

SOUTHERN RESIDENT KILLER WHALE TASK FORCE PREY POTENTIAL ACTIONS

SUMMARY TABLE OF ALL PREY POTENTIAL ACTIONS DISCUSSED IN 2018

The Table below (Pages 1-7) is intended to be an abbreviated way to see the outcomes of the Prey Working Group discussions on each action. For more detailed information on an action and an explanation of ratings, click the hyperlink embedded in each action name to be directed to the full matrix of considerations. Actions in **Bold** have an effectiveness rating of Medium or High.

Effectiveness: the ability for the action to contribute to SRKW recovery by improving prey abundance

Affordability: High (Under \$30million), Medium (\$30million-\$100million), Low (\$100million+)

Ease of Implementation: Considers technical, regulatory, social, and political factors

Timeline of SRKW benefits once action is implemented: Immediate (0-3 years), Intermediate (3-10 years), Long-term (10+ years)

Note: The Prey Working Group would like to stress that there is a great deal of uncertainty related to many of the rankings of the actions considered due to incomplete knowledge. More geographic specificity for each action (this is often pending) and time to source information or create information through models, studies, etc. would/will create greater certainty around this rankings.

	Action	E	A	I	Timeline for SRKW Benefits	Supporting and Dissenting Opinions on Ratings (if applicable)	Geographic Specificity Progress	Notes
Hydro	<p><u>A1. Recommend that Ecology adjust gas caps (match or exceed OR's gas caps) on the Snake and Columbia rivers to allow flexibility to adjust spill regimes, as needed, to benefit Chinook salmon and other salmonids.</u></p> <p><u>A2. Recommend that Ecology adjust gas caps (match or exceed OR's gas caps) on the Snake and Columbia rivers and that spill be increased to benefit Chinook salmon and other salmonids.</u></p>	H	M	H	Intermediate	<p>Supporting:</p> <ul style="list-style-type: none"> Increased spill leads to increased survival rates of migrating fish. Even if funds are reallocated away from habitat etc. due to increases in spill, the action has the potential to result in such an improvement to the number of fish successfully migrating that it would be overwhelmingly worth it. Also, other funding sources could be sought to replace those lost. NEPA process is too slow to benefit the SRKW when they most need it. <p>Dissenting:</p> <ul style="list-style-type: none"> Disagreement on science about impacts of increased spill. Dueling models for how much more benefit additional spill provides—more light will hopefully be shed via NEPA over next 3 years. 	Applies to Columbia/Snake but could be elsewhere statewide	<ul style="list-style-type: none"> Affordability depends on how much is spilled (125% would be in low affordability category, but other amounts could be medium or high affordability) Spill regime and gas cap not inextricably linked – TF could recommend changing gas caps without changing spill regimes, which would allow flexibility to use the best available science to decide how much spill is beneficial at specific dams/systems, years, etc. Barging of fish beyond dams may be a related action that will allow for greater survival of fish.

	Action	E	A	I	Timeline for SRKW Benefits	Supporting and Dissenting Opinions on Ratings (if applicable)	Geographic Specificity Progress	Notes
						<ul style="list-style-type: none"> Increased cost of changes in spill management would reallocate funding currently going to habitat improvements or hatcheries 		
	B. Regional partners review, and where appropriate, revise standards for juvenile survival in river associated with dams	M	M	L	Intermediate		Applies Statewide	
	C. Increase survival at predation hot spots near dams	M	M	L	Intermediate		Applies Statewide	<ul style="list-style-type: none"> Affordability may vary by specific action: reservoir management could be expensive
	D. Where it helps provide safer passage, improve fish screens and eliminate entrainment in diversions at dams. Consolidate diversions to reduce risks to salmon	L	H	H	Intermediate		Applies Statewide	<ul style="list-style-type: none"> Very limited opportunity for incremental improvement remains for this action.
	E. Prioritize and fund re-establishment of runs into currently blocked areas above dams in those areas that can successfully produce more salmon.	H	L	L	Intermediate		See Hydro Action E Matrix for discussion of ongoing and future options	<ul style="list-style-type: none"> Effectiveness is variable, depending on location High affordability and ease of implementation for trap and haul but these would be smaller scale operations and smaller benefits to SRKW (low effectiveness). Volitional passage very expensive and more difficult to implement.
	F. Remove dams in locations that most benefit Chinook passage	H	L	L	Intermediate	<ul style="list-style-type: none"> Variable affordability, efficacy, depending on location Consider SRKW chinook in proposals for new dams No new dams doesn't account for potential climate change impacts 	Analysis Pending Statewide	
Hatchery	A. Increase hatchery production at facilities that most benefit SRKWs and apply measures to remove excess hatchery fish before they reach	H	H	M	Intermediate	Supporting: <ul style="list-style-type: none"> Increases are essential in the near term for the whales due to dire need for more Chinook Disagreement with some that believe wild stocks are not impacted by hatchery fish. 	Analysis Pending; WDFW is drafting a decision-making model for potential	<ul style="list-style-type: none"> Due to carrying capacity issues, habitat improvements are needed for increases to be effective at producing adult fish. Decisions on production increase locations should consider adjacent wild stock

Action	E	A	I	Timeline for SRKW Benefits	Supporting and Dissenting Opinions on Ratings (if applicable)	Geographic Specificity Progress	Notes
spawning grounds (e.g. weirs, mark-selective harvest)					<ul style="list-style-type: none"> It is possible to increase production in some areas without negatively impacting wild stocks (for example see suggestion letter from ODFW) <p>Dissenting:</p> <ul style="list-style-type: none"> Increased production may increase risk for wild fish recovery. WDFW should proactively coordinate with Regional Organizations to ensure any increased hatchery production aligns with recovery plan goals and objectives, prior to making decisions. This should include evaluation and modeling of risks and benefits, where supported by data. This evaluation should also address populations in the Coast Region, where the focus would be to ensure hatchery production does not result in increased risk to non ESA-listed natural origin populations. Increased hatchery production is not a long-term goal or solution in itself but instead just one tool to get to larger Chinook abundances. Larger goal is healthy wild Chinook populations and ecosystems. If production is increased it needs to be for a timeframe only (e.g. 10 years) before it is fully analyzed for effectiveness. Do not want this effort to result in a blank check for more hatchery production for other purposes. 	<p>production increase locations,</p> <p>including factors like: 1)capacity in existing programs, 2)benefits to SRKW, 3) numbers of Chinook per dollar invested, 4) programs that can best be operated consistently with salmon conservation and recovery. Model will be out for review in early August.</p>	<p>categorization (supporting, contributing, primary) and not affect primary stocks.</p> <ul style="list-style-type: none"> Needs a strong emphasis on comprehensive reviews (5 year intervals) and adaptive management (annual) to limit hatchery impacts to wild stocks. Should consider: stray rates, productivity, PNI, juvenile rearing carrying capacity, smolt to adult ratios, genetic fitness, etc. Limited ability to use mark selective harvest to remove hatchery fish because Canada does not mark their fish. Locations of harvest of these hatchery fish needs to ensure that SRKW get a chance to forage on them first.
B. Perform actions in hatcheries to increase productivity, smolt-to-adult survival and/or marine survival of Chinook (including but not limited to reducing predation on hatchery fish), adjust return timing and locations to align with whale needs, increase size	M	M	M	Intermediate		<p>Pilot suggested at a location where increases occur (see above)</p>	<ul style="list-style-type: none"> Need to better reflect natural run timing and variability. SRKW would benefit from more diverse prey availability throughout the year and selecting for larger fish.

Commented [BPA(1): Make this a hyperlink to the ODFW letter on the box site

	Action	E	A	I	Timeline for SRKW Benefits	Supporting and Dissenting Opinions on Ratings (if applicable)	Geographic Specificity Progress	Notes
	and age of return, and reduce potential competition with wild fish							
Harvest	A: Further limit Chinook harvest in areas important to SRKW foraging	L	H	L	Immediate	Supporting: <ul style="list-style-type: none"> If we're serious about SRKWs, then close fisheries as an emergency action with immediate results Dissenting: <ul style="list-style-type: none"> Treaty right concerns regardless of whether or not tribes are specifically excluded from harvest limits Likely low benefit for SRKWs – in Marine Area 7 recreational catch was only 3500 chinook for summer 	Marine Area 7— San Juan Islands	<ul style="list-style-type: none"> If any type of closure area is considered (due to vessel and/or prey impacts) then it should not be specific to fishers only, both due to social issues and because it would not be as beneficial to SRKW.
	B: Subsidize or compensate fishers to not fish	L	H	L	Immediate	Supporting: <ul style="list-style-type: none"> If we're serious about SRKWs, then we need to reduce harvest because it has immediate results It's possible because sport industry has been compensated before and commercial fisheries have had buy-backs in past Dissenting: <ul style="list-style-type: none"> Treaty right concerns regardless of whether or not tribes are specifically excluded from harvest limits; low return Disagreement about including recreational fishers – no mechanism to individually compensate 	Marine waters when and where SRKW are actively feeding or likely to be arriving within one month/one week (I don't know)	
	C: Reduce non-targeted fisheries' impact, including limiting gear types that increase mortality and incentivizing innovative gear types that decrease mortality, and by-catch	M	M	M	Immediate	Supporting <ul style="list-style-type: none"> Differences geographically w/ west coast fishery (low effectiveness) and AK fishery (high effectiveness) – changes need to happen in AK Dissenting <ul style="list-style-type: none"> There is a tribal allocation and treaty right concern 	This pertains to coast-wide fisheries but is especially pertinent in AK where there is opportunity for the most improvement	

	Action	E	A	I	Timeline for SRKW Benefits	Supporting and Dissenting Opinions on Ratings (if applicable)	Geographic Specificity Progress	Notes
	D. Negotiate reductions in AK and Canadian fisheries to allow more Chinook to reach WA waters	H	L	L	Long-term	Supporting <ul style="list-style-type: none"> • Already complete, will be in place for 10 years— discussions include some SRKW benefits • Taskforce should still make comments regarding what this should look like in the future 	Alaska and Canada	
	E: Reduce marine harvest and transfer opportunity to terminal fisheries	M	M	L	Immediate	Supporting: <ul style="list-style-type: none"> • If we're serious about SRKWs, then we need to reduce harvest because it has immediate results Dissenting <ul style="list-style-type: none"> • Significant tribal treaty concerns – action would affect tribes disproportionately and likely result in legal action 	West Coast Ocean Fisheries Area	
	F: Implement slot size limits to get larger fish to whales, spawning grounds, and hatcheries (put a maximum size limit on catch)	L	M	M	Long-term	Supporting: <ul style="list-style-type: none"> • Could help to get bigger fish the whales Dissenting <ul style="list-style-type: none"> • May have impacts to wild stocks. Need full analysis to understand effects • Could have unintended consequence of catch mortality if catch and release rates increased • Fishing derbies would be eliminated 	Puget Sound, Coast, and Columbia	<ul style="list-style-type: none"> • Potential gear restrictions for commercial harvest for large fish escapement • Long-term because would take time to fully implement
Habitat	A. Increase the implementation & enforcement of existing local, state and federal habitat protection regulations	H	M	L	Immediate		Statewide – see Regional Recovery Organizations priorities	<ul style="list-style-type: none"> • Any regulation is not a long-term durable fix. Needs to be coupled with significant improvements through acquisition and restoration in habitat
	B. Enhance/change local, state and federal protection regulations, especially for key Chinook/SRKW habitats or areas	H	M	L	Immediate		Statewide – see Regional Recovery Organizations priorities	<ul style="list-style-type: none"> • Any regulation is not a long-term durable fix. Needs to be coupled with significant improvements through acquisition and restoration in habitat
	C. Acquire important Chinook habitat	H	L	L	Immediate for existing habitat; Long-term for		Statewide – see Regional Recovery	<ul style="list-style-type: none"> • Effectiveness and affordability depend upon scale. Higher for both for greater amount of habitat.

Commented [BPA(2)]: Insert Box folder links for all of these 5 actions

	Action	E	A	I	Timeline for SRKW Benefits	Supporting and Dissenting Opinions on Ratings (if applicable)	Geographic Specificity Progress	Notes
					habitat needing restoration		Organizations priorities	
	D. Accelerate habitat restoration by increasing funding significantly to address current regional priorities, including fish blockages in areas most beneficial to SRKW	H	L	M	Intermediate for blockages; Long-term for restoration but an action to ensure sustainability for future generations		Statewide – see Regional Recovery Organizations priorities	<ul style="list-style-type: none"> Should consider what projects are currently not on the table because of feasibility (moving I5, BNSF rail line, dams) as an opportunity for the governor to make a significant difference. This is essential in areas where habitat is at carrying capacity and hatchery production increases are desired.
	E. Create additional or bolster existing habitat protection and restoration incentives for landowners	M	M	H	Immediate for existing habitat; Long-term for habitat needing restoration		Statewide – see Regional Recovery Organizations priorities	
Predation	A. Remove or alter artificial habitats or breeding locations so they are not as attractive to predators (Pinnipeds and Birds)	L	H	M	Immediate		Statewide where appropriate: Haul out and breeding colony maps available	
	B. Lethal removal to benefit specific runs and stocks Pinnipeds Birds Fish	M	M	L	Intermediate	Supporting: <ul style="list-style-type: none"> Predation has been shown to be a massive issue in some locations limiting Chinook stocks Dissenting <ul style="list-style-type: none"> Uncertainty at ecosystem-wide scale effects and unintended consequences that may not benefit Chinook or SRKW Emotional issue for mammals and birds and may lead to lawsuits 	Recommend implementing on a pilot basis where important SRKW stocks might benefit (due to effectiveness uncertainty)	<ul style="list-style-type: none"> Effectiveness is uncertain and therefore rankings difficult Will have to be monitoring to assess benefits and discontinue if ineffective
	C. Lethal removal in order to establish new baseline population levels Pinnipeds Birds	M	H	L	Intermediate	Supporting: <ul style="list-style-type: none"> Predation has been shown to be a massive issue in some locations limiting Chinook stocks Dissenting:		<ul style="list-style-type: none"> Effectiveness is uncertain and therefore rankings difficult Will have to be monitoring to assess benefits and discontinue if ineffective

	Action	E	A	I	Timeline for SRKW Benefits	Supporting and Dissenting Opinions on Ratings (if applicable)	Geographic Specificity Progress	Notes
	Fish	M	H	M		<ul style="list-style-type: none"> Emotional issue for mammals and birds and would be a violations of Migratory Bird Act and MMPA—will lead to lawsuits Uncertainty at ecosystem-wide scale effects and unintended consequences that may not benefit Chinook or SRKW 		
	D. Employ new non-lethal hazing or exclusion techniques	L	H	H				<ul style="list-style-type: none"> Good to keep as alternative to lethal removal, but there are no new methods known and much has already been tried.
Forage Fish	A. Increase Forage Fish populations through: Habitat restoration Habitat protection	H	M	H	Intermediate	<p>Supporting</p> <ul style="list-style-type: none"> Benefit to reducing predation and increasing salmon survival, but a lot of uncertainty to SRKWs More forage fish will be more positive than negative (even if some eat the same food at juvenile Chinook) <p>Dissenting</p> <ul style="list-style-type: none"> Potential negative feedback loop from forage fish consuming juvenile chinook food (zooplankton) For harvest—treaty right component, relatively low take related to other species 	Focus on Puget Sound	<ul style="list-style-type: none"> Consider life history of forage fish relative to size needed for juvenile chinook Habitat protection for SRKW will directly benefit forage fish Prey for Chinook are sardines, anchovy, herring, sand lance, and smelt Habitat impacts from bulkheads in Puget Sound; single family exemption elimination would greatly improve protections. Need to accelerate any studies of marine food web to be more confident on effect Forage fish recovery planning process is underway
	B. Increase Forage Fish populations through: Harvest reductions	H	H	M	Intermediate	<p>Dissenting</p> <ul style="list-style-type: none"> For harvest—treaty right component. Relatively low take related to other species 	Outer Coast and Puget Sound	<ul style="list-style-type: none"> Forage fish recovery planning process is underway – need to align efforts

CONSIDERATIONS MATRICES FOR EVALUATING POTENTIAL ACTIONS

Hydro and Dams (structures that impound water)

Emerging issues:

Provide policy support for Ecosystem based function in Columbia River Treaty Re-Negotiations by identifying SRKW and to help chinook throughout the Columbia Basin

- This is happening now, but it depends on how much the negotiators are hearing the state’s voice.
- Interior has committed to giving regions, state, tribes and others – maybe there’s some opportunity to express that we’re all interested in having them consider SRKW as part of the ecosystem considerations.
- Timeline is not swift. Not all parties are in agreement on the relative negotiating value of ecosystem functions.

