreational vessels to protect Southern Resident orcas north of Pile Point and south of Mitchell Bay. If additional authority is necessary for WDFW to establish and implement such zones, it should request such authority from the 2019 Washington legislature. The work should employ updated scientific methodologies and seek to balance competing objectives by providing maximum benefit to the Southern Resident orcas at the least cost to ocean users. The zones should avoid high commercial navigation lanes. WDFW should consult with the United States Coast Guard to avoid conflicts with federal regulations. WDFW should adopt regulations establishing the zones no later than May 1, 2019, by emergency regulations if necessary.

Potential vessel recommendation 7C: Redirect vessels in near real-time when Southern Resident orcas are near or approaching a fishing area, through temporary fishing closures.

This could be accomplished through potential harvest recommendation 4 and potential vessel recommendation 6 above.

Potential vessel recommendation 8: The governor should direct the Department of Ecology and request that the Department of Natural Resources and the Department of Fish and Wildlife work with the Governor's Office for Regulatory Innovation and Assistance to determine — and report to the task force by April 2019 — how applicable current and future permit applications** in Washington state that could increase vessel traffic and vessel impacts (risk of oil spills, increased noise, threat of ship strikes) could be required to explicitly address potential impacts to Southern Resident orcas and treat underwater noise as a “primary constituent element” of critical habitat. This work must coordinate with local governments, tribes and others to identify authorities to issue permits, authorizations or mitigation measures related to any projects, and must increase transboundary coordination to address impacts from projects initiating in Canada.

**For example:

- Update the State Environmental Protection Act or SEPA checklist.
- Update the Joint Aquatic Resources Permit Application form.
- Update the Prevention of Significant Deterioration Permit to Construct to specifically include potential vessel traffic impacts to Southern Resident orcas.
- Update state regulations and Ecology’s Shoreline Master Program Handbook to address vessel traffic impacts and require Southern Resident orca expertise for all state application submittals

Potential vessel recommendation 9: The governor and legislature should support and accelerate transition of the Washington State Ferries fleet to quieter, more fuel-efficient designs and technologies — while funding the Washington State Ferries fleet noise baseline analysis project in 2019 — to achieve data-driven noise reduction goals.

Potential vessel recommendation 10: The governor should request that the Washington State Parks and Recreation Commission, Northwest Marine Trade Association and Recreational Boating Association of Washington work with the U.S. Coast Guard and National Association of State Boating Law Administrators to require that the print and online curricula, testing, and outreach for the mandatory Washington State Boater Education Card: (1) include Be Whale Wise guidelines; (2) include related updates to voluntary and regulatory measures by May 2019; and (3) include broader outreach to charter boat, boat rental companies and exempted audiences from outside Washington state (particularly in Canada) and those whose lifetime certification was obtained prior to the updated standards.

Potential vessel recommendation 11: The legislature should provide direction and resources for the Washington State Academy of Sciences to create a collaborative forum that includes acoustics researchers, the State of Washington, NOAA and the Pacific Whale Watch Association to create vessel and fleet sound profiles to determine acceptable underwater sound baselines (decibels at source/received) and identify whale watching guidelines for the Pacific Whale Watch Association and private boaters that will better minimize underwater noise levels, the occurrence of acoustic masking and interference with orca communication.

Potential vessel recommendation 12: The governor and legislature should support establishment of a permit or endorsement to be required of all boaters engaged in whale watching. Boaters transiting an area with whales would be given a 15-minute grace period and enforcement officers would be advised to use their discretion. The fee should not exceed \$10 annually, with revenue collected to be used exclusively by the WDFW Marine Enforcement Division (see potential vessel recommendation 2). The permit or endorsement could be in the form of a marine endorsement upon vessel registration but could also be obtained from WDFW by boaters and kayakers through outlets selling fishing licenses and access passes to Washington recreational lands and facilities (such as the Discover Pass). A whale-watching guidelines booklet should be provided when the permit or endorsement is obtained; this could also be added to the fishing rules booklet that is already provided. If additional statutory authority is needed for this action, proposed legislation should be forwarded to the 2019 Washington legislature.

Actions related to the following potential recommendation *received less than half the level of support from the Vessels Working Group* compared to all of the above actions. However, the issue has received compelling support from individual members of the task force who have urged for inclusion of an oil spill prevention recommendation as part of the vessels portfolio of recommendations in this report.

