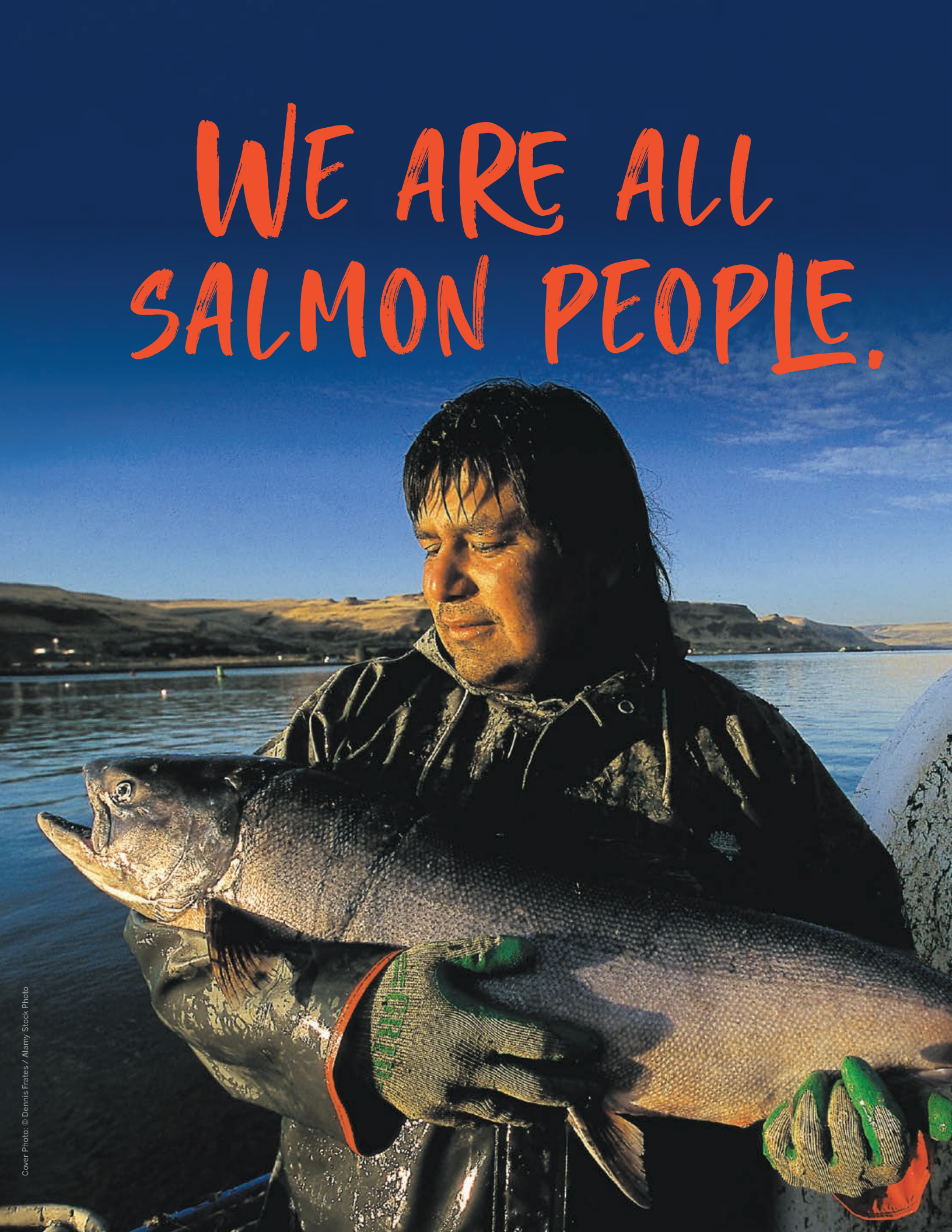
Appendix G. CRITFC Energy Vision

ENERGY VISION

for the Columbia River Basin

Columbia River Inter-Tribal
Fish Commission

WE ARE ALL SALMON PEOPLE.