Hydro Action A – Recommend DOE consideration of gas caps (to provide flexibility for spill regimes) to improve life-cycle survival

Action, including time and place for implementation	Effectiveness		Affordability		Ease of Implementation	
<p>Recommend that Ecology adjust gas caps (match or exceed OR’s gas cap) on the Columbia River FCRPS facilities to allow flexibility to adjust spill regimes, as needed, to benefit chinook salmon and other salmonid.</p> <p>Applies to the Columbia and Snake River systems; may not apply elsewhere but opportunities for other facilities may exist.</p>	L	<p>Magnitude of benefit to SRKW (quantify if possible):</p> <ul style="list-style-type: none"> • Moderate to 2017 injunction baseline spill (High proportionate to pre-2005 injunction hydro/dam actions, and could be high compared to 2008 FCRPS BiOp, if you achieve improved SARs predicted by CSS model) • Likely only the Columbia/Snake stocks would benefit from increasing gas cap and subsequent increased spill, so not a fix for all priority stocks. 	M	<p>Estimated cost to implement (in dollars):</p> <ul style="list-style-type: none"> • Spill: it was noted that \$40 million annually (above BiOp) on average for spilling to current 115% forebay/120% tailrace standard; 24/7 spill increase spill to 120% tailrace only standard is estimated to cost another \$20 million, or an average of \$60 million total annually. 	H	<p>Regulatory feasibility (laws, regulations and treaties— including local, state, federal, international, tribal, etc.):</p> <ul style="list-style-type: none"> • Near-term decisions on 2019-21 spill for “interim” FCRPS BiOp • Longer term 2022 FCRPS BiOp will be informed by CRSO NEPA process, which will wind up in 2021.

<p>ECY could temporarily or permanently adjust gas caps to allow for new spill regimes on the mainstem of the Columbia and Snake. Would apply to the whole mainstem below Chief Joseph.</p> <p>Should consider options of WA waiving forebay cap and managing to Oregon's existing standard, as well as both states going to 125%, other options.</p> <p>Also a request to look at in-river transportation alternative to increased spill, especially in very hot, low water years like 2015. Might be part of the technical analysis and debate over efficacy of spill under certain conditions.</p> <p>Comment: In near term, regional federal, state, and tribal salmon managers may have some joint recommendations this summer or fall, and recommendations here should recognize the value and relevance of discussions over 2019-2021 operations (Interim FCRPS BiOp) as well as the CRSO NEPA and 2022 BiOp processes in terms of identifying the best spill regime.</p>	<p>Time for response to occur:</p> <ul style="list-style-type: none"> Intermediate after changes are implemented (implementation could occur as early as 2019, with first effects 2-5 years out) <p>Degree of certainty:</p> <ul style="list-style-type: none"> Moderate certainty that magnitude of benefit analyzed in Comparative Survival Study can be achieved, depending on approach. Low certainty if the magnitude of benefit in NOAA COMPASS model is achieved. High certainty that hydro operations that include spill for fish passage provide a benefit to juvenile survival broadly and increased prey for SRKW. <p>Comparative survival study may not clearly show improves smolt survival with increased flow above pre-injunction flows. CSS is a life cycle basis showing that SAR does increase due to a decrease in "delayed mortality" attributed to non-spillway hydrosystem passage. Comment that Interim BiOp and regional process then NEPA will inform this action and the taskforce may not want to get too far in the weeds on particulars of spill operations. However the state's total dissolved gas standards is the limiting factor in these other processes. If standards aren't raised, then any additional spill agreed to through these processes would not be able to occur.</p>	<ul style="list-style-type: none"> Flexible timing (market peaks) rather than 24/7 spill could reduce the cost [Can we generate costs per ratepayer of different spill scenarios? Comment that survey showed ratepayer willingness to pay more to help salmon.] <p>Degree of Certainty: Dependent upon water year, energy markets potential trade-offs with other actions funded by BPA</p> <p>Find report/analysis to help understand the basis for these costs.</p>	<ul style="list-style-type: none"> For FERC (PUD) dams, adaptive management processes through FERC operating plans would be required <p>Degree of alignment with current federal/state law: Varies by dam and legal processes</p> <ul style="list-style-type: none"> Increase in spill % above current WA TDG standards would require approval from Ecology <p>Political/social feasibility:</p> <ul style="list-style-type: none"> There is opportunity for regional collaboration and some consensus <p>Technical feasibility:</p> <ul style="list-style-type: none"> Technically feasible <p>Degree to which it reinforces or leverages existing efforts:</p> <ul style="list-style-type: none"> High <p>Degree of certainty:</p> <ul style="list-style-type: none"> Unknown
--	---	---	---

NOTES ON INPUT, COMMENTS AND QUESTIONS FROM TASK FORCE ON THIS ACTION ON 6/14/18:

- For Columbia River dams, quantify the change in revenue to BPA from spill change – also overall economy, extra production.
 - Hydro work group members noted the change in revenue: \$40 million annually (above BiOp) on average for spilling to 115%/120% TDG; to increase 24/7 spill to 120% tailrace-only standard is estimated to cost another \$20 million, or \$60 million total annually. Flexible spill to 120% or 125% TDG that allows for less spill at peak power market times may cost less.
 - At 24/7 115%/120% TDG for Calendar Year 2018: Approximately \$30 million
- NEEDS MORE INFORMATION:
 - Impact of raising gas caps on juvenile survival
 - How can dams be reconfigured/re-engineered to increase survival

Additional information (WG Meetings 2 & 3)

- Recommendations about where and when to implement each action, including sequencing (if not covered above in table)
 - Steps to take: Inventory dams and impoundments that block fish passage or otherwise impair salmon survival, overlay with priority areas, and prioritize impoundments and dams to be considered for modification or removal
 - Assess spill levels to maximize survival of juvenile chinook and raise total dissolved gas cap if needed or where appropriate to maximize survival of juvenile chinook
 - Facilitate spilling to less than cap during peak market price times, in order to reduce cost of action.
 - Columbia Basin dam operation and ecosystem service benefits for SRKW should be prioritized in Columbia River Treaty re-negotiation
- Whether each action will improve conditions for all pods or a subset
 - All Pods

Hydro Action B – Review and Update standards for juvenile salmon survival

Action, including time and place for implementation	Effectiveness	Affordability	Ease of Implementation
<p>Regional partners review, and where appropriate, revise standards for juvenile survival</p> <p>Need to list places where this is an opportunity, particularly outside of the Columbia system. Might make it more digestible, geographically.</p> <p>Existing standards will be challenging to revise (and may not need revision). It's fair for the Task Force to understand that the metric for the performance standard is a debate.</p>	<p>M</p> <p>Magnitude of benefit to SRKW (quantify if possible):</p> <ul style="list-style-type: none"> • High if current standards are not sufficient but low if there is not much increase possible <p>Time for response to occur:</p> <ul style="list-style-type: none"> • Intermediate to Long-term; Analysis and adoption, construction, operation changes, and adaptive management after regulatory adoption of new standards, then additional time for fish return (5-15 years depending on complexity of passage) <p>Degree of certainty:</p> <ul style="list-style-type: none"> • Moderate <p>Effectiveness depends on whether the current standards are high enough, and whether they're being met. There may not be much room for improvement, varying from site to site.</p>	<p>M</p> <ul style="list-style-type: none"> • Unknown. May require different technical approaches at different facilities. Affordability depends on the actions necessary to implement the standards. Could be very expensive to implement but the action "review and update" is not costly <p>Degree of certainty</p> <ul style="list-style-type: none"> • Uncertain based on unknown outcome and recommendations 	<p>L</p> <p>Regulatory feasibility (laws, regulations and treaties—including local, state, federal, international, tribal, etc.):</p> <ul style="list-style-type: none"> • FCRPS BiOP survival standards exist and would need modification if changes are suggested • FERC license BiOP survival standards exist and would need to be modified • SAR standards would need to be incorporated in modified BiOPs • 401 Water Quality Certs with fish passage performance standards would need to be amended • Application for non-listed Chinook stocks? <p>Degree of alignment with current federal/state law</p> <ul style="list-style-type: none"> • Depends if new survival standards are suggested or not, and how dramatically they deviate from current standards <p>Political/social feasibility:</p> <ul style="list-style-type: none"> • Depends if new survival standards are suggested or not • Low – lengthy legal process <p>Technical feasibility:</p> <ul style="list-style-type: none"> • Feasible to implement actions to improve survival <p>Degree to which it reinforces or leverages existing efforts:</p> <ul style="list-style-type: none"> • High, particularly in FCRPS and at facilities with new downstream collectors and adaptive management in FERC licenses

					Degree of certainty: • Unknown
--	--	--	--	--	-----------------------------------

Additional information (WG Meetings 2 & 3)

- Recommendations about where and when to implement each action, including sequencing (if not covered above in table)
 - FERC Dams with fish passage survival standards in priority Chinook watersheds:
 - Northern Puget Sound
 - Baker Lake Dams (Baker River - Puget Sound Energy)
 - Floating Surface collectors
 - Skagit River Dams (Seattle City Light)
 - Jackson Dam (Sultan River- Snohomish PUD)
 - Southern Puget Sound
 - Cushman Dams (Skokomish River – Tacoma Power)
 - Floating Surface Collectors
 - Nisqually Dams
 - Lower Columbia River
 - Lewis River Dams (Lewis River – PacifiCorp, Cowlitz Co PUD)
 - Cowlitz River Dams (Cowlitz River – Tacoma Power, Lewis Co PUD)
 - Upper Columbia River
 - Middle Columbia river
 - Wanapum, Priest Rapids, Rock Island, Rocky Reach, Wells, Lake Chelan (Mid-C PUDs)
 - Washington Coast
 - Skookumchuck Dam (Skookumchuck River - TransAlta)
 - Non-FERC existing and proposed large dams with potential fish passage standards
 - Northern Puget Sound
 - Middle Fork Nooksack Diversion Dam (Bellingham)
 - Southern Puget Sound
 - Cedar/Lake Washington
 - Ballard Locks
 - Lower Columbia River
 - Toutle River Sediment Retention Structure

- Mid-Columbia
 - Roza and Chandler Irrigation Diversions (Yakima River – Roza ID (Support expediting negotiated operational changes through YBIP)
 - Tumwater Diversion Dam (Wenatchee watershed)
- Mid-Columbia (but in Snake River Recovery Plan geography)
 - Mill Creek/Bennington dam(USACE)
- Washington Coast
 - Upper Chehalis River flood control dam
- FERC relicensing
 - 3 Skagit River Dams (Seattle City Light -2025) – high in naturally blocked watershed and no Chinook passage ramifications
 - S. Fork Tolt (Seattle City Light – 2028)
 - Rock Island (Chelan PUD – 2027)
- Whether each action will improve conditions for all pods or a subset
 - Depends on where implemented. Survival improvements in watersheds may benefit pods that overlap with Chinook stocks in those watersheds

Hydro Action C – Reduce predation near dams

Action, including time and place for implementation	Effectiveness	Affordability	Ease of Implementation
<p>Increase survival at predation hot spots near dams/created by dams</p> <ul style="list-style-type: none"> • Ensure netting, sprinklers or other deterrents to predators • Implement diffused release sites for juveniles by-passing a dam • Deter bird predators near outfalls/ladders • Increase predator removal programs at dams • Decrease spawning success of non-native fish in reservoirs through reservoir management • Support efforts to keep northern pike from moving into anadromous waters <p>Many dam operators are doing what they can already, very actively managing bird and pinniped predation to achieve survival standards.</p> <p>Very important to keep northern pike from moving into anadromous waters. Check into how this relates to spill, since they're coming from the headwaters downstream.</p>	<p>M</p> <p>Magnitude of benefit to SRKW (quantify if possible):</p> <ul style="list-style-type: none"> • High <p>Time for response to occur:</p> <ul style="list-style-type: none"> • Intermediate <p>Degree of certainty:</p> <ul style="list-style-type: none"> • High <p>Depends on what's already being done at each facility. Highly effective, but might already be underway. Most if not all FERC licensed dams have deterrent devices (wire, netting, sprinklers, etc.).</p>	<p>M</p> <p>Estimated cost to implement</p> <ul style="list-style-type: none"> • Unknown <p>Degree of certainty</p> <ul style="list-style-type: none"> • Uncertain based on unknown cost 	<p>M</p> <p>Regulatory feasibility (laws, regulations and treaties—including local, state, federal, international, tribal, etc.):</p> <ul style="list-style-type: none"> • Structural modifications or enhancements to existing infrastructure shouldn't require legal process <p>Degree of alignment with current federal/state law</p> <ul style="list-style-type: none"> • Migratory Bird Treaty Act and Marine Mammal Protection Act create more permitting processes, or may require regulation change • Would also need to change classification of invasive fish that are currently considered "sport fish." See Predation actions. <p>Political/social feasibility:</p> <ul style="list-style-type: none"> • Netting and deterrents are easy from a social standpoint; altering gamefish rules, amending MMPA and MBTA, and reclassifying non-native game fish to invasive or revisions to sport fishing rules may face opposition <p>Technical feasibility:</p> <ul style="list-style-type: none"> • High <p>Degree to which it reinforces or leverages existing efforts:</p> <ul style="list-style-type: none"> • High <p>Degree of certainty:</p> <ul style="list-style-type: none"> • High

Additional information (WG Meetings 2 & 3)

- Whether each action will improve conditions for all pods or a subset
 - K & L pods would benefit the most because of Columbia River benefits, but J pod may also benefit from increased Columbia stocks moving along the outer coast.