Potential vessel recommendation 13: Address ongoing vessel safety issues, including oil transport, in the shared waters of the Salish Sea. Utilizing recommendations from the Department of Ecology's Strait of Juan de Fuca and Puget Sound Vessel Traffic Safety Report (2018), the 2019 Washington legislature should enact legislation to reduce the risk of oil spills in Puget Sound. The legislation should: (1) require escort tugs for all oil transport vessels over 5,000 tons, including oil barges and articulated tug-barges; (2) require the oil shipping industry to fund a stationed emergency response towing vessel (rescue tug) in a location to minimize response time in the Haro Strait and other navigation lanes with the highest tank vessel traffic; and (3) require updated oil spill prevention and cleanup standards to address new types of oil (e.g., diluted bitumen) and increased shipments by articulated tug-barges. The governor should meet with Canadian officials and seek involvement from the US Coast Guard and the joint meetings of the Puget Sound Harbor Safety Committee and Canadian Pacific Coast Marine Advisory Review Panel and Navigation Aids and Navigation Services. The governor should direct the Department of Ecology and the Department of Fish and Wildlife to engage in Canadian environmental assessments of project-related shipping's cumulative effects on Southern Resident orcas.

Contaminants recommendations

The Contaminants Working Group has developed nine potential recommendations for near-term action. As noted above, these have not been identified as the final recommendations of the task force.

Potential contaminant recommendation 1: The Department of Enterprise Services should immediately accelerate implementation of the ban on PCBs in state-purchased products and make information about PCB levels in state-procured products and packaging available online to the public so other purchasers can access this information and make informed purchasing decisions.

Washington state adopted a procurement law in 2014 that states: "no agency may knowingly purchase products or products in packaging containing polychlorinated biphenyls above the

practical quantification limit except when it is not cost-effective or technically feasible to do so.”(RCW 39.26.280)

Implementation of this law should be accelerated to reduce PCBs entering Puget Sound from products such as paints, hatchery fish feed, adhesives, electrical equipment, caulking, paper products and lubricants. Product suppliers to the state will provide information about PCBs in their products, and this information can be shared with other purchasers that want to avoid products containing PCBs.

Potential contaminant recommendation 2: The Department of Ecology should develop a prioritized list of the chemicals of emerging concern (CECs)* based on greatest benefit to Southern Resident orcas and their prey if action is taken. The Department of Ecology, with input and review from regional experts, should begin this prioritization process in 2018 and complete the list in March 2019.

It is important to note that there is limited toxicological information on many CECs and this process will need to be periodically revisited to ensure that new chemicals and new research findings are incorporated into our efforts to decrease chemical exposure to Southern Residents and their prey.

Potential contaminant recommendation 3: The Department of Ecology should develop a plan and pursue agency request legislation and/or budget requests in the 2019 legislative session to address control of those chemicals of emerging concern (CECs)* based on greatest benefit to Southern Resident orcas and their prey if action is taken (based on the outcome of potential contaminant recommendation 2 above). This legislative request should include funding to implement existing policies as well as identify new policies and actions to decrease the load of priority CECs* to Puget Sound (e.g., phaseouts, disclosure, assessment of safer alternatives and enhanced treatment). Given that pharmaceuticals require a different control mechanism, the Department of Ecology should convene discussions about priority pharmaceuticals, source control and wastewater treatment options. The plan will identify the most effective actions to decrease loading of priority CECs* to Puget Sound and be completed by 2025.

Potential contaminant recommendation 4: The legislature should fund the Department of Ecology in 2019 for a program that incentivizes the accelerated removal of primary legacy sources of PCBs, PAHs, PBDEs and PFAS present in the built environment in the central Puget Sound. In phase 1, Ecology should develop the program, to include a) prioritizing those legacy chemicals likely to have greatest impact on Southern Resident orcas, b) coordinating with ongoing programs, c) gathering stakeholder input, and d) undertaking targeted communications and outreach. In phase 2, the incentive program will be implemented.

Potential contaminant recommendation 5: The Department of Ecology should report in 2019 on how to accelerate effectiveness, implementation and enforcement of National Pollutant Discharge Elimination System or NPDES permits. Using the existing regulatory framework and authority under the Clean Water Act and Water Pollution Control Act, Ecology should set new,

** The following groups of chemicals were identified as potentially important (in no particular order): flame retardants, per- and polyfluoroalkyl substances (PFAS), phthalates, bisphenols, nonylphenols, medications, pesticides and chemical(s) in tires.

more protective numeric water quality standards and technology-based NPDES standards, based on ecosystem needs. To fill gaps, this will primarily focus on PBDEs, CECs* and other chemicals based on greatest benefit to Southern Resident orcas and their prey. In addition, Ecology should consider developing stronger pre-treatment standards for municipal and industrial wastewater dischargers under NPDES.