Hydro Action D – Improve fish screens and eliminate entrainment in diversions at dams (see habitat for irrigation diversions)

Action, including time and place for implementation	Effectiveness	Affordability	Ease of Implementation
<p>Where it helps provide safer passage, improve fish screens and eliminate entrainment in diversions at dams. Consolidate diversions to reduce risks to salmon.</p> <p>Could use a map or geographic specificity. May already be largely taken care of.</p> <p>Yakima screens will be replaced in the next few years – being worked on constantly.</p> <p>Chris has a list of OR passage priorities; not overlain with SRKW priority stocks, but will send it along. Mostly dams, some culverts, bridges.</p> <p>DFW received some funding to help with east-side screening inventories, more on the habitat side. Not as much benefit on the larger dam side.</p>	<p>L</p> <p>Magnitude of benefit to SRKW (quantify if possible):</p> <ul style="list-style-type: none"> Unknown but likely low considering the incremental benefit is likely low relative to how much has already been completed <p>Time for response to occur:</p> <ul style="list-style-type: none"> Intermediate <p>Degree of certainty:</p> <ul style="list-style-type: none"> High <p>Encourage consolidation of diversions – effective</p> <p>In general, we’re pretty effective at this already, hard to see when incremental benefit would be.</p> <p>Most if not all known public and larger private dams are in compliance and an inventory of smaller dams and the magnitude of impact is unknown so the effectiveness of increasing chinook for SRKW is probably low.</p>	<p>H</p> <p>Estimated cost to implement</p> <ul style="list-style-type: none"> Unknown <p>Degree of certainty</p> <ul style="list-style-type: none"> Uncertain based on unknown cost and/or magnitude of this action 	<p>H</p> <p>Regulatory feasibility (laws, regulations and treaties— including local, state, federal, international, tribal, etc.):</p> <ul style="list-style-type: none"> High as these are structural modifications or enhancements to existing infrastructure that shouldn’t require legal process <p>Degree of alignment with current federal/state law</p> <ul style="list-style-type: none"> High; In OR, these kinds of actions can trigger some of their passage laws, including a fairly mandatory investment on the owner’s part to bring things up to current standard. <p>Political/social feasibility:</p> <ul style="list-style-type: none"> High <p>Technical feasibility:</p> <ul style="list-style-type: none"> High <p>Degree to which it reinforces or leverages existing efforts:</p> <ul style="list-style-type: none"> High <p>Degree of certainty:</p> <ul style="list-style-type: none"> High

Additional information (WG Meetings 2 & 3)

- Whether each action will improve conditions for all pods or a subset
 - Depends upon where implemented

Hydro Action E – Successfully reintroduce salmon into blocked areas above dams

Action, including time and place for implementation	Effectiveness	Affordability	Ease of Implementation
<p>Prioritize and fund re-establishment of runs into currently blocked areas above dams in those areas that can successfully produce more salmon.</p> <p>Two different scenarios: trap and haul operations would be smaller scale and fewer benefits to SRKW, while greater benefit would come from volitional passage through dams but very expensive and difficult to implement. (Ratings for E, A, I here are for volitional passage)</p> <ul style="list-style-type: none"> Continue exploring, through processes already underway, reintroducing salmon above the Chief Joseph Dam. Continue to support reintroduction of Skokomish spring Chinook. Identify if there are opportunities to support or accelerate reintroduction efforts in the Lewis and Cowlitz systems. <p>Efforts with plans already underway (conservation focused):</p> <ul style="list-style-type: none"> Skokomish spring reintroduction Lewis and Cowlitz Oregon Deschutes Green River Howard Hanson Cle Elum (under construction) Mill Creek and Bennington dam, Walla Walla If people know of others, others please send to us <p>Habitat suitability needs to be assessed before reintroductions. Return on investment may be low assuming natural passage is not viable and whether or not upstream habitat is suitable</p> <p>Above Chief Joe – if excess adults are put above it, there’s good spawning habitat in the mainstem. There’s modeling of this, and the cost-benefit looks good without additional downstream passage.</p>	<p>H</p> <p>Magnitude of benefit to SRKW (quantify if possible):</p> <ul style="list-style-type: none"> High for <p>Time for response to occur:</p> <ul style="list-style-type: none"> Intermediate to Long-term <p>Degree of certainty:</p> <ul style="list-style-type: none"> High <p>Really depends on specific site and whether or not passive passage is possible or if active transport will be needed.</p> <p>Explore areas where restoration would add additional value to passage into currently blocked areas</p> <p>Some reservoirs provide cool water in the summer and flow enhancement when</p>	<p>L</p> <p>Estimated cost to implement</p> <ul style="list-style-type: none"> Unknown at this time but assessments have been or will be completed and that information will be provided; range is less than one million to over one hundred million depending upon facility <p>Degree of certainty:</p> <ul style="list-style-type: none"> Low certainty unless additional revenue becomes available 	<p>L</p> <p>Regulatory feasibility (laws, regulations and treaties—including local, state, federal, international, tribal, etc.):</p> <ul style="list-style-type: none"> Site variable and dependent upon ESA listed species in some areas. May/will require policies and agreements <p>Degree of alignment with current federal and state law (versus requiring changes to laws):</p> <ul style="list-style-type: none"> High but unknown <p>Political/social feasibility:</p> <ul style="list-style-type: none"> Varies but reintroducing fish above blocked areas need to consider ESA implications (e.g. moving ESA listed species to new locations with potential ESA regulation) <p>Technical feasibility:</p> <ul style="list-style-type: none"> Site specific and variable <p>Degree to which it reinforces or leverages existing efforts:</p> <ul style="list-style-type: none"> High <p>Degree of certainty:</p> <ul style="list-style-type: none"> Varies from high to low depending upon site

<p>Exploring potential passage options through NW Power and Conservation Council process – first phase, now wrapping up is feasibility and habitat analysis. Likely to move to second phase involving experiment with salmon releases and further detail work on passage technologies. Then decision about level of permanent implementation in Phase 3. Teed up in the Columbia River Treaty too. Colvilles also considering near-term releases of hatchery fish above Chief Joseph.</p> <p>Lower Columbia – studies of reintroductions, particularly of spring Chinook, already done, and these are crucial parts of the regional recovery plan. Lewis and Cowlitz are high priority for SRKW. Maybe focus habitat restoration downstream of this to capture full benefit? (Complementary initiative) Historically, habitat for spring Chinook was mostly above those reservoirs. There’s a lot of habitat work planned in both of those basins, and lots of productive habitat already there. Need to dial in juvenile capture-ability in those systems- key bottleneck.</p> <p>Substantial good quality habitat in the Willamette – working with Corps on this. Make sure don’t forget OR in doing geographic prioritization.</p> <p>Non-hydro dams:</p> <ul style="list-style-type: none"> • Juvenile passage at Howard Hanson Dam (Green River) • Some spring Chinook benefits to Cle Elum passage • Tieton Dam/Rimrock Reservoir passage in the Yakima Basin • See the notes from Action A, see where they overlap with priority watersheds <p>Make sure climate resiliency is built into this recommendation. Think about downstream habitat improvements where necessary.</p>	<p>needed and both can buffer against climate change.</p>			
--	---	--	--	--

Additional information (WG Meetings 2 & 3)

- Whether each action will improve conditions for all pods or a subset
 - Depends on where implemented

Hydro Action F – Remove structures that impound rivers of most benefit to chinook, where feasible

Action, including time and place for implementation	Effectiveness	Affordability	Ease of Implementation
<p>Remove dams in locations that most benefit Chinook passage for SRKW prey</p> <p>Compile a list of dams and structures that impound rivers that have been successfully removed that benefit salmon with little or no impacts to stakeholders</p> <p>Prioritize most effective dams to remove for SRKW recovery. Identify and prioritize those dams that are feasible for removal as near term/immediate actions. For those dams deemed less feasible currently, determine if actions could be taken to mitigate those challenges (e.g. other energy generation).</p> <p>DFW has an app on its website where you can search and filter by different kinds of dams and sort by watershed. Then need to apply the other socio-economic criteria.</p> <p>John Floberg at NOAA has been working on creating a list of dams that are “relatively” feasible to remove. Run this by the Lead Entities to check the list. Middle Fork Nooksack Diversion Dam, Chambers Creek, Whnoochee, Enloe Dam, which blocks listed upper Columbia River spring chinook, recently videotaped jumping below the dam. Pilchuck Dam on Snohomish River at Granite Falls. https://www.landauinc.com/our-work/permitting-and-compliance/pilchuck-dam-removal-feasibility-study/ Sullivan Lake facility also was removed. Associated with the Box Canyon Dam. Steve also will ask the regions and lead entities to verify the list of dams that have been removed. Skookumchuck</p>	<p>H</p> <p>Magnitude of benefit to SRKW (quantify if possible):</p> <ul style="list-style-type: none"> High <p>Time for response to occur:</p> <ul style="list-style-type: none"> Intermediate; Response is almost immediate following implementation but SRKW benefits 3 years out <p>Degree of certainty:</p> <ul style="list-style-type: none"> Highly effective 	<p>L</p> <p>Estimated cost to implement (in dollars):</p> <ul style="list-style-type: none"> High but unknown. Assessments are likely available so information is probably available for some dams <p>Degree of certainty:</p> <ul style="list-style-type: none"> Low unless new revenue becomes available 	<p>L</p> <p>Site-specific</p> <p>Regulatory feasibility (laws, regulations and treaties—including local, state, federal, international, tribal, etc.):</p> <ul style="list-style-type: none"> NEPA process underway to examine lower Snake River dam removal among other options but won’t be wrapped up until 2021 Regulatory process for other dams varies by dam (FERC or other processes) <p>Degree of alignment with current federal and state law (versus requiring changes to laws):</p> <ul style="list-style-type: none"> Varies by dam <p>Political/social feasibility:</p> <ul style="list-style-type: none"> Varies by dam and we must be very clear that this action considers (1) every dam, (2) benefit to chinook, and (3) stakeholder considerations Work with regional organizations and lead entities to address political/social factors <p>Technical feasibility: High</p>

<p>Dam? Can we talk with TransAlta about this? Might be an opportunity there.</p> <p>Consider climate change. Balance the carbon emissions benefits of hydro with its effects on species. Could make a link to the climate fee/tax initiative. Funding would go to clean water and habitat projects. TF could make a recommendation on that.</p> <p>Consider SRKW and Chinook in proposals for new dams Proposals for Dams in spring Chinook (or fall Chinook) habitat (like Chehalis) should evaluate the effect of new dams on orcas.</p>				<p>Degree to which it reinforces or leverages existing efforts:</p> <ul style="list-style-type: none"> Certain dam removals could put in jeopardy funds for habitat work and mitigation while there are some/several dams already identified to be removed to leverage existing efforts <p>Degree of certainty:</p> <ul style="list-style-type: none"> Highly variable
--	--	--	--	--

NOTES ON INPUT, COMMENTS AND QUESTIONS FROM TASK FORCE ON THIS ACTION ON 6/14/18:

- What dam removal projects are already under consideration?
- Is there a list of dams that could be removed even if they are still useful?
- Paul Allen Foundation/American Rivers has done an analysis; can the WG look at that list and give the TF feedback?
 - Report lists some potential dams that could be removed but was not comprehensive or consider all factors- not publicly available.
- Consider where dams are in the legal process; some already have an EIS.
- What are the unintended consequences of dam removal? Human safety, spills, etc.
- Consider potential loss of hatchery production due to less mitigation burden to produce fish.
 - This was discussed and in matrix. Also noted that if dam removal is successful, in the longer term there could be less reliance on hatchery fish due to high benefits to wild stocks.
- Consider potential loss of F&W funding due to less mitigation burden/requirements and decreased revenue generated.
- Consider unintended consequences (e.g. if ships cannot pass then what increase would arise in trains and trucks?)

Additional information (WG Meetings 2 & 3)

- Recommendations about where and when to implement each action, including sequencing (if not covered above in table)
 - Steps to take: Inventory dams and impoundments that block fish passage or otherwise impair salmon survival, overlay with priority areas, and prioritize impoundments and dams to be considered for modification or removal
 - Assess spill levels to maximize survival of juvenile chinook and raise total dissolved gas cap if needed or where appropriate to maximize survival of juvenile chinook
- Whether each action will improve conditions for all pods or a subset
 - Depends on location of dam removal

Hatchery

Note:

In addition to the SRKW TF effort, the legislature tasked WDFW with increase production in 2018/2019 – attached to budget. This project is outside of the TF charge due to timing of decisions necessary. The 2018 decisions on broodstock are happening in consultation with the co-managers and NOAA on a tight schedule now (July 2018) with input from stakeholders, HSRG, etc. right now. Interested groups are encouraged to contact Eric Kinne at DFW to provide input. SRKW Task Force considerations should take 2018 program changes into account.

Hatchery Action A – Increase hatchery production in strategic areas

Action, including time and place for implementation	Effectiveness	Affordability	Ease of Implementation
<p>A. Increase hatchery production at facilities that most benefit SRKWs and apply measures to remove excess hatchery fish before they reach spawning grounds (e.g. weirs, mark-selective harvest)</p> <p>WDFW Staff will bring decision support model to August 7th TF and August 9th Prey WG.</p> <p>May also want to look at ways to increase the smolt-to-adult / marine survival of Chinook, adjust return timing and locations to align with whale needs, and increase size and age of return (would increase costs; See Action B)</p> <p>Principles:</p> <ul style="list-style-type: none"> • Need to emphasize the ultimate goal is to maintain wild fish populations. • Do not jeopardize ESA-listed stocks or wild populations generally. Also do not want to contribute to potential listings <p>Timeframe for hatchery production: biological response from the whales, monitor effectiveness for 10 years and then check in. LCFRB monitors annually and makes adaptive decisions.</p>	<p>H</p> <p>Magnitude of benefit to SRKW (quantify if possible):</p> <ul style="list-style-type: none"> • High (compare NOAA information to WDFW potential table?) • Unknowns: Dependent on survival of fish released • Not a lot of agreement on the effectiveness of this strategy <p>Risk: Depressing wild fish survival and productivity.</p> <p>Time for response to occur:</p> <ul style="list-style-type: none"> • Intermediate 3-10 Years (at best, based on survival) 	<p>H</p> <p>Estimated cost to implement (in dollars):</p> <ul style="list-style-type: none"> • \$110K/1M Chinook fry. • Coho and steelhead more expensive, chum cheaper • Any yearling programs are more expensive • \$50K? for model integration, leverage what we already know for 2019 broodstock collection. Identify data gaps. Time-and-place goals for SRKWs, and how do we get it there for them. 	<p>M</p> <p>Regulatory feasibility (laws, regulations and treaties—including local, state, federal, international, tribal, etc.):</p> <ul style="list-style-type: none"> • Administrative process (coordinate with WDFW/NOAA/Tribes/Regional Salmon Board directors)? <p>Degree of alignment with current federal and state law (versus requiring changes to laws):</p> <ul style="list-style-type: none"> • HGMPs <p>Political/social feasibility:</p> <ul style="list-style-type: none"> • Could be expectations that there are increased harvest opportunities with increased production <p>Technical feasibility:</p> <ul style="list-style-type: none"> • Aligning with regions and technical partners

<p>Consider productivity of hatchery AND wild fish as a variable or metric. Metrics exist in some regional recovery plans</p> <p>Selective removal of hatchery fish is one tool for managing the potential negative interaction of hatchery fish on wild fish (limit number of hatchery fish that could spawn in the wild with wild fish).</p> <p>Carefully describe assumptions and hypotheses by life stage and evaluate annually through adaptive management, in a transparent and public manner. Considerations when deciding which stocks to increase and when evaluating each hatchery population increased:</p> <ul style="list-style-type: none"> • How many Chinook will be available to the whales (fish available pre-terminal/before spawning grounds and near or in river fisheries) • What's the average size and age of return? • When are the Chinook returning? • How are these Chinook distributing? Does it continue to align with whale needs? • Juvenile carrying capacity. Are there conflicts with wild fish in estuary, nearshore and Puget Sound? • Smolt-to-adult/marine survival. What are the marine survival rates? • Predation (does the action attract predators (-) or buffer predation (+)? How do we manage for best outcome) • Proportion of hatchery fish co-spawning with wild fish (pHOS). What does increased production do to increasing stray rates • Proportion of natural influence (pHOS + proportion of wild/natural origin fish used in hatchery broodstock or pNOB) • Harvest ramifications? Does more adult hatchery Chinook returning to specific areas increase (or decrease) encounter rates of wild Chinook? • Did increasing hatchery production provide a direct benefit to whales by increasing their food supply? (choose a few of the larger hatchery production increases. Use as index programs for 	<p>Degree of certainty:</p> <ul style="list-style-type: none"> • Short term – certain, longer term, depends on the affect on the wild stocks <p>Short-term: Emergency situation—crude analysis required, w/high degree of uncertainty. FY 19 (5M Chinook?). No impacts on wild fish, no backsliding.</p> <p>Intermediate: Due diligence—more time for analysis, the more certainty no impacts to wild fish.</p> <p>Long-term: Analysis including wild fish recovery should start immediately too, but will likely have little impact to SRKW recovery. Assuming successful turn around of orca—don't see hatcheries as solution. The other Hs kick in.</p>	<p>Degree of certainty:</p> <ul style="list-style-type: none"> • High 	<p>Degree to which it reinforces or leverages existing efforts:</p> <ul style="list-style-type: none"> • Would need to ensure that any additional hatchery production compliments existing salmon recovery plans and accounts for ecosystem response of additional hatchery fish <p>Degree of certainty:</p> <ul style="list-style-type: none"> • Question of where this would be most effective
--	---	--	--

<p>the greater effort. Parental-Base Tag the fish and then see whether contribution changes over time ongoing collections of whale feces)</p> <p>Need to check with salmon recovery regions – not just co-managers, HSRG and NOAA. Councils may support hatchery production through targeted habitat protection and restoration and/or hatchery production in targeted areas unlikely to compromise salmon recovery goals</p> <p>Allocate funds for a study/analysis/model integration of hatchery production statewide for 2019 broodstock collection.</p> <p>Lower priority areas for wild salmon recovery where you could boost hatchery production for SRKWs—focus here</p> <p>Major stocks whales are consuming are hatchery stocks</p> <p>Net pens were not generally supported in discussions – when adults come back, there is nowhere for them to go other than the nearest freshwater. Could this strategy work at the mouth of the Strait of Juan de Fuca? Explore this idea – net pens combined with increased fishing in local rivers to reduce hatchery fish on the spawning grounds. Net pens could both increase production or could change the way that you diversify life history – just another hatchery tool.</p> <p>Yearling programs could introduce risk</p>				
---	--	--	--	--

Additional information (WG Meetings 2 & 3)

- Whether each action will improve conditions for all pods or a subset
 - All pods since production is likely to be increased across Puget Sound, Columbia and Outer coast.

Hatchery Action B – Improve hatchery chinook performance

Action, including time and place for implementation	Effectiveness	Affordability	Ease of Implementation
<p>Perform actions in hatcheries to increase productivity, smolt-to-adult survival and/or marine survival of Chinook (including but not limited to reducing predation on hatchery fish), adjust return timing and locations to align with whale needs, increase size and age of return, and reduce potential competition with wild fish.</p> <p>(INSERT GEOGRAPHIC, TIMING, STOCK SPECIFICS OF WHERE THIS MIGHT BE TRIED)</p> <p>Measure of success for hatcheries needs to be redefined to long window for out-migration, increase size and age of return fish. Stock and # of fish is great, but FRAM to determine pre-terminal and see what would be best for whales.</p>	<p>M</p> <p>Some certainty for average % survival, less certainty for productivity of fish. Greater risk, potentially higher return and more fish</p> <p>Magnitude of benefit to SRKW (quantify if possible):</p> <ul style="list-style-type: none"> • Unknown • Could increase the benefit of Action A • Could increase abundance even absent increased production <p>Time for response to occur:</p> <ul style="list-style-type: none"> • Long term? 10+ years for larger impacts (shorter timeline to see results of test on smaller scale?) • Short term survival could decrease <p>Degree of certainty:</p> <ul style="list-style-type: none"> • Data need regarding: <p>Brood stock management and spawning protocols to increase fish size; timing and location of smolt release to reduce predation and competition with natural fish; rearing strategies to improve survival in natural environment; net pens for endemic stocks</p>	<p>M</p> <p>Estimated cost to implement (in dollars):</p> <ul style="list-style-type: none"> • Higher than current Chinook production <p>Degree of certainty:</p> <ul style="list-style-type: none"> • High 	<p>M</p> <p>Regulatory feasibility (laws, regulations and treaties—including local, state, federal, international, tribal, etc.):</p> <ul style="list-style-type: none"> • Administrative process (coordinate with WDFW/NOAA/Tribes/Regional Salmon Board directors)? <p>Degree of alignment with current federal and state law (versus requiring changes to laws):</p> <ul style="list-style-type: none"> • No issues id'ed <p>Political/social feasibility:</p> <ul style="list-style-type: none"> • No issues id'ed <p>Technical feasibility:</p> <ul style="list-style-type: none"> • Need scientific design to test effects on returns, predation, etc. • Disease risk – yearling production of Chinook? • Facility will have to be larger – so technical feasibility depends on the individual facility. Would want to test in a few locations where it is easy before you make changes to current production • Need to work with co-managers, NOAA and salmon recovery regions to understand risk to wild stocks <p>Degree to which it reinforces or leverages existing efforts:</p>

	<p>Will it change pinniped or bird behavior so that they stay to feed all the time? Research will take time. Could a pilot in some hatcheries determine efficacy of limiting predation or would confounding factors limit ability to detect success?</p>			<ul style="list-style-type: none"> • If increases production in the process would need to ensure that any additional hatchery production compliments existing salmon recovery plans and accounts for ecosystem response of additional hatchery fish <p>Degree of certainty:</p> <ul style="list-style-type: none"> • Low
--	--	--	--	--

Additional information (WG Meetings 2 & 3)

- Whether each action will improve conditions for all pods or a subset
 - Depends upon where implemented

Harvest

Note: Chinook harvest has been decreased significantly over the last few decades and relative to the overall abundance of chinook available to SRKW, further reduction in harvest may have little benefit. Vessel disturbance associated with fishing is considered by the Vessel work group.

Harvest Action A – Limit chinook harvest in key SRKW foraging areas

Action, including time and place for implementation	Effectiveness	Affordability	Ease of Implementation
<p>Limit harvest of Chinook in areas important to SRKW foraging</p> <p>There used to be hot spot foraging areas (west side of San Juan Islands) – these are shifting. This action may not be easy to implement as the whales are no longer predictable. Canada has just implemented this action – may want to better understand why they thought this would work.</p> <p>It is important to distinguish between vessel noise and the taking of Chinook.</p> <p>All actions in deference to and respect of tribal treaty rights</p> <p>Common theme is to share conservation burden equally if fishing is reduced</p> <p>Sliding scale concept. Very conservative harvest in low abundance years and more liberal harvest in high abundance years</p>	<p>L</p> <p>Magnitude of benefit to SRKW (quantify if possible):</p> <ul style="list-style-type: none"> • Low – Sport fishery in Marine Area 7 is 3,500 chinook in summer (July-Sept). • Total chinook ocean harvest North of Cape Falcon, OR, varies annually and has been about 95,000-130,000 per year in recent years. <p>Time for response to occur:</p> <ul style="list-style-type: none"> • Immediate (0-3 years) <p>Degree of certainty:</p> <ul style="list-style-type: none"> • Low 	<p>H</p> <p>Estimated cost to implement (in dollars):</p> <ul style="list-style-type: none"> • High (cost to fisheries – economic cost, cultural cost) • Low implementation cost <p>Degree of certainty:</p> <ul style="list-style-type: none"> • High 	<p>L</p> <p>Regulatory feasibility (laws, regulations and treaties— including local, state, federal, international, tribal, etc.):</p> <ul style="list-style-type: none"> • Impossible to implement with co-managers? Case law would not support. • Tribal treaty rights concerns • May require WDFW Commission policy change <p>Additional information and policy/legal review needed</p> <p>Degree of alignment with current federal and state law (versus requiring changes to laws):</p> <ul style="list-style-type: none"> • Low alignment due to treaty rights <p>Political/social feasibility:</p> <ul style="list-style-type: none"> • North of Falcon fishing season setting is already challenging <p>Technical feasibility:</p> <ul style="list-style-type: none"> • SRKW locations won't overlap nicely with current Marine Areas. <p>Degree to which it reinforces or leverages existing efforts:</p> <ul style="list-style-type: none"> • Existing efforts are underway in Canada – look to see if they are effective

					Degree of certainty: <ul style="list-style-type: none"> • There is low certainty that this would be politically or even legally feasible with the co-management framework.
--	--	--	--	--	---

Additional information (WG Meetings 2 & 3)

- Whether each action will improve conditions for all pods or a subset
 - All pods

Harvest Action B – Subsidize lost/closed fishing opportunity

Action, including time and place for implementation	Effectiveness	Affordability	Ease of Implementation
<p>Subsidize or compensate fishers to not fish</p> <p>Commercial fishers across all marine areas and recreational charter. For the sport fishery in general there is no mitigation that has occurred in the past, however, in the Columbia Basin, there is an endorsement (\$8.75) required to purchase a salmon/steelhead license with proceeds used by WDFW to comply with ESA requirements for those fisheries (monitoring, enforcement, etc).</p> <p>This action would likely be focused on the pre-terminal Puget Sound areas. Could be implemented immediately.</p> <p>Concerns expressed relative to recreational and tribal fisheries, but should we remove them from subsidy? Provide compensation to sport fishing industry perhaps.</p> <p>Especially relevant during a low abundance year</p>	<p>L</p> <p>Magnitude of benefit to SRKW (quantify if possible):</p> <ul style="list-style-type: none"> • Low – Sport fishery in Marine Area 7 is 3,500 chinook in summer (July-Sept). • Total chinook ocean harvest North of Cape Falcon, OR, varies annually and has been about 95,000-130,000 per year in recent years. <p>Time for response to occur:</p> <ul style="list-style-type: none"> • Immediate (0-3 years) <p>Degree of certainty:</p> <ul style="list-style-type: none"> • Medium in biggest stocks (can use abundance index to predict in biggest stocks) 	<p>H</p> <p>Long-term cost to WDFW and feds would be substantial—would need to accurately project revenue impacts</p> <p>Estimated cost to implement (in dollars):</p> <ul style="list-style-type: none"> • 2008 – U.S. federal government in implementation of the US – Canada Pacific Salmon Treaty paid millions of dollars to Canada (\$30M to reduce fleet size) and Alaskan (\$15M mitigation for reduced harvest) commercial fishers <p>Degree of certainty:</p> <ul style="list-style-type: none"> • High 	<p>L</p> <p>Regulatory feasibility (laws, regulations and treaties—including local, state, federal, international, tribal, etc.):</p> <ul style="list-style-type: none"> • Again, very difficult to implement with tribal fishers as the right to harvest has cultural value as well as economic value. Can't "buy back" ability to practice cultural and spiritual traditions. <p>Degree of alignment with current federal and state law (versus requiring changes to laws):</p> <ul style="list-style-type: none"> • There is precedent but only with northern fisheries <p>Political/social feasibility:</p> <ul style="list-style-type: none"> • Treaty tribes will not allow rights to be “bought back” – this is not an option for tribal fishers. • Recreational fishers may not participate. No mechanism for subsidy for general anglers, though may be able to achieve something for charter/guides or local economies. <p>Technical feasibility:</p> <ul style="list-style-type: none"> • High <p>Degree to which it reinforces or leverages existing efforts:</p> <ul style="list-style-type: none"> • Low <p>Degree of certainty:</p> <ul style="list-style-type: none"> • High

Additional information (WG Meetings 2 & 3)

- Whether each action will improve conditions for all pods or a subset
 - All pods.

Harvest Action C – Reduce incidental harvest of chinook

Action, including time and place for implementation	Effectiveness		Affordability		Ease of Implementation	
<p>Reduce non-targeted fisheries' impact on salmon, including limiting gear types that increase mortality and by-catch (Action 5)</p> <p>Focused on trawl fisheries in pacific and north pacific that intercept Chinook (mid-water targeting hake or pollock)</p> <p>This action does not include forage fish – that would be under the integrated forage fish action.</p>	M	<p>Brief explanation of rating:</p> <p>Magnitude of benefit to SRKW (quantify if possible):</p> <ul style="list-style-type: none"> • Low (Pacific) – West Coast hake trawl fishery has a chinook limit of 11,000 • Medium (North Pacific) – Bering Sea pollock trawl fishery has a chinook cap of 60,000 <p>Time for response to occur:</p> <ul style="list-style-type: none"> • Immediate (0-3 years) <p>Degree of certainty:</p> <ul style="list-style-type: none"> • There is a NMFS Biological Opinion that was just updated in December 2017 addressing the bycatch of salmon (chinook and coho) in West Coast groundfish fisheries (including hake/whiting trawl). The trawl fisheries are 100% 	M	<p>Brief explanation of rating:</p> <p>Estimated cost to implement (in dollars):</p> <ul style="list-style-type: none"> • Possibly high – The economic value of these fisheries is in the billions – fishers wouldn't want to risk targeted harvest to save a few Chinook • Costs of reduced fisheries would be much more of an effect than improved bycatch mitigation or avoidance might be. <p>Research could be costly (M)</p> <p>Degree of certainty:</p> <ul style="list-style-type: none"> • Low 	M	<p>Brief explanation of rating:</p> <p>Regulatory feasibility (laws, regulations and treaties—including local, state, federal, international, tribal, etc.):</p> <ul style="list-style-type: none"> • WDFW Commission policy change may be required • Need to work via Regional Fishery Management Council (NPFMC and PFMC) processes who manage these fisheries. • Want excluder device requirement – need better designs for equipment • Difficulty in requiring a specific design or device is that one size does not fit all, and maintaining the flexibility for individuals to experiment and find the configuration that works best for them is important for fishery viability <p>Degree of alignment with current federal and state law (versus requiring changes to laws):</p> <ul style="list-style-type: none"> • New by-catch goals were just set with the pacific fisheries <p>Political/social feasibility:</p> <ul style="list-style-type: none"> • High if \$\$\$ is provided <p>Technical feasibility:</p> <ul style="list-style-type: none"> • High if research improves designs

		<p>observed and observers collect coded wire tag samples to determine the origin of salmon bycatch. The occurrence of bycatch events, particularly in the whiting fishery, is difficult to predict and is considerably lower than the salmon fisheries catch. The groundfish trawl fisheries are closely monitored with real-time catch information, and include prescribed harvest limits and measures (e.g., time and area closures) that can be implemented inseason in the event that bycatch rates and/or numbers are higher than anticipated.</p>				<p>Degree to which it reinforces or leverages existing efforts:</p> <ul style="list-style-type: none"> • Current competition for new innovations that limit by catch <p>Degree of certainty:</p> <ul style="list-style-type: none"> • Medium
--	--	---	--	--	--	--

Additional information (WG Meetings 2 & 3)

- Whether each action will improve conditions for all pods or a subset
 - All pods.