Improved permit requirements would also result in increased innovation and source control for permitted dischargers and drive improved technology requirements under the existing “best available technology” standard. For municipal wastewater facilities this would combine improved industrial pretreatment and deployment of improved treatment technologies with already planned or required upgrades to wastewater treatment facilities. New standards could be implemented through renewals of the five-year NPDES permit cycle and could allow permittees the necessary time to fully implement solutions (ideally within one permit cycle).

Potential contaminant recommendation 6: To ensure that new and existing NPDES permit conditions and water quality standards are met, the Department of Ecology should seek funding in the 2019 legislative session to conduct more robust inspections, assistance programs and enforcement. This funding should support field staff and data analysis and should include a clear directive to increase enforcement against entities that exceed limits for pollutants known to cause harm to the Southern Residents and their prey.

Potential contaminant recommendation 7: The Department of Ecology should reduce stormwater threats in existing hotspots as soon as possible. In 2018-2019, Ecology, in consultation with regional experts, should identify toxic stormwater hotspots and prioritize them for source control, stormwater retrofits and/or redevelopment projects to meet today’s standards. Ecology should seek new funding in the 2019 legislature through the Stormwater Financial Assistance Program to incentivize stormwater retrofits and source control to achieve goals faster.

Programs such as the Stormwater Financial Assistance Program, retrofits through the Washington State Department of Transportation and federal funding through the Clean Water State Revolving Fund are in place to support this effort but they need substantially increased funding to increase the pace and provide the necessary pollutant removal.

Potential contaminant recommendation 8: The Department of Ecology and the Department of Natural Resources should immediately prioritize and accelerate sediment remediation and nearshore restoration and clean-up of hotspots in forage fish and juvenile Chinook rearing habitat (in sensitive areas) where toxics are known to impact prey survival. All prioritized cleanup actions should ensure that “upstream” source control is also addressed. During the prioritization process, Ecology should coordinate with other agencies such as the Washington Department of Fish and Wildlife and the National Oceanic and Atmospheric Administration. Previously identified hotspots include the Duwamish Estuary and river, Commencement Bay, Hanford Reach, Sinclair and Dyes Inlets and Lake Union.

Potential contaminant recommendation 9: The legislature should fund the Department of Ecology and the Department of Fish and Wildlife to expand and coordinate existing monitoring and new science programs in 2019. Funding is needed immediately to develop and support a robust toxics monitoring program as well as new science to understand the effects of CEC exposure on Southern Resident orcas, their prey and other species in the lower trophic levels. This funding is

critical to gain a more comprehensive understanding of CECs*†; to collect data to address areas where there are critical uncertainties; to evaluate the impact of CECs* on Southern Resident orcas to prioritize cleanups, phase outs and bans; to document whether the actions that are taken are effective; and to make changes to actions/strategies that are implemented if the data demonstrates there is no impact.

Overview of all recommendations

This will be filled out for the final report, using the final list of recommended actions.

Action number	Action	Timeframe	Responsible party	Key partners	Estimated cost to government	Next steps
		Examples: Immediate Near-term Long-term			(range)	

Next steps for the task force

The task force will continue its work in 2019. This work will include discussing remaining potential actions such as those listed in Appendix 4, and others that may be brought forward by the public later. The executive order charges the task force with producing a second report outlining the progress made, lessons learned, and outstanding needs by October 1, 2019; that will conclude the work of this task force.

The task force hopes that through the recommendations in this report, we can make significant, immediate progress toward our goal of consistently well-nourished whales and the survival of several thriving young orcas in the near term. In 2019, the task force will work to refine additional recommendations to ensure that the state is on a clear path to working with partners and across boundaries to ensure a self-sustaining and resilient population of Southern Resident orcas for many generations to come.

† *The following groups of chemicals were identified as potentially important (in no particular order): flame retardants, per- and polyfluoroalkyl substances (PFAs), phthalates, bisphenols, nonylphenols, medications, pesticides and chemical(s) in tires.