Harvest Action D – Negotiate reductions in AK and Canadian fisheries

Action, including time and place for implementation	Effectiveness	Affordability	Ease of Implementation
<p>Negotiate reductions in AK and Canadian fisheries to allow more Chinook to reach WA waters</p> <p>The U.S. Pacific Salmon Commissioners are well aware of the chinook interceptions off Alaska and BC and those are major factors in the re-negotiation of the Chinook Annex. Note: The results of the negotiations are being finalized and should be publicly available soon, and are expected to include reductions in chinook harvest for both Alaska and BC over the next 10 years.</p>	<p>H</p> <p>Magnitude of benefit to SRKW (quantify if possible):</p> <ul style="list-style-type: none"> Dependent upon amount of reductions and how implemented <p>Time for response to occur:</p> <ul style="list-style-type: none"> Long-term (10+ years) <p>Degree of certainty:</p> <ul style="list-style-type: none"> High 	<p>L</p> <p>Estimated cost to implement (in dollars):</p> <ul style="list-style-type: none"> Lost fisheries/economy Likelihood of compensation for lost fishing could be more than \$50 million <p>Degree of certainty:</p> <ul style="list-style-type: none"> High 	<p>L</p> <p>Regulatory feasibility (laws, regulations and treaties—including local, state, federal, international, tribal, etc.):</p> <ul style="list-style-type: none"> International treaty with no re-opening, negotiated over 10 year period <p>Degree of alignment with current federal and state law (versus requiring changes to laws):</p> <ul style="list-style-type: none"> Would have to reopen Chinook annex – right now not possible Plan for next negotiation now. Expand on what could look like now? <p>Political/social feasibility:</p> <ul style="list-style-type: none"> Low <p>Technical feasibility:</p> <ul style="list-style-type: none"> High <p>Degree to which it reinforces or leverages existing efforts:</p> <ul style="list-style-type: none"> SRKW are being considered in Chinook annex. Need to include a summary of actions being included in the re-negotiated treaty and what specific actions are intended to relate to SRKWs. <p>Degree of certainty:</p> <ul style="list-style-type: none"> High

Additional information (WG Meetings 2 & 3)

- Whether each action will improve conditions for all pods or a subset
 - All pods

Harvest Action E – Reduce marine harvest of chinook and transfer opportunity to terminal areas (rivers or areas beyond SRKW foraging areas)

Action, including time and place for implementation	Effectiveness		Affordability		Ease of Implementation	
<p>Reduce marine harvest and transfer opportunity to terminal fisheries while chinook abundance in increased (Action 7)</p> <p>Would affect all marine pre-terminal fisheries. An exemption for tribes is not a preferred solution.</p> <p>Work Group recommends the TF not pursue this action because it is an allocation debate but rather suggest to others willing to consider voluntary adjustments</p>	L-H	<p>Magnitude of benefit to SRKW (quantify if possible):</p> <ul style="list-style-type: none"> • Depends on action details and annual abundance of chinook • Highest benefit would occur if reduced harvest in times and areas that encounter chinook stocks preferred by SRKW, particularly in low chinook abundance years • Low to medium benefits, depending on time and area, expected in high chinook abundance years <p>Time for response to occur:</p> <ul style="list-style-type: none"> • Immediate (0-3 years) <p>Degree of certainty:</p> <ul style="list-style-type: none"> • Low 	M	<p>Estimated cost to implement (in dollars):</p> <ul style="list-style-type: none"> • Economic impacts to fisheries <p>Degree of certainty:</p> <ul style="list-style-type: none"> • High 	L	<p>Regulatory feasibility (laws, regulations and treaties—including local, state, federal, international, tribal, etc.):</p> <ul style="list-style-type: none"> • Tribal treaty concerns – e.g., vast majority of Makah Tribes fisheries are non-terminal • Reallocation inter-tribal. Would disproportionately affect some tribes more than others <p>Degree of alignment with current federal and state law (versus requiring changes to laws):</p> <ul style="list-style-type: none"> • Co-management might not support this <p>Political/social feasibility:</p> <ul style="list-style-type: none"> • It is not a 1:1 fish for fish <p>Technical feasibility:</p> <ul style="list-style-type: none"> • High <p>Degree to which it reinforces or leverages existing efforts:</p> <ul style="list-style-type: none"> • Never has been tried <p>Degree of certainty:</p> <ul style="list-style-type: none"> • High

Additional information (WG Meetings 2 & 3)

- Whether each action will improve conditions for all pods or a subset
 - All pods.

Harvest Action F – implement size limits on chinook

Action, including time and place for implementation	Effectiveness	Affordability	Ease of Implementation
<p>Implement slot size limits to get larger fish on the spawning grounds (put a maximum size limit on catch; Action 9)</p> <p>This would be implemented throughout the Puget Sound, Coast, and Columbia.</p>	<p>L</p> <p>Magnitude of benefit to SRKW (quantify if possible):</p> <ul style="list-style-type: none"> • Low/Medium? <p>Time for response to occur:</p> <ul style="list-style-type: none"> • Long term (10+ years for full implementation) <p>Degree of certainty:</p> <ul style="list-style-type: none"> • Release mortality and survival data is inconclusive; grading through caught fish in search of the allowable size means more fish would be handled • Not clear where or whether age selective fishing mortality is occurring – troll or sport or net? Biologically, size selection in hatchery programs might provide a larger potential change, on the same time frame 	<p>M</p> <p>Estimated cost to implement (in dollars):</p> <ul style="list-style-type: none"> • Need increased enforcement <p>Degree of certainty:</p> <ul style="list-style-type: none"> • Low 	<p>M</p> <p>Regulatory feasibility (laws, regulations and treaties— including local, state, federal, international, tribal, etc.):</p> <ul style="list-style-type: none"> • WDFW Commission policy may be required <p>Degree of alignment with current federal and state law (versus requiring changes to laws):</p> <ul style="list-style-type: none"> • <p>Political/social feasibility:</p> <ul style="list-style-type: none"> • Expect significant stakeholder feedback • Require co-manager agreement • In Federal waters - PFMC <p>Technical feasibility:</p> <ul style="list-style-type: none"> • High <p>Degree to which it reinforces or leverages existing efforts:</p> <ul style="list-style-type: none"> • Have this on the books in Canada <p>Degree of certainty:</p> <ul style="list-style-type: none"> • Low

Additional information (WG Meetings 2 & 3)

- Whether each action will improve conditions for all pods or a subset
 - All pods.

Habitat

Note: The State of Washington adopted Extinction is not an Option (by RCW in 1999) as the strategy to recover ESA-listed salmon and conserve those that are not listed. The central tenant of the strategy is for regional salmon recovery organizations to form, develop scientifically sound and locally supported recovery plans, pursue approval of the plans by the state and federal government and then implement, track and report. The 7 salmon recovery organizations are intimately familiar with the needs and priorities for salmon (all species) in their regions and they have habitat and non-capital “projects” identified and prioritized. The regional organizations are currently working to develop region-specific high priority chinook projects based on current recovery plans for consideration by the Task Force for the list of five general actions for habitat that are listed below. Those priorities are located in the Box folder and reviewers should refer to them.

Habitat Action A – Increase implementation and enforcement of habitat protection regulations

Action, including time and place for implementation	Effectiveness		Affordability		Ease of Implementation	
<p>Increase the implementation & enforcement of existing local, state and federal habitat protection regulations</p> <p>SEE REGIONAL RECOVERY ORGANIZATION LETTERS FOR SPECIFIC GEOGRAPHIES</p> <p>Need clear guidance/direction on expectations, roles and responsibilities for agencies and co-managers, regarding enforcement of regulations. Takes political will.</p> <p>As scalable to high priority watersheds:</p> <ul style="list-style-type: none"> • For marine HPAs, encourage more consistent application of existing hydraulic code and guidelines, so that close to 100% of issued permits comply with statute and guidelines. 	H	<p>Magnitude of benefit to SRKW (quantify if possible):</p> <ul style="list-style-type: none"> • High (extremely difficult to quantify) <p>Time for response to occur:</p> <ul style="list-style-type: none"> • Immediate (0-3 years) <p>Degree of certainty:</p> <ul style="list-style-type: none"> • This may not be additive but is crucial in future losses. • Future permits that are issued could correct past implementation problems <p>Important to maintain protections and regulations, but this will only maintain</p>	M	<p>Estimated cost to implement (in dollars):</p> <ul style="list-style-type: none"> • Understaffing issue across most regulatory agencies - More enforcement, permitting, compliance staff \$\$ • Applying the actual regs properly in the Hydraulic Code (as an example) doesn't cost anything • Cost to fully fund staff needed for compliance and enforcement could be scalable and prioritized <p>Degree of certainty:</p> <ul style="list-style-type: none"> • Depends on what work is being estimated. <p>Application of the laws</p>	L	<p>Regulatory feasibility (laws, regulations and treaties—including local, state, federal, international, tribal, etc.):</p> <ul style="list-style-type: none"> • Administrative complexity – applying the laws as they are written may not always be easy • Consistency among agencies is not known • Enforcement has some feasibility issues – if criminal allegations are made, they often are not prioritized by the prosecutor's offices. • Risk of being sued by wealthy waterfront landowners <p>Degree of alignment with current federal and state law (versus requiring changes to laws):</p> <ul style="list-style-type: none"> • Aligned <p>Political/social feasibility:</p> <ul style="list-style-type: none"> • Politically hard decisions • Politicians get blow back for hard decisions

<ul style="list-style-type: none"> • Improve HPA compliance and effectiveness by enhancing WDFW regional biologist capacity in priority watersheds • Support enhanced civil enforcement authority in the HPA program. Current civil authority is limited and criminal enforcement authorities are not resulting in resolution or fish and habitat benefit. Enhanced civil authority would better match what local governments, Ecology and DNR currently utilize. • DFW has used grant funds to pilot increased civil compliance under current law, and have seen many successes increasing compliance with added capacity to visit sites before and during construction. Fund compliance inspectors, increase WDFW effectiveness monitoring funding • Ensure Shoreline Development Permits and Variance Permits pursuant to Shoreline Master Plans enforce the "need" for armoring when reviewing replacement of bulkheads. • Fund increased staffing to communicate to local governments and land management agencies the riparian conditions necessary for the long-term survival of salmonids through the full range of environmental conditions, consistent with PHS riparian guidelines • Fund staffing for public awareness efforts around salmon, killer whales, and land use decisions . 		<p>the status quo and will not improve habitat for salmon. Focus should be acquisition and restoration.</p>		<p>correctly doesn't cost anything. Checking and following up does.</p> <ul style="list-style-type: none"> • Consistency among agencies is not certain 		<ul style="list-style-type: none"> • May be cultural issues within agencies that need to be addressed that deal with permitting and enforcement <p>Technical feasibility:</p> <ul style="list-style-type: none"> • Need monitoring for compliance and effectiveness <p>Degree to which it reinforces or leverages existing efforts:</p> <ul style="list-style-type: none"> • <p>Degree of certainty:</p> <ul style="list-style-type: none"> • Depends on scope of changes. Limited changes to implementation may have limited effect on SRKW
---	--	---	--	---	--	--

NOTES ON INPUT, COMMENTS AND QUESTIONS FROM TASK FORCE ON THIS ACTION ON 6/14/18:

- What regulations is this action referring to specifically? (GMA, SMA? CAOs?) If there are state, federal, local then separate them out?

- Which habitat are we most concerned about for Chinook/SRKWs? Prioritize recommended actions here.
- Salmon recovery council priorities speak to these issues. Look there.
- What are the effects of current exemptions? Where is that important?
- Organize an evaluation of regulations at the local, state, and federal levels.
- Differentiate between enforcement and implementation. (Note that Penny changed language to try to provide clarity... more discussion needed?)
- Across the boards, appropriate application of hydraulic code is failing. Issue is both implementation and enforcement. Easier to implement existing laws well? Need to put some attention on WDFW laws.
- HPA compliance – enhance civil authority. See notes from Justin Allegro (WDFW)
- May need to look at mitigation for cumulative impacts

Additional information (WG Meetings 2 & 3)

- Whether each action will improve conditions for all pods or a subset
All pods.

Habitat Action B – Enhance or change if needed, habitat protection regulations

Action, including time and place for implementation	Effectiveness	Affordability	Ease of Implementation
<p>Enhance/change habitat protection regulations, especially for key Chinook/SRKW habitats or areas</p> <p>SEE REGIONAL RECOVERY ORGANIZATION LETTERS FOR SPECIFIC GEOGRAPHIES</p> <p>As scalable to high priority watersheds:</p> <ul style="list-style-type: none"> • Support a requirement for Net Ecological Benefit for Growth Management Plans and Shoreline Management Plans. • Evaluate ramifications and benefits of limitations around fair market value in state acquisition of priority chinook habitat acquisition, offer recommendations to legislature. <p>Need to review how mitigation is used to off-set impacts, and whether that should be an option</p>	<p>H</p> <p>Magnitude of benefit to SRKW (quantify if possible):</p> <ul style="list-style-type: none"> • High <p>Time for response to occur:</p> <ul style="list-style-type: none"> • Intermediate (3-10 years) <p>Degree of certainty:</p> <ul style="list-style-type: none"> • High <p>Important to maintain protections, but this will only maintain the status quo and will not improve habitat for salmon.</p> <p>Regulations (GMA, SMA) were not written to protect habitat. Perhaps apply hydraulic code differently.</p> <p>Goes hand-in-hand with Action A.</p>	<p>M</p> <p>Estimated cost to implement (in dollars):</p> <ul style="list-style-type: none"> • Need to consider the degree to which there would be economic loss (indirect as opposed to direct implementation cost) • Costs for policy work are not extremely high <p>Degree of certainty:</p> <ul style="list-style-type: none"> • High 	<p>L</p> <p>Regulatory feasibility (laws, regulations and treaties—including local, state, federal, international, tribal, etc.):</p> <ul style="list-style-type: none"> • Administrative complexity <p>Degree of alignment with current federal and state law (versus requiring changes to laws):</p> <ul style="list-style-type: none"> • Legislative code changes? <p>Political/social feasibility:</p> <ul style="list-style-type: none"> • Politically hard decisions • Economic loss • Limits development <p>Technical feasibility:</p> <ul style="list-style-type: none"> • Need better understanding of how to integrate salmon recovery priorities into land use planning • Need monitoring for compliance and effectiveness <p>Degree to which it reinforces or leverages existing efforts:</p> <ul style="list-style-type: none"> • More difficult than implementing laws already on the books <p>Degree of certainty:</p> <ul style="list-style-type: none"> • High

Notes:

- GMA/SMA planning – net ecological benefit requirement as opposed to no net loss?
- Fair market value requirements for acquisition of lands need to be addressed. Barrier to acquisition currently is inability for acquisition to compete with bidders.
- Single family exemptions are the highest priority
- No net loss is not sufficient
- Aquaculture has few regulations and has impact that needs to be considered

Additional information (WG Meetings 2 & 3)

- Whether each action will improve conditions for all pods or a subset

Habitat Action C – Acquire habitat

Action, including time and place for implementation	Effectiveness		Affordability		Ease of Implementation	
<p>Acquire important Chinook habitat for permanent protection</p> <p>SEE REGIONAL RECOVERY ORGANIZATION LETTERS FOR SPECIFIC GEOGRAPHIES</p>	<p>H this action is scalable so could be a range from L to H</p>	<p>Magnitude of benefit to SRKW (quantify if possible):</p> <ul style="list-style-type: none"> High <p>Time for response to occur:</p> <ul style="list-style-type: none"> Immediate (0-3 years) to Intermediate (3-10 years) depending on site and level of development/conversion risk <p>Degree of certainty:</p> <ul style="list-style-type: none"> <p>Acquisition is critical. Regulations (GMA, SMA) were not written to protect habitat.</p> <p>Consider especially the quality of the habitat.</p>	<p>L this action is scalable so could be a range from L to H</p>	<p>Estimated cost to implement (in dollars):</p> <ul style="list-style-type: none"> Need to focus in on the funding piece—across recommendations <p>Degree of certainty:</p> <ul style="list-style-type: none"> Land prices may be prohibitive in some key areas 	<p>Likely H because of willing seller/willing buyer but L if funds and/or willing landowner are unavailable</p>	<p>Regulatory feasibility (laws, regulations and treaties—including local, state, federal, international, tribal, etc.):</p> <ul style="list-style-type: none"> <p>Degree of alignment with current federal and state law (versus requiring changes to laws):</p> <ul style="list-style-type: none"> <p>Political/social feasibility:</p> <ul style="list-style-type: none"> Legislative/political will may be challenging <p>Technical feasibility:</p> <ul style="list-style-type: none"> Difficult given current land use, high land prices, and number of willing sellers in key locations <p>Degree to which it reinforces or leverages existing efforts:</p> <ul style="list-style-type: none"> <p>Degree of certainty:</p> <ul style="list-style-type: none"> Need map of where development is likely to happen and habitat to acquire/protect most important areas for Chinook to benefit SRKW

Additional information (WG Meetings 2 & 3)

- Whether each action will improve conditions for all pods or a subset

Habitat Action D – Accelerate habitat restoration

Action, including time and place for implementation	Effectiveness		Affordability		Ease of Implementation	
<p>Accelerate habitat restoration, including fish blockages in areas most beneficial to SRKW</p> <p>ALSO CONSIDER: ‘Increase and/or improve Hydro habitat mitigation for salmon recovery’</p> <p>SEE REGIONAL RECOVERY ORGANIZATION LETTERS FOR SPECIFIC GEOGRAPHIES</p> <p>Lower Columbia –</p> <ol style="list-style-type: none"> 1) Best use of available habitat through reintroduction in Lewis and Cowlitz (captured in hydro) 2) About 50 miles of F/W production potential – reaches are specified and costs have been laid out (\$3M/year for 10 years) 3) Estuarine restoration. Used by all populations. Accelerate work to achieve targets. 3300 acres over the next 5 years (SUBS, Bachelor Island, Chinook, etc) 	H	<p>Magnitude of benefit to SRKW (quantify if possible):</p> <ul style="list-style-type: none"> • High <p>Time for response to occur:</p> <ul style="list-style-type: none"> • Intermediate (0-3 years) for blockages and big projects that need to start now, Long-term (10+ years for restoration) <p>Degree of certainty:</p> <p>Restoration and acquisition are what are going to turn the tide on salmon recovery. Protection/regulation is status quo, preventing backsliding.</p> <p>Focus on riparian and flood zone areas, and focus on specific species (chinook)</p> <p>Can’t restore our way out of the problem—have to use all the tools available to us</p>	L	<p>Large-scale, increased funding essential to get more projects completed</p> <p>Estimated cost to implement (in dollars):</p> <ul style="list-style-type: none"> • More than \$50 million/year above current investments is needed to accelerate restoration <p>Degree of certainty:</p> <ul style="list-style-type: none"> • High <p>Could focus on priority watersheds. Choose 1-2 and apply additional funds surgically.</p> <p>The Yakima has already been prioritized, but to get the restoration benefits at the speed you need them would take a massive influx of funds</p> <p>Not a matter of redistributing current resources, or picking a specific watershed—has to be</p>	M	<p>Regulatory feasibility (laws, regulations and treaties—including local, state, federal, international, tribal, etc.):</p> <ul style="list-style-type: none"> • Funding sources don’t allow for the time it takes to sequence issues on the ground <p>Degree of alignment with current federal and state law (versus requiring changes to laws):</p> <p>Political/social feasibility:</p> <ul style="list-style-type: none"> • Need public education for why it is important • Alignment of all necessary implementation projects is difficult – need more capacity <p>Technical feasibility:</p> <ul style="list-style-type: none"> • Need to align approaches of many different species recovery goals • Need to consider climate change and resiliency <p>Degree to which it reinforces or leverages existing efforts:</p> <ul style="list-style-type: none"> • All recovery plans have scientific backing and many have priorities for

	<p>Capacity is already maxed out on the implementation side, even if money is allocated for restoration</p> <p>FPBRB is not specific to Chinook—statewide</p> <p>Consider relationship between hatchery production and habitat restoration</p>		<p>across Washington to be effective. Habitat will cost a lot of money, but we should not limit ourselves, because that is what it will take.</p> <p>The few remaining projects are complicated: PSAR large capital list SRFB list Feasibility lens is applied to these lists—so what if we thought even larger? I.e. get I-5 off Nisqually Delta</p> <p>Highlight the strategies for orca and where the projects are located in the realm of a floodplain, for example</p>		<p>habitat restoration already identified</p> <ul style="list-style-type: none"> NW Power CC Fish and Wildlife Program currently funds many restoration projects – SRKW priorities could be added? Current Chinook recovery goals do not include Orca needs – may need to review all recovery goals and increase the recovery targets Could tie to incentives – makes restoration easier and compliance more likely (A & B) <p>Degree of certainty:</p> <ul style="list-style-type: none"> Need to consider questions at project/watershed level around effectiveness
--	--	--	---	--	---

NOTES ON INPUT, COMMENTS AND QUESTIONS FROM TASK FORCE ON THIS ACTION ON 6/14/18:

- Location is very important.
- Can we execute habitat restoration that can help us with fishery recovery as well as SRKW recovery?
- Accelerate culvert replacement schedule.
- The Task Force will need to look at implementation capacity for steeply accelerating habitat restoration.
- Consider using condemnation for habitat restoration in areas identified as critically important for SRKW recovery.
- Do we need to do more intrusive restoration projects to get quicker results?
- Do we need to change the way we allocate restoration funding to focus on particular areas for SRKW and/or Chinook benefit?
- If we don't do the habitat protection piece then we will lose more habitat that we gain through these investments.
- Check out NPCC website – good info on climate change work – ranked the different Chinook watersheds for resiliency

- Authorize permanent application of and increased funding for the ESRP small grant program for highest priority projects for shoreline projects – could be folded in with PS focus on shorelines
- Refer to specific restoration projects that WDFW and NOAA have been developing for Pacific Salmon Treaty conversations.
- PS NERP Tier 1 projects are Nooksack, Skagit, Duckabush (\$460M). State would have to match.
- Middle Fork Nooksack – could be fully funded by PSAR this year – waiting to see. Also been discussed in hydro discussion
- Floodplains is a huge focus of recovery plans
- Political pressure needed for the Skokomish floodplain passage issue
- Information that is being compiled through other efforts needs to be considered – Columbia Basin Partnership (Liz to send). Ecosystem based goals – not just harvestable

Additional information (WG Meetings 2 & 3)

- Whether each action will improve conditions for all pods or a subset

Habitat Action E – Create additional habitat protection and restoration incentives for landowners

Action, including time and place for implementation	Effectiveness		Affordability		Ease of Implementation	
<p>Create additional or bolster existing habitat protection and restoration incentives for landowners</p> <ul style="list-style-type: none"> • Evaluate fair market value ramifications for priority chinook habitat acquisition • Enhance funding for enhanced wildlife forage within estuaries • Increase funding for Floodplains by Design • Increase funding for flexible incentives for restoring riparian on agricultural lands <p>Need integration b/w salmon projects, flood reduction for farms. W/ competing stakeholder interests, what incentives would move a stakeholder toward yes.</p> <p>Currently, landowners compensated for lost property. But also generational component from lost income from the land. Need to compensate landowners for “growing” fish over time. Need to develop these kind of non-traditional tools.</p>	M	<p>Magnitude of benefit to SRKW (quantify if possible):</p> <ul style="list-style-type: none"> • <p>Time for response to occur:</p> <ul style="list-style-type: none"> • <p>Degree of certainty:</p> <ul style="list-style-type: none"> • 	M	<p>Estimated cost to implement (in dollars):</p> <ul style="list-style-type: none"> • <p>Degree of certainty:</p> <ul style="list-style-type: none"> • 	H	<p>Regulatory feasibility (laws, regulations and treaties—including local, state, federal, international, tribal, etc.):</p> <ul style="list-style-type: none"> • <p>Degree of alignment with current federal and state law (versus requiring changes to laws):</p> <ul style="list-style-type: none"> • <p>Political/social feasibility:</p> <ul style="list-style-type: none"> • <p>Technical feasibility:</p> <ul style="list-style-type: none"> • <p>Degree to which it reinforces or leverages existing efforts:</p> <ul style="list-style-type: none"> • <p>Degree of certainty:</p> <ul style="list-style-type: none"> •

Additional information (WG Meetings 2 & 3)

- Whether each action will improve conditions for all pods or a subset

Predation

Predation Action A – Remove or alter artificial habitat that is benefiting predators

Action, including time and place for implementation	Effectiveness		Affordability		Ease of Implementation	
<p>Remove or alter artificial haul outs or breeding locations so they are not as attractive to predators (pinnipeds and birds; for predatory fish see Hydro actions)</p> <p>A pilot approach may be appropriate to better determine efficacy. Would need to develop implementation plan, adaptive management approach.</p> <p>WDFW is creating maps the overlay SRKW priority prey stocks with map of haul out sites and breeding bird colonies that would affect adult and juvenile migration</p>	<p>L</p> <p>Varies by stock/ geography and predator type</p>	<p>Magnitude of benefit to SRKW (quantify if possible):</p> <ul style="list-style-type: none"> • Pinnipeds: <u>Uncertain</u> due to new data becoming available on pinniped numbers and diet (which will give a more current and area-specific estimate of predation levels- Fall 2018 for WDFW and Canada DFO work to be completed). If alterations to haulouts are done the animals may shift distribution and numbers to other locations (anecdotal information suggests this is the case). A pilot approach may be appropriate to better determine efficacy. • Birds: <u>Low</u>; concerns that the animals will redistribute to other areas that may or may not be desirable. Though birds have been successfully dissuaded before, it has been difficult to quantify impacts 	<p>H</p>	<p>Estimated cost to implement (in dollars):</p> <ul style="list-style-type: none"> • Pinniped: Variable cost, depending on approach. Up to \$250k to retrofit dock in Astoria. Need to add in pre and post monitoring costs • Birds: Have call into FWS for estimate. • Both: High cost to be a substantial action. There would be an 	<p>M</p>	<p>Regulatory feasibility (laws, regulations and treaties—including local, state, federal, international, tribal, etc.):</p> <ul style="list-style-type: none"> • Pinnipeds: Permits/authorization is required from National Oceanic and Atmospheric Administration authorization due to Marine Mammal Protection Act; other permission or permitting may be required depending on ownership (e.g. Wildlife refuges) • Birds: Permits/authorization is required from US Fish and Wildlife Service authorization due to Migratory Bird Treaty Act; other permission or permitting may be required depending on ownership (e.g. Wildlife refuges). This is feasible particularly if the action simply moves the population versus reducing the population, the USFWS would likely require monitoring to ensure the population is merely redistributing itself and is not being impacted by the action. Habitat modification has occurred at sites in Columbia River estuary, so that part of the equation is possible. <p>Degree of alignment with current federal and state law (versus requiring changes to laws):</p> <ul style="list-style-type: none"> • Pinnipeds: No changes needed to remove but permitting required. For controlling the creation of new haul outs what about private property? May be able to limit this through permitting requirements under WAC from DNR. • Birds: No changes needed to remove but permitting required. Limiting creation of artificial habitat might be possible. However, in some cases there might be economic or other reasons that indirectly lead to creation of habitat or substrate conditions that are conducive to nesting birds (e.g., building a warehouse with a flat roof may be economical, but may result in a nest site for Caspian Terns). Modifying these practices may require

<p>corridors to determine specific alteration locations.</p> <p>Potential Opportunities (birds): Terns, cormorants, gulls: Rat Island, east sand and rice islands; rooftops in Bellingham bay, etc. Pigeon Guillemots: Hood Canal bridge</p> <p>(predatory fish): boat docks, piers, pilings, riprap, static reservoirs</p> <p>(pinnipeds): boat docks, piers, pilings, bouys, constrictions in salmon migratory routes,</p>		<p>of these actions to previous dissuasion events. Columbia River different from Puget Sound- don't focus on birds in Puget Sound. Not clear that birds are impacting salmonid populations in Puget Sound. Also due to huge foraging distances this action is unlikely to be effective.</p> <p>Time for response to occur:</p> <ul style="list-style-type: none"> • Intermediate (3-10 years) <p>Degree of certainty:</p> <ul style="list-style-type: none"> • <u>Low/Medium</u>: Uncertainty about where pinnipeds and birds may shift to after being excluded from some areas. Uncertain about bird impact to salmonids in Puget Sound. 		<p>additive effect of each site modification.</p> <p>Degree of certainty:</p> <ul style="list-style-type: none"> • Uncertain until more examples. 	<p>economic incentives or other non-regulatory measures. Regulatory measures could cause additional conflict.</p> <p>Political/social feasibility:</p> <ul style="list-style-type: none"> • Easier than lethal removal • Pinnipeds: social issues of encouraging lands/property owners to accommodate modifications to prevent haul outs (e.g., some have incentive to increase haul out availability for tourism). Conservation status on state lands may restrict with opportunity to modify haulouts (e.g., DNR NRCA). • Birds – social conflicts with conservation groups for certain actions <p>Technical feasibility:</p> <ul style="list-style-type: none"> • Pinnipeds: May not be possible to move them even if we try? • Birds: Has been successful in past for birds. Doing this in Puget Sound may be different than doing this in Columbia. <p>Degree to which it reinforces or leverages existing efforts:</p> <ul style="list-style-type: none"> • Pinnipeds: Not directly but follows marine survival study results we have at this point • Birds: ACE EIS- cormorants; inland avian predation plan. Existing (ongoing) action involves a different geography and largely fresh water environment of Columbia River. Not clear that a Puget Sound effort reinforces or leverages other efforts. <p>Degree of certainty:</p> <ul style="list-style-type: none"> • Implementation is likely possible in many places but complicated or delayed due to permitting required under current laws.
--	--	---	--	--	---

INPUT, COMMENTS AND QUESTIONS FROM TASK FORCE ON THIS ACTION FROM 6/14/18:

- Where are there artificial haul outs?
 - These haul outs are log booms at mills, at boat docks, navy facilities, dredge spoils, sand bars, etc. Almost all haul outs in Puget Sound from Olympia to Bellingham are artificial. In Strait of Juan De Fuca, San Juan Islands and Coast mostly natural haul outs are used.
- Are there any easy wins?