Appendix 1: Executive order

EXECUTIVE ORDER 18-02 SOUTHERN RESIDENT KILLER WHALE RECOVERY AND TASK FORCE

WHEREAS, Southern Resident Killer Whales (Southern Residents) are an iconic and treasured species in Washington and throughout the Pacific Northwest;

WHEREAS, Southern Residents are classified as endangered in Washington and surrounding waters, under the U.S. Endangered Species Act and in Canada under the Species at Risk Act;

WHEREAS, the population of Southern Residents has declined, from a high of 98 in 1995, to 76 today, which is the lowest number of Southern Residents in more than three decades. Recent science also indicates that many Southern Residents are in poor condition and are struggling to raise calves;

WHEREAS, if Southern Residents were to become extinct, we would suffer an unacceptable loss to our environment, economy, and way of life. We would also lose an essential component of our marine ecosystem and an indicator of the health of our waters;

WHEREAS, Southern Residents hold significant cultural value to native tribes and all Washingtonians;

WHEREAS, Southern Residents, through the whale watching industry alone, contribute as much as \$60 million to the local economy annually and provide hundreds of jobs to the Puget Sound region;

WHEREAS, Southern Residents make their home in Washington's marine waters for a portion of the year, but they are also highly migratory seeking prey along the west coast from Northern California to Southeast Alaska. Therefore, Southern Residents rely on healthy ecosystems and food sources from Washington and throughout the west coast of the United States and Canada;

WHEREAS, three primary factors threaten Southern Resident populations: (1) prey availability, (2) legacy and new toxic contaminants, and (3) disturbance from noise and vessel traffic. The health of Southern Residents and Chinook salmon are tightly linked. Recent scientific studies indicate that reduced Chinook salmon runs undermine the potential for the Southern Resident population to successfully reproduce and recover. Both Southern Residents and Chinook salmon populations are adversely impacted by warming oceans and ocean acidification due to climate change. Presence of contaminants and accumulation of pollutants in Washington's waters are also linked to the decline of Southern Residents. Key sources of contamination in storm water runoff remain to be addressed and the potential for a catastrophic oil spill continues to threaten Southern Residents and the entire ecosystem of Puget Sound. In addition, increased boat and ship traffic has caused greater underwater noise that interferes with Southern Resident critical feeding and communication;

WHEREAS, both swift near-term actions and effective long-term actions are necessary to recover these iconic and endangered animals. Essential recovery actions that are described in both United States and Canadian federal plans and federally approved regional plans must be implemented

through close coordination with all of our partners including state, local, tribal, and Canadian governmental entities and other private sector partners to be successful;

NOW THEREFORE, I, Jay Inslee, Governor of the state of Washington, by virtue of the power vested in me by the Constitution and statutes of the state of Washington do hereby order and direct as follows:

Implement Immediate Actions to Benefit Southern Resident Killer Whales

Within existing resources, I ask the following state agencies, in consultation with the appropriate local governments, federal agencies, and tribal governments, to conduct the immediate actions listed below to further the purpose of this Executive Order.

- Washington Department of Fish and Wildlife (WDFW) with review from the Governor’s Salmon Recovery Office (GSRO) and the Puget Sound Partnership (PSP)—By July 31, 2018, identify the highest priority areas and watersheds for Southern Resident prey in order to focus or adjust, as needed, restoration, protection, incentives, hatcheries, harvest levels, and passage policies and programs.
- WDFW and Washington State Parks and Recreation Commission (WSPRC)—By April 30, 2018, develop implementation plans for increased enforcement, outreach and education of vessel regulations as well as enforcement of Chinook fisheries regulations in areas frequented by orcas.
- Washington State Department of Ecology (Ecology)—By April 30, 2018, create a curriculum to improve and increase the number of trainings for vessels in the whale watching industry to become “vessels of opportunity” to assist in the event of an oil spill.
- Washington State Department of Transportation (WSDOT)—By May 31, 2018, develop strategies for quieting state ferries in areas most important to Southern Residents.
- WDFW—By April 30, 2018, review and amend, as needed, 2018 recreational and commercial fishing regulations prioritizing protection of key areas and fish runs for Southern Resident recovery. I will also ask our tribal co-managers, and international and federal fisheries managers to work directly with WDFW and its Commission in developing recommendations for implementing this action.
- WDFW—By April 30, 2018, explore options and develop a proposal to alter fish food used in state hatcheries to limit the amount of Polychlorinated Biphenyls (PCBs) in Southern Resident prey.
- PSP, WDFW, GSRO—By December 15, 2018, demonstrate how Chinook recovery projects benefit Southern Resident recovery, beginning in the 2018 grant round, for the Pacific Coast Salmon Recovery Fund, the Puget Sound Acquisition and Restoration Program, the Estuary and Salmon Restoration program and the Washington Coastal Restoration Initiative.
- PSP, WDFW, GSRO, WSPRC, Washington State Department of Licensing (DOL)—By July 1, 2018, prioritize existing outreach resources to support Southern Resident recovery. Collaborate with the Governor’s Office to develop a public education program and identify needed resources.
- Ecology—By July 31, 2018, develop criteria to prioritize financial assistance beginning in the 2019-21 biennium for storm water projects that benefit Southern Resident recovery.

Establishment of the Southern Resident Killer Whale Task Force

A Southern Resident Killer Whale Task Force is hereby created to identify, prioritize, and support the implementation of a longer term action plan needed for the recovery of Southern Residents and necessary to secure a healthy and sustained population for the future. The plan shall include actions needed to make significant progress in addressing all three of the identified threats to Southern Residents. The Task Force should monitor and evaluate the immediate actions undertaken by state agencies and build upon the progress and effectiveness of that work when developing longer term actions. Where available and applicable, the Task Force should build upon existing state, regional and federal plans.

Members of the Task Force will include directors or their senior designees from the Washington Departments of Agriculture, Commerce, Ecology, Health, and Transportation, as well as the Puget Sound Partnership, the Governor's Office of Indian Affairs, the Recreation and Conservation Office, and the Governor's Salmon Recovery Office. I also invite the Department of Fish & Wildlife and its Commission, the Department of Natural Resources, and the Washington State Parks and Recreation Commission to participate on the Task Force as members in full.

I will separately invite representatives of appropriate federal, tribal, and local governments, the private sector and the nonprofit sector, to participate in the Task Force. I will invite each Washington legislative caucus to appoint a member to participate in the Task Force.

I shall appoint co-chairs and convene the Southern Resident Killer Whale Task Force (Task Force) beginning in April 2018.

The Task Force shall work with all levels of government and other partners to identify needed policies and programs, recommend priority actions to support recovery efforts, highlight budget needs, and recommend any legislation needed to support this Executive Order. The Task Force shall coordinate their work with appropriate representatives of the Government of Canada, the Province of British Columbia, and the states of Oregon, California, Idaho, and Alaska.

The Task Force shall prepare a comprehensive report and recommendations for recovering Southern Residents, with a full draft due by October 1, 2018, and a final report by November 1, 2018. The report should detail ongoing and new actions that will address all of the major threats to Southern Residents, including prey availability, legacy and ongoing toxic contaminants, and disturbance from noise and vessel traffic. A second report outlining the progress made, lessons learned, and outstanding needs shall be completed by October 1, 2019. With the submission of its second report, the Task Force shall dissolve.

I direct the Puget Sound Partnership and ask the Department of Fish and Wildlife to organize the necessary agency experts and staff to support the work of the Task Force.

The Governor's Policy Office and the Office of Financial Management will provide assistance and guidance to the lead agencies as needed to ensure the success of the Task Force.

The Governor's Office will work with both the State Legislature and State Congressional delegation to solicit their early and ongoing advice and guidance.

The Southern Resident Killer Whale Task Force shall conduct its business in an open, transparent manner, and its meetings will be open to the public.

Signed and sealed with the official seal of the state of Washington on this 14th day of March, 2018, at Olympia, Washington.

By:

/s/
Jay Inslee
Governor

BY THE GOVERNOR:

/s/
Secretary of State

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Appendix 2: Task force and working group members

See the lists of task force and working group members on the governor's webpage:

<https://www.governor.wa.gov/issues/issues/energy-environment/southern-resident-killer-whale-recovery-and-task-force>

The lists of task force, working group, steering committee, and consultant team members will be included in the final report.

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Appendix 3: Progress update on executive order immediate actions

Progress updates are currently available on the governor's webpage:

<https://www.governor.wa.gov/issues/issues/energy-environment/southern-resident-killer-whale-recovery-and-task-force>

A matrix with all progress updates as of early November will be included in the final report.

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Appendix 4: Additional potential actions for task force discussion

These are additional potential actions that working groups are not currently proposing for inclusion in the 2018 report. For the 2018 report, working groups have recommended other actions that a) would have immediate benefit to the orcas, or b) need to start immediately to have the greatest benefit to orcas in the future.

Some of the actions below are retained as alternative wording to potential recommendations that are already included in the draft Year 1 report.

Other actions below may be discussed in 2019 for potential inclusion in the Year 2 report. The executive order charges the task force with producing that second report by October 1, 2019.

Prey

Habitat

Potential habitat action 9: WDFW and/or others should assess and report on the status of implementation compliance and enforcement of existing regulations statewide.