- If we can use social attraction (shown to be effective) and nest site enhancement in Grays Harbor (there are some promising candidate sites – Sand Island NAP, Whitcomb Island NAP, two islands off the mouth of Johns River) we could potentially attract Caspian Terns away from Puget Sound. Easy win if Caspian Terns move away from Puget Sound. Potential complication if Caspian Tern population increases in Grays Harbor and then expands back into Puget Sound.
- Pigeon guillemot modification of Hood Canal Bridge – can eat outmigrating chinook and they have developed cavities on both sides of the bridge. Several hundred pairs.
- Are there differences in how structures present in the Columbia River versus Puget Sound (e.g., Hood Canal Bridge versus Bonneville Dam)?
 - Yes, for birds there are differences. Along the Columbia River the birds are using dredge spoil islands and other islands. In Puget Sound, Caspian Terns are nesting on a natural island, for one year on a floating barge, on a waterfront dock, perhaps on a flat roof; cormorants are nesting on a rock jetty and now there is a 400-nest colony in coniferous trees in south Puget Sound.
- Ensure that we aren't harming transients (by removing their food resource) while we try to help SRKW.
 - Could this help transients eat more pinnipeds? Perhaps but they do not eat as many pinnipeds as many think. Would need a lot more transients to change pinniped population levels. (source: Benjamin Nelson)
- There are some companies that specialize in deterrents... consider these for figuring out potential affordability.
 - Attempting to contact USFWS and USACE because they have been involved in doing this for birds along the Columbia River.
 - Attached list of companies that specialize in deterrents.
- Consider any impacts that removal might have on forage fish artificial habitat
 - Our greatest understanding of the Puget Sound marine food web comes from a period when the system and the various component pieces had been substantially altered from the pre-European or early-European period. Consequently, management actions could easily result in species responses in the ecological system that we do not expect or that we can't fully anticipate. A trophic cascade may have occurred 100 years ago, and local actions may transition things back somewhat to the period prior to that event. Do we know what that condition looked like and all the bits and pieces that will occur in the future as we strive for that desired state? "Recovery" of Puget Sound may not produce a linear "signature" such that stages of progression could be situations where not only are changes unexpected, but actually unstable and/or undesirable. This is potentially true for any of the actions.
 - Atlantis food web model being developed for Puget Sound by NOAA (within the year) that will give decision makers better tools to understand the ecosystem effect of specific management actions.

Additional information (WG Meetings 2 & 3)

- Whether each action will improve conditions for all pods or a subset
 - Depends on location of where action is done-see above and then determine this

Predation Action B – Remove predators using lethal means in specific locations

Action, including time and place for implementation	Effectiveness		Affordability		Ease of Implementation	
<p>Lethal removal to benefit specific runs and stocks (pinnipeds, birds, and/or other predatory fish)</p> <p>WDFW producing maps that overlay SRKW priorities systems pinniped haul out sites and piscivorous bird breeding colonies to determine where to priority to alter or remove.</p> <p>Fish: Columbia basin distribution of bass, walleye, and Pikeminnow is throughout the system, except not much walleye below Bonneville. Northern Pike are not found below Grand Coulee Dam and are not currently predators on salmonids in the Columbia downstream of Coulee dam but do consume kokanee, trout and other</p>	<p>Pinnipeds: L-Uncertain</p> <p>Birds: L-Uncertain and varies by location</p> <p>Fish: M - Could have a large effect at certain locations, depending on fish assemblage</p>	<p>Magnitude of benefit to SRKW (quantify if possible):</p> <ul style="list-style-type: none"> Pinnipeds: <u>Uncertain</u> due to new data becoming available on pinniped numbers and diet (which will give a more current and area-specific estimates of predation levels- Fall 2018 for WDFW and Canada DFO completion). Other data indicates that pinniped predation is generalized and not localized, meaning that removal from a specific foraging or haul out area may not greatly affect the number of pinnipeds using them. There is also uncertainty about how lethal 	<p>Pinnipeds: M</p> <p>Birds: M</p> <p>Fish: M</p>	<p>Estimated cost to implement (in dollars):</p> <ul style="list-style-type: none"> Pinnipeds: Canada for estimates? (Lisa Jones follow up) 1M dollars a year? Lethal removal of sea lions in the Columbia costs \$300k/yr. Puget Sound is different and likely more costly. \$685k estimate (plus enforcement costs) for pilot study to determine effectiveness Birds: contact USFWS and USACE for estimates. Fish: Total annual cost of the Pikeminnow program that is funded by BPA is \$3.5 million. Each of the three PUDs also runs a Pikeminnow program. Northern Pike suppression program estimated at \$1-\$2M 	<p>Pinnipeds: L (at Bonneville, could do more w/out permit, if it were deemed effective and funding were avail.)</p> <p>Birds: M</p> <p>Fish: M</p>	<p>Regulatory feasibility (laws, regulations and treaties—including local, state, federal, international, tribal, etc.):</p> <ul style="list-style-type: none"> Pinnipeds: Permits/authorization required from NOAA due to Marine Mammal Protection Act and already exists for some actions; other permission or permitting may be required depending on ownership (e.g. Wildlife refuges). Amount of allowed lethal take under MMPA limited to certain level (Potential Biological Removal, PBR) of each stock, which may or may not be enough for desired impact. Depending on this factor, a change in MMPA may be required to take additional animals over and above PBR. Birds: Permits/authorization required from USFWS due to Migratory Bird Treaty Act; other permission or permitting may be required depending on ownership (e.g. Wildlife refuges). In addition, seems likely USFWS would approve this option only after nonlethal options had failed or impractical. Consequently, feasibility of proposed project will be based in part on other elements of a strategy. Fish: Few regulatory constraints for removal or suppression programs. Request F&W Commission reclassify non-native predatory fish? <p>Degree of alignment with current federal and state law (versus requiring changes to laws):</p> <ul style="list-style-type: none"> Pinnipeds: Depends on how many you want to take within each stock. Could take PBR levels within each stock. If need to take more animals then a need change in MMPA.

<p>salmonids above Grand Coulee. Their potential as future predators is very large. Any program should include containment costs. Could map the dams/reservoirs, Chinook pinchpoints that are most problematic and the tributaries that are most impacted. Overlay with SRKS priority systems.</p>		<p>removal would impact the food web and therefore if “freed up fish” would really go to SRKW or another animal/factor in system.</p> <ul style="list-style-type: none"> • Birds: If birds are responsible for a very small level of predation on salmonids there would be uncertainty about effectiveness. • Fish: Piscivorous predators of primary concern for salmon / steelhead are invasive non-natives (Northern Pike), non-native warm water species (Walleye, bass), and native fish (northern pikeminnow). A high priority and potential big impact is Northern Pike if they move into the anadromous zone in the Columbia River. Suppression of 		<p>minimal cost to be effective in short term. Northern Pike are not currently in the anadromous zone of Columbia River so this is a preventative program. There is currently no impact. Would be a direct impact if salmon are reintroduced above Grand Coulee Dam.</p> <p>Degree of certainty:</p> <ul style="list-style-type: none"> • Pinnipeds: Removal operations are likely costly • Birds: Fairly certain that this action would be costly, because a likely condition of the permit would be to conduct monitoring to assess population response (of the birds), and to assess success of population management on salmonids • Fish: Northern Pike are not found below Grand Coulee Dam. Funding is for containing them in Roosevelt, so they do not become a predation 	<ul style="list-style-type: none"> • Birds: USFWS can authorize this. But their general approach to lethal action is last resort after other actions have been attempted and found ineffective. Leading with lethal management instead of nonlethal will almost certainly be ineffective due to USFWS (and stated Pacific Flyway Council) practices and the threat of legal challenges. • Fish: State game fish laws modifications may be needed for certain species <p>Political/social feasibility:</p> <ul style="list-style-type: none"> • Pinnipeds and Birds: <ul style="list-style-type: none"> ○ Social tolerance for lethal removal is a factor. ○ Actions to change MMPA or MBTA would likely be met with strong opposition from conservation groups. ○ Lawsuits would be likely for pinnipeds and birds, possibly for game fish as well. ○ Some WG members believe that once information about potential benefit to SRKW and Chinook by doing this action is out to public and decision makers that many of these implementation difficulties would be resolved. Other WG members believed that these complications would still exist and affect implementation greatly. Knowing that bird population management was being done to benefit salmonids in the Columbia River did not prevent legal challenges over the last 15-20 years. ○ Pacific flyway council policy on piscivorous bird management exists – nonlethal first, develop management plans, coordinate stakeholders, use science, monitoring, etc, and exhaust all other possibilities before any lethal action. • Pinnipeds: <ul style="list-style-type: none"> ○ Salmon advocates, anglers, etc. increasing concern over pinniped population increases since MMPA implementation. Concerns about cost of not doing it?
--	--	---	--	---	---

	<p>Northern Pike is high priority and high magnitude action.</p> <ul style="list-style-type: none"> For Pinnipeds and Fish: A pilot to determine efficacy in one area may help to detect success but may be difficult due to several confounding factors. <p>Time for response to occur:</p> <ul style="list-style-type: none"> <u>Intermediate (3-10 years)</u> <p>Degree of certainty:</p> <ul style="list-style-type: none"> Pinnipeds: <u>Low</u> and certainty of current problem statement and best ways and places to address pinniped predation should be strengthened by WDFW analysis and Canada new study available in late summer/fall 2018. Birds: Low Fish: Low/Medium Pinnipeds, Birds, Fish: Detecting 	<p>problem downstream. They are not currently predators on salmonids in the Columbia, but their potential as future predators is so large that any program should include containment costs. Walleye and smallmouth bass are non-native predators and managed by sport fishing regulations that in some areas, limit how many and what size may be harvested.</p>	<ul style="list-style-type: none"> Due to uncertainty about efficacy of a lethal control program and food web consequences, questions were brought up that public and WG members may be in two camps: 1) Need more information to be sure before taking action or 2) Need to take the action in order to provide the data needed to understand efficacy. <ul style="list-style-type: none"> Fish: <ul style="list-style-type: none"> Northern Pikeminnow program successful with public support Awareness and public concern over Northern Pike growing, funding is major constraint currently Walleye and bass fishers somewhat out of alignment with predator reduction/removal programs and varies across geographic location. Bass and walleye anglers are aware that predation on salmonids is a localized issue with those two species, in comparison with Pikeminnow predation which is widespread, and pike predation, which is expected to be widespread. Bass and walleye anglers are much more supportive of local control programs at identified predation hotspots. They tend to be more opposed to general programs as predation problems are not broadscale. In other words, there would be more angler support for localized actions than for population level maintenance actions for these two species. <p>Technical feasibility:</p> <ul style="list-style-type: none"> An ongoing comprehensive predator management program or programs would be needed to maintain any potential benefits to Chinook and SRKW. Potential that costs of a "maintenance level" program may be less than costs of program to make immediate and near-term progress. <p>Degree to which it reinforces or leverages existing efforts:</p>
--	--	---	---

		success in salmon recovery would be contingent upon other actions for ecosystem recovery				<ul style="list-style-type: none"> Aligns with Puget Sound salmon recovery (not explicitly in plans though) since aligns with current knowledge from marine survival study. Predation actions included in Columbia River FCRPS BiOp. Birds: leading with lethal instead of nonlethal is misaligned with USFWS (and stated Pacific Flyway Council) practices. <p>Degree of certainty:</p> <ul style="list-style-type: none"> Low; See varying opinions under social/political. Low certainty of implementation if lethal is start point; much increased certainty when lethal action are component of a strategy where nonlethal actions are attempted first.
--	--	--	--	--	--	---

NOTES ON INPUT, COMMENTS AND QUESTIONS FROM TASK FORCE ON THIS ACTION ON 6/14/18:

- How big is the problem with predators, compared to other prey-limiting factors (e.g., losses to dams and to human harvest)?
 - Important to recognize that predation actions aren't and "or" relative to other recovery actions, they are an "and" – i.e., not in lieu of other actions but as a suite of actions.
 - New data becoming available on pinniped numbers and diet (which will give a more current and area-specific estimate of predation levels) by Fall 2018 from WDFW and partners and Canada DFO.