Potential habitat action 10: The legislature should increase funding for hydraulic code compliance monitoring and enforcement statewide.

Potential habitat action 11: Review previously completed assessment of the no-net-loss policy.

Potential habitat action 12: Explore the feasibility of implementing an ecological-net-gain policy.

Potential habitat action 13: Require that state agencies and local shoreline modification rules (WAC 173-26-231) consider cumulative impacts in issuing permits and use-authorizations of state-managed aquatic lands.

Potential habitat action 14: Fund and complete an assessment of regulations relative to key Chinook and Southern Resident orca habitats and report on the effectiveness of existing regulations. Improve regulations based on findings.

Potential habitat action 15: WDFW should update Southern Resident orca priority habitat guidance for the Growth Management Act and Shoreline Management Act implementation and updates.

Potential habitat action 16: Emphasize avoidance versus mitigation for impacts to Southern Resident orcas, salmon and forage fish habitat.

Potential habitat action 17: Take immediate year one legislative and/or rulemaking action to improve habitat and fish life protection in the Hydraulic Code, fish passage and water quality statutes and regulations.

Potential habitat action 18: Have Ecology and local governments require emphasis on low-impact development practices and prioritize retrofits in urbanized areas in Southern Resident priority Chinook and coho salmon watersheds.

Potential habitat action 19: Amend and expand the Salmon Recovery Funding Board list of projects to include unlisted Chinook stocks that contribute or could contribute to Southern Resident prey.

Potential habitat action 20: Direct state agencies to conserve important Southern Resident, salmon and forage fish habitat on state-owned and managed aquatic lands from future development.

Potential habitat action 21: Create safe harbor agreements for landowners voluntarily protecting or restoring habitat on their properties.

Potential habitat action 22: Direct regulatory agencies to allow deposition of landslide material into the nearshore of Puget Sound to contribute to the nearshore sediment budget.

Potential habitat action 23: Work with BNSF to address fish passage barriers, restore pocket estuaries, and otherwise restore natural habitat processes along the eastern shore of Puget Sound.

Hydropower

Potential hydropower action 6: Recommend that Ecology remove the 115 percent forebay total dissolved gas standard, leaving just the 120 percent tailrace standard in place on the Snake and Columbia Rivers to allow flexibility to adjust spill regimes, as needed, to benefit Chinook salmon and other salmonids.

Potential hydropower action 7: Recommend that Ecology adjust gas standards to a 120 percent tailrace-only standard on the Snake and Columbia rivers and that spill be increased to this level to benefit Chinook salmon and other salmonids.

Potential hydropower action 8: Recommend that Ecology work with Oregon to adjust gas standards to 125 percent on the Snake and Columbia rivers and that spill be increased to this level to benefit Chinook salmon and other salmonids.

Potential hydropower action 9: Distribute the discharge/release sites for juvenile salmonids collected at Columbia and Snake River dams.

Potential hydropower action 10: Open Yakima River flow by removing the Bateman Island causeway.

Potential hydropower action 11: Support non-lethal dissuasion to reduce bird predation near dams.

Potential hydropower action 12: Develop a list of dams that have already been removed to benefit salmon and develop a list of priority projects for potential removal.

Potential hydropower action 13: Support the removal of dams that are on the American Whitewater list. The dams identified for removal in the next one to three years are Middle Fork Nooksack Diversion Dam on the Middle Fork Nooksack River, Pilchuck on the Middle Pilchuck River, and Nelson Dam on the Naches River. In the next four to five years, the list recommends removing Chambers Creek Dam on Chambers Creek and Enloe Dam on the Similkameen River.

Potential hydropower action 14: Develop a potential outline of a package to fund hatchery production to prevent any decreases in Chinook abundance due to dam removal. Snake River hatcheries currently depend on funding tied to the dams' existence and operation; Lower Snake River Compensation Plan documents report the budget is \$30 million annually.

Potential hydropower action 15: Advocate that the US Army Corps unilaterally make a decision to stop operating the Lower Snake River dams and seek authority to breach the dams in near-term. Work to develop a mitigation package for affected communities and stakeholders, and to fund necessary hatcheries and habitat actions in the absence of mitigation funding depending on dam operations. Work to ensure the dams' energy is replaced with carbon-free alternatives.

Potential hydropower action 16: Pass an executive order in favor of Lower Snake River dam removal and replacement with carbon-free alternatives.