Additional information (WG Meetings 2 & 3)

- Recommendations about where and when to implement each action, including sequencing (if not covered above in table)
 - Pinnipeds: Geographic overlay with SRKW priorities - being produced.
 - Birds: Geographic overlay needed with SRKW priorities being produced. Some bird species can move substantial distances from breeding sites to foraging areas (Caspian Terns: 50 miles; American White Pelicans: 150-200 miles), so these overlays would be specific to the different predator species.
 - Fish: Geographic overlay needed with SRKW priorities
 - For Pinnipeds and Fish: Could a pilot determine efficacy in one area or would confounding factors limit ability to detect success?
- Whether each action will improve conditions for all pods or a subset
 - Depends on location of where action is done

Predation Action C – Establish new baseline predator population abundance levels

Action, including time and place for implementation	Effectiveness	Affordability	Ease of Implementation
<p>Lethal removal in order to establish new baseline population levels (pinnipeds, birds, and/or other predatory fish)</p> <p>Fish Action 1 - Active removal similar to Northern Pike Minnow program, which is likely to be most effective. Potential to use bounties.</p> <p>Fish Action 2: Potential for managing water within reservoirs to modify spawning habitat to reduce productivity of warm water fish. – concept holds promise, study proposed.</p>	<p>Pinnipeds: M</p> <p>Birds: M</p> <p>Fish: M</p> <p>Magnitude of benefit to SRKW (quantify if possible):</p> <ul style="list-style-type: none"> Pinnipeds: <u>Uncertain</u> due to new data becoming available on pinniped numbers and diet (which will give a more current and area-specific estimates of predation levels- Fall 2018 for WDFW and Canada DFO completion). Recent study by Bowen and Lidgard 2012 – “Marine mammal culling programs: review of effects on predator and prey populations” (DFO) suggests that 50% decrease in abundance of predators and continued action to maintain this level needed to detect a change in predation levels. Check this study to ground truth Other data indicates that pinniped predation is generalized and not localized, meaning that removal from a specific foraging or haul out area may not greatly affect the number of pinnipeds using them. There is also 	<p>Pinnipeds: H - Uncertain</p> <p>Birds: H - Uncertain</p> <p>Fish: H- Uncertain</p> <p>Estimated cost to implement (in dollars):</p> <p>May be more expensive than Action B due to more widespread work.</p> <ul style="list-style-type: none"> Pinnipeds: <ul style="list-style-type: none"> Canada for estimates? 1M dollars a year? Review historic information to better understand the cost and effect of widespread pinniped control programs through bounty. May not be so expensive if we engage the citizenry. Costs could be reduced if individuals were allowed to take animals (e.g. as 	<p>Pinnipeds: L</p> <p>Birds: L</p> <p>Fish: M</p> <p>Regulatory feasibility (laws, regulations and treaties—including local, state, federal, international, tribal, etc.):</p> <ul style="list-style-type: none"> Pinnipeds- L: Not currently possible under Marine Mammal Protection Act. MMPA only allows lethal removal up to a certain level (Potential Biological Removal) of each stock, which will not be enough to reach the overall reduced population levels this action calls for. Also, lethal take by any individual person (not permitted state, federal, tribal agencies) is not currently allowed, so this change would need to be made if that method is desired. Tribes have some opportunity now, but is not publicly supported. Birds - L: Permits/authorization is required from US Fish and Wildlife Service authorization due to Migratory Bird Treaty Act; other permission or permitting may be required depending on ownership (e.g. Wildlife refuges). In addition, it seems quite likely the USFWS would approve this option only after nonlethal options had failed or were found to be impractical. Consequently, feasibility of the proposed project will be based in part on the other elements of a strategy. Fish - M: Columbia River treaty and flows would be affected if doing modifications of spawning at reservoirs. FCRPS. ESA Permitting issues regarding netting and removal – bycatch on listed fish. Example: Changing the status of non-native warm water fish to take it off the game fish list. But there

		<p>uncertainty about how lethal removal would impact the food web and therefore if “freed up fish” would really go to SRKW or another animal/factor in system.</p> <ul style="list-style-type: none"> • Birds: If birds are responsible for a very small level of predation on salmonids there would be uncertainty about effectiveness. Studies from some localized areas indicate very high level of smolt predation. • Fish: Even when lakes have been rotenoned, seems like not long before the fish return. Predator removal has been shown to trigger the compensatory response and make a bigger problem. Need to follow up with more information on potential effect of removal. Analyze how much predation pressure would result from certain levels of predator removal. The magnitude of action for fish would be need to be much larger than scoped for pinniped/birds. Lower baseline for fish. 		<p>was done historically with bounties), but this would make enforcement work around this more important and costs would increase in that area.</p> <ul style="list-style-type: none"> ○ Funding also needed to monitor effectiveness. • Birds: planning, EIS, actual lethal action, comprehensive monitoring (10yr?) back of envelope estimate - \$10mil • Fish: Total annual cost of the Pikeminnow program that is funded by BPA is \$3.5 million. Each of the three PUDs also runs a Pikeminnow program. • by BPA • Northern Pike suppression program estimated 	<p>would be pushback from anglers. But status change may not affect fishery management. Develop a rule mechanism to allow folks to legally dispose of warm water fish in Col mainstem.</p> <p>Degree of alignment with current federal and state law (versus requiring changes to laws):</p> <ul style="list-style-type: none"> • Pinnipeds: Depends on how many you want to take within each stock... could take PBR levels within each stock. If need to take more or allow individual take then need change in MMPA • Birds: USFWS can authorize this. However, their general approach to lethal action is as a last resort after other actions have been attempted and found to be ineffective. Leading with lethal management instead of nonlethal will almost certainly be ineffective due to incompatibility with USFWS (and stated Pacific Flyway Council) practices and the threat of legal challenges. • Fish: State of WA has no legal limitations on warm water fish, so could do removal. State of Oregon can. Issue of interaction of Fed listing stocks exists. <p>Political/social feasibility: L</p> <ul style="list-style-type: none"> • Pinnipeds and Birds: <ul style="list-style-type: none"> ○ Social tolerance for lethal removal is a factor making this difficult. ○ Lawsuits would be likely for pinnipeds and birds. Risk of litigation seems likely to be higher because some might argue the management is less targeted and has a bit of randomness to it. ○ If take was allowed by any individual, this action would have higher social costs • Pinnipeds:
--	--	--	--	--	--

		<ul style="list-style-type: none"> For Pinnipeds and Fish: A pilot to determine efficacy in one area may help to detect success but may be difficult due to several confounding factors. <p>Time for response to occur:</p> <ul style="list-style-type: none"> <u>Intermediate (3-10 years)</u> <p>Degree of certainty:</p> <ul style="list-style-type: none"> Pinnipeds: <u>Low</u> and certainty of current problem statement and best ways and places to address pinniped predation should be strengthened by WDFW analysis and Canada new study available in late summer/fall 2018. Birds: If birds are responsible for a very small level of predation on salmonids there would be uncertainty about effectiveness. Fish: Primary concern for salmon/steelhead are invasive non-natives (Northern Pike), non-native warm water species (Walleye, bass), and native fish (northern pikeminnow). A high priority and potential big impact is Northern Pike if they move into the anadromous zone in 		<p>at \$1-\$2M minimal cost to be effective in short term. Northern Pike are not currently in the anadromous zone of Columbia River so this is a preventative program. There is currently no impact. Would be a direct impact if salmon are reintroduced above Grand Coulee Dam.</p> <p>Degree of certainty:</p> <ul style="list-style-type: none"> Pinnipeds: Removal operations are likely costly Birds: costly because permit condition likely to conduct monitoring to assess population response (of the birds), and to assess success of population management on salmonids 		<ul style="list-style-type: none"> Salmon advocates, anglers, etc. increasing concern over pinniped population increases since MMPA implementation. Concerns about cost of not doing it. Due to uncertainty about efficacy of a lethal control program and food web consequences questions were brought up that public and WG may be in two camps: 1) Need more information to be sure before taking action or 2) Need to take the action in order to provide the data needed to understand efficacy? Fish: Power generation (revenue) may be an issue with reservoir modification but reducing spawning success for walleye and bass in particular may have significant immediate benefits. May also impact recreation depending on level of modification. <p>Technical feasibility:</p> <ul style="list-style-type: none"> An ongoing comprehensive predator management program or programs would be needed to maintain any potential benefits to Chinook and SRKW. However, once levels are initially reduced it may be less effort to maintain them. Potential that costs of a "maintenance level" program may be less than costs of program to make immediate and near-term progress. Fish: unknown/promising re reservoir modification, worth learning more about. <p>Degree to which it reinforces or leverages existing efforts:</p> <ul style="list-style-type: none"> Aligns with Puget Sound salmon recovery (not explicitly in plans though) since aligns with current knowledge from marine survival study.
--	--	---	--	---	--	--

		<p>the Columbia River. Suppression of Northern Pike is high priority and high magnitude action. Uncertain how many would need to be removed to be effective.</p> <ul style="list-style-type: none"> • Pinnipeds, Birds, Fish: Detecting success in salmon recovery would be contingent upon other actions for ecosystem recovery 		<ul style="list-style-type: none"> • Fish: if fully funded can be effective. If regulations protecting non-native game fish are relaxed, we may see some localized reduction in predation. 		<ul style="list-style-type: none"> • Predation actions are included in Columbia River FCRPS BiOp. • Birds: leading with lethal management instead of nonlethal is misaligned with USFWS (and stated Pacific Flyway Council) practices. <p>Degree of certainty:</p> <ul style="list-style-type: none"> • <u>Medium</u>; Working Group is more certain that implementation would be difficult (more than for targeted lethal removal) due to social/political reasons and changes needed in MMPA
--	--	---	--	---	--	---

Additional information (WG Meetings 2 & 3)

- Recommendations about where and when to implement each action, including sequencing (if not covered above in table)
 - Statewide
- Whether each action will improve conditions for all pods or a subset
 - All pods because action is statewide

Predation Action D – Identify and implement new or emerging technology to non-lethally remove predators

Action, including time and place for implementation	Effectiveness		Affordability		Ease of Implementation	
<p>Employ new non-lethal hazing or exclusion techniques</p> <p>New, unknown, prototype or other experimental non-lethal hazing or exclusion techniques need researched, assessed and possibly encouraged</p>	L	<p>Magnitude of benefit to SRKW (quantify if possible):</p> <ul style="list-style-type: none"> Pinnipeds: Low, Unknown? Birds: as in other responses to proposed actions this would be low, because the Puget Sound pressure on salmonids from birds seems likely to be so low. <p>Time for response to occur:</p> <ul style="list-style-type: none"> Intermediate <p>Degree of certainty:</p> <ul style="list-style-type: none"> Need information on previous discussions, studies and trials 	H	<p>Estimated cost to implement (in dollars):</p> <ul style="list-style-type: none"> Pinnipeds: Birds: Cost will be specific to methods used. Some methods require ongoing maintenance (disruptive flagging), field efforts to dissuade (disturbing birds from the nest area; egg oiling), or field efforts to attract (social attraction). Other approaches may require one-time actions (vegetation management). These have been used along the Columbia R. or in an attempt to recruit away from the Columbia R. <p>Degree of certainty:</p> <ul style="list-style-type: none"> Pinnipeds: Birds: strategies will be dependent on local conditions; flagging may be required on rooftop nests, vegetation management 	H	<p>Regulatory feasibility (laws, regulations and treaties—including local, state, federal, international, tribal, etc.):</p> <ul style="list-style-type: none"> Pinnipeds: Birds: being used currently along the Columbia River, so seems like practical approach <p>Degree of alignment with current federal and state law (versus requiring changes to laws):</p> <ul style="list-style-type: none"> Pinnipeds: Birds: being used currently along the Columbia River, so seems like practical approach <p>Political/social feasibility:</p> <ul style="list-style-type: none"> Pinnipeds: Birds: Not entirely clear. If approach is local and birds have other places to nest that are secure and free of conflict it seems like there would be better prospects for political/social acceptance. <p>Technical feasibility:</p> <ul style="list-style-type: none"> Pinnipeds: Birds: many methods field tested and being used along the Columbia River. <p>Degree to which it reinforces or leverages existing efforts:</p> <ul style="list-style-type: none"> Pinnipeds: Birds: Not sure, because involves different regions/environments.

				might be best on a dredge spoil island, etc.		Degree of certainty: <ul style="list-style-type: none"> • Pinnipeds: • Birds: Fairly high
--	--	--	--	--	--	---

Additional information (WG Meetings 2 & 3)

- Whether each action will improve conditions for all pods or a subset
 - Depends upon if effective and where implemented

Forage Fish

During the July 25 Prey WG Meeting, members chose to pull forage fish out as a separate category. If the Task Force decides to further pursue forage fish actions, members will work to develop more information, including quantitative and geographic information, for the matrices. Because these forage fish actions are one step removed from benefiting SRKW (they more directly affect Chinook) the potential effectiveness of these actions for SRKW recovery are a little less certain.

Forage Fish Action A – Increase forage fish through habitat protection and restoration

Action, including time and place for implementation	Effectiveness		Affordability		Ease of Implementation	
Protect and restore marine nearshore and shoreline habitat to increase forage fish populations <ul style="list-style-type: none"> • Forage fish are primary diet of Chinook • When forage fish are abundant, predation on chinook appears to decrease 	H	Magnitude of benefit to SRKW (quantify if possible): <ul style="list-style-type: none"> • Increases in Forage Fish will support Chinook which will in turn help SRKW Time for response to occur: <ul style="list-style-type: none"> • Intermediate Degree of certainty: <ul style="list-style-type: none"> • H 	M	Estimated cost to implement (in dollars): <ul style="list-style-type: none"> • Same as habitat protection/restoration Degree of certainty: <ul style="list-style-type: none"> • High 	H	<ul style="list-style-type: none"> • See habitat actions– ease of implementation in many ways depends on location. Regulatory feasibility (laws, regulations and treaties—including local, state, federal, international, tribal, etc.) Degree of alignment with current federal and state law (versus requiring changes to laws) Political/social feasibility Technical feasibility: <ul style="list-style-type: none"> • PSNERP has provided good maps for where prime forage fish habitat exists in the Puget Sound; ESRP, Early Marine Survival Study Degree to which it reinforces or leverages existing efforts: <ul style="list-style-type: none"> • Reinforces habitat actions Degree of certainty: <ul style="list-style-type: none"> • High

Additional information (WG Meetings 2 & 3)

- Whether each action will improve conditions for all pods or a subset
 - All pods

Forage Fish Action B –Reduce forage fish harvest

Action, including time and place for implementation	Effectiveness		Affordability		Ease of Implementation	
Increase populations through reducing forage fish harvest in marine waters of Washington	<p>H</p> <p>Early marine survival study connects low abundance of forage fish with poor survival of salmon (need to confirm and/or caveat)</p>	<p>Magnitude of benefit to SRKW (quantify if possible):</p> <ul style="list-style-type: none"> Increases in Forage Fish will support Chinook which will in turn help SRKW <p>Time for response to occur:</p> <ul style="list-style-type: none"> Intermediate <p>Degree of certainty:</p> <ul style="list-style-type: none"> H 	H?	<p>Estimated cost to implement (in dollars):</p> <p>Need to assess economic value of the industry</p> <p>Degree of certainty:</p> <ul style="list-style-type: none"> 	M	<ul style="list-style-type: none"> Ease of implementation in many ways depends on location. <p>Regulatory feasibility (laws, regulations and treaties—including local, state, federal, international, tribal, etc.):</p> <ul style="list-style-type: none"> Will affect tribal allocation <p>Degree of alignment with current federal and state law (versus requiring changes to laws)</p> <p>Political/social feasibility</p> <p>Technical feasibility</p> <p>Degree to which it reinforces or leverages existing efforts</p> <p>Degree of certainty</p>

Additional information (WG Meetings 2 & 3)

- Whether each action will improve conditions for all pods or a subset
 - All pods