Potential hydropower action 17: Request that the governor send the US Army Corps of Engineers a letter requesting that the National Environmental Policy Act and its associated assessment of impacts and alternatives of the federal Columbia River hydropower system be expedited.

Potential hydropower action 18: Request that the federal Columbia River hydropower system NEPA process and related biological opinion issued by NMFS on the operations of the hydropower system fully consider the impact of the hydropower system on the Southern Resident orcas and recommend that the alternatives analysis fully consider, especially in light of climate change, a) increased spill system-wide up to 125 TDG, and b) breaching the lower Snake River dams.

Potential hydropower action 19: Oppose any additional extension of time to complete the federal Columbia River hydropower system NEPA review process.

Harvest

Potential harvest action 6: Further reduce the number of days open to harvest for both recreational and commercial fisheries in marine areas 4, 5, 6, and 7 (Strait of Juan de Fuca and San Juan Islands) in the months of June through September.

Potential harvest action 7: Further limit the number of days open to harvest for both recreational and commercial fisheries on the west side of San Juan Island in the months of June through September.

Potential harvest action 8: Only in years with low Chinook availability in coastal and inland waters (which can be defined based on post-season quartile estimates of abundance), further restrict both commercial and recreational harvest on the west side of San Juan Island in the months of June through September.

Potential harvest action 9: Further reduce the number of days open to harvest for both recreational and commercial fisheries in Marine Area 7 (San Juan Islands) in the months of June through September.

Potential harvest action 10: Only in years with low Chinook availability in coastal and inland waters (which can be defined based on post-season quartile estimates of abundance), further restrict both commercial and recreational harvest in Marine Area 7 (San Juan Islands) in the months of June through September.

Potential harvest action 11: Only in years with low Chinook availability in coastal and inland waters (which can be defined based on post-season quartile estimates of abundance), further restrict both commercial and recreational harvest in Marine Areas 4, 5, 6, and 7 (Strait of Juan de Fuca and San Juan Islands) in the months of June through September.

Potential harvest action 12: Encourage the Washington state legislature to give WDFW the authority to develop a limited-entry fishing permit system for recreational fisheries, to be implemented in foraging hotspots.

Predation

Potential predation action 4: Establish a fund that would be available to private entities, individuals or state agencies to support infrastructure costs associated with modification of artificial haul-outs.

Potential predation action 5: Integrate best management practices that discourage pinniped haul-outs into review and permitting of projects (e.g., docks, swim platforms, buoys, riprap) that could create haul-out sites at predation hotspots.

Potential predation action 6: Support further relocation of Caspian terns from the Columbia River estuary to historical or prepared colony sites outside of the Columbia River basin.

Potential predation action 7: The governor should support removing catch and size limits on nonnative predatory fish (including, but not limited to, walleye, bass, and channel catfish) to encourage removal of these predatory fish, where appropriate. Walleye, bass and channel catfish catch and size limits have been removed in the anadromous zones of the Columbia River and tributaries.

Potential predation action 8: Fund research into harassment devices for pinnipeds, specifically devices that target the middle ear reflex rather than painful high-intensity noise. Also research the use of drones. If successful, these might offer effective alternatives between lethal removal and inaction.

Potential predation action 9: Support existing cormorant management plan objectives for East Sand Island in the Columbia River estuary (including discouraging nesting on the Astoria/Megler bridge).

Potential predation action 10: Request direct congressional appropriations and authority to the US Army Corps of Engineers to restore or create cormorant nesting habitat in non-sensitive areas outside of the Columbia Basin, such as has already been done as part of the federal Caspian tern management plan. Creation of habitat will allow for expanded management options by alleviating habitat constraints in other areas of the cormorants' range.

Forage fish and marine productivity

Potential forage fish action 5: Complete the ongoing Puget Sound forage fish assessment to establish baseline condition/current condition for measuring future progress or loss against.

Potential forage fish action 6: Support and fund the Salmon Recovery Funding Board and Washington Coast Restoration Initiative nearshore projects this biennium to restore forage fish habitat.

Potential forage fish action 7: Support initiatives that inventory and identify shoreline habitats (e.g., PSNERP geodatabase, ESRP Beach Strategies geodatabase, Department of Ecology Coastal Atlas) to prioritize protection and restoration actions that most benefit forage fish spawning habitat.

Potential forage fish action 8: Monitor and enforce regulations to protect nearshore habitat.

Potential forage fish action 9: Increase public awareness and landowner education about the importance of properly functioning nearshore habitat and its relationship to Southern Resident orcas by expanding the current Puget Sound “Shore Friendly” outreach efforts via ESRP, including funding and other incentives for landowners to remove armoring and restore natural shorelines.

Potential forage fish action 10: Ensure full application of hydraulic code regulations.

Potential forage fish action 11: Direct state agencies to emphasize avoidance versus mitigation for impacts to forage fish habitat.

Potential forage fish action 12: Revise the single-family exemptions laws and exceptions for docks (WAC 173-26-241) shoreline armoring and removal of management of riparian areas in shoreline master plans.

Potential forage fish action 13: Conduct development and redevelopment operational activities in a manner that does not affect spawning behavior; or disturb spawning substrate or sediment sources that support spawning including nearshore riparian shading in upper intertidal spawning areas.

Potential forage fish action 14: Inventory shoreline geomorphology and assess spawning beaches to identify locations where upper beaches have space for upslope/landward expansion and prioritize these areas for acquisition.

Potential forage fish action 15: Reduce anthropogenic sources of light pollution in spawning areas.

Potential forage fish action 16: Fund the synthesis and solution testing phase of the Salish Sea Marine Survival Project.

Potential forage fish action 17: Direct WDFW to fully apply hydraulic code rules and regulations to all projects and instruct that the precautionary principle be used, with existing regulations applied to historic, current and potential spawning areas. This will mean consistent application of the regulations with a goal of increased forage fish protections and populations.

Potential forage fish action 18: Develop legislative action to improve forage fish protections in the hydraulic code. Work with the Governor’s Office, legislative partners, tribes, DNR, WDFW, Ecology and salmon recovery representatives to develop a forage fish habitat/protection legislative package to put forward for action during the upcoming legislative session.

Potential forage fish action 19: Recognize and support the work of the Salish Sea Pacific Herring Assessment and Management Team.

Potential forage fish action 20: Close commercial and recreational harvest of surf smelt in Puget Sound until a full inventory and assessment of existing population levels and impacts from harvest or benefit from reduced harvest has been completed.

Potential forage fish action 21: Close commercial and recreational harvest of herring in Puget Sound until a full inventory and assessment of population levels and impact from harvest or benefit from reduced harvest has been completed.

Vessels

Potential vessel action 14: Review the science to understand the relative effect on the orcas of idling versus shutting off and restarting engines, to thereby inform a possible recommendation for commercial whale-watching operators in the vicinity of Southern Resident orcas.

Potential vessel action 15: Request that Governor Inslee and the legislature take action to address potential vessel traffic impacts (raising risks of oil spills, noise and ship strikes) that may be generated by potential increases in vessel traffic that may result from any possible expansion of the “Puget Sound pipeline” spur from Canada. Work with state agencies, local governments and tribes to identify their authorities to issue permits, authorizations or mitigation measures related to any expansion. Request that the governor meet with Canadian officials to address state concerns and recovery goals.

Potential vessel action 16: Extend the existing distance limit to approach orcas from 200 yards around (and 400 yards in their path) to 400 yards in front of and behind the orcas and 200 yards alongside. Require a 5-knot speed limit for vessels alongside (between 200 and 400 yards) with long-term funding for enforcement.

Potential vessel action 17: Increase enforcement and education around current NOAA distance limit guidelines.

Potential vessel action 18: Slow down Washington State Ferries in the presence of orcas during the fall months of October through December when conditions are safe and effective to do so.

Potential vessel action 19: Require slowdown by private ferries (such as Victoria Clipper and Black Ball) and local government ferries (such as the King, Kitsap and Skagit County ferries) in the presence of orcas when conditions are safe and effective to do so.

Potential vessel action 20: Request the development of a cover memo to the draft Strait of Juan de Fuca and Puget Sound Vessel Traffic Safety Report being completed this fall per Senate Bill 6269 that applies an orca lens to the analysis of vessel traffic risk.

Potential vessel action 21: Prioritize new hybrid ferries for runs where orcas are more frequently present.

Potential vessel action 22: Consider a moratorium on whale watching for a certain period of time.

Potential vessel action 23: Require a few “quiet days” each week (e.g., Mondays-Thursdays) when watching Southern Resident orcas is off-limits.

Potential vessel action 24: Increase funding for on-the-water educational programs like Soundwatch as well as governmental enforcement of private vessels for infractions.

Potential vessel action 25: Collect information on the noise reduction potential of electric boat motors to determine whether to recommend incentives for the manufacture and purchase of such motors.

Contaminants

All of the potential actions from the Contaminants Working Group are currently listed above in the main body of the report under Contaminants recommendations.

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