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Columbia River Inter-Tribal Fish Commission

PREFACE

The **Columbia River Inter-Tribal Fish Commission (CRITFC)** was created by the Nez Perce, Umatilla, Warm Springs, and Yakama tribes in 1977. CRITFC provides technical support, policy coordination, and enforcement services to the four tribes. More than 40 years ago, CRITFC assisted its member tribes in developing the provisions for the Northwest Power Acts energy planning and fish and wildlife requirements. Since then, it has supported its member tribes' goals for improving the conditions of the Columbia Basin's anadromous fish populations.

Recent dramatic changes in Columbia Basin salmon populations and the West Coast energy planning environment prompted CRITFC to undertake this second major revision of its energy-related recommendations intended to protect the tribes' treaty-secured fish, wildlife, cultural and other resources. I would like to express my appreciation to the Commission, which remained engaged with staff in development of this Vision document.

CRITFC received comments from more than thirty reviewers on the draft it released June 30, 2021. Commenters made many helpful suggestions for the final, including requests for:

- Recognition of broad tribal support for restoring healthy and harvestable salmon populations;
- Expanded energy efficiency for the region;
- Additional detail on future hydro configurations and operations;
- Analysis of Snake River dam breaching;
- Siting transmission and renewable resources; and
- Modernizing the Columbia River Treaty.

Looking forward, we appreciate the engagement of other sovereigns in the region and their desire to collaborate in the implementation of many recommendations contained in the 2022 Energy Vision. Making the recommendations in this Energy Vision a reality will take collaboration and hard work.

Sincerely,

Aja K. DeCoteau
Executive Director

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"It took us two centuries to destroy this land. It's going to take longer than that to fix it back up. So I'm saying that you are the land. We are the land. What is done to the earth is done to ourselves. So I would hope that you become my allies."

— Louie Dick, Warm Springs, 1994

The Pacific Northwest Is Facing Four Critical Issues.

Many Columbia Basin **salmon and steelhead populations are near extinction.**

The climate crisis is already underway; without strong action, it will further reduce the survival of salmon and steelhead and damage every part of the region's economy and environment.

Renewable resources will play a larger role in meeting future electricity needs in the region. Under the right conditions they can reduce greenhouse gases and benefit salmon.

Without proper integration and siting, **renewable resources can make things worse for Columbia River salmon** and other tribal resources.

A major theme of this Energy Vision is to ensure that renewable resources in combination with increased storage, reductions in peak demand, and increased energy efficiency can provide clean, adequate, reliable, and affordable electricity, support the restoration of healthy, harvestable salmon populations, and prevent future damage to salmon and steelhead and other tribal resources caused by the electrical system.

Vision for Columbia River Resources and Energy

CRITFC and its member tribes envision a future where the Columbia Basin electric power system supports healthy and harvestable fish and wildlife populations, protects tribal treaty and cultural resources, and provides clean, reliable, and affordable electricity.

The goals for this Energy Vision are:

- **Create a regional energy portfolio** that protects and enhances environmental quality, treaty protected resources, and supports the restoration of Columbia Basin's fish and wildlife to healthy and harvestable population levels.
- **Prevent new and reduce ongoing damage** to Columbia River Basin resources, including fish, wildlife, water quality, and tribal cultural resources, by recognizing the relationships and interdependencies of natural and built systems including the Northwest's energy system.
- **Provide increased protection** for both fish and wildlife and utility customers against unanticipated events, such as drought, fire, and market aberrations while providing an adequate, economical, and reliable electric supply.
- **Mitigate climate change impacts** to protect Northwest ecosystems by replacing fossil-fuel electric generation and reducing the reliance on fossil-fuels for power, transportation, and other uses.

The Yakama, Nez Perce, Umatilla, and Warm Springs tribes founded CRITFC in 1977 to protect their treaty rights to take salmon and other resources. In 1855, each of the four tribes entered a separate treaty with the United States which ceded title to vast amounts of land in the interior Columbia Basin while reserving rights to take fish and gather First Foods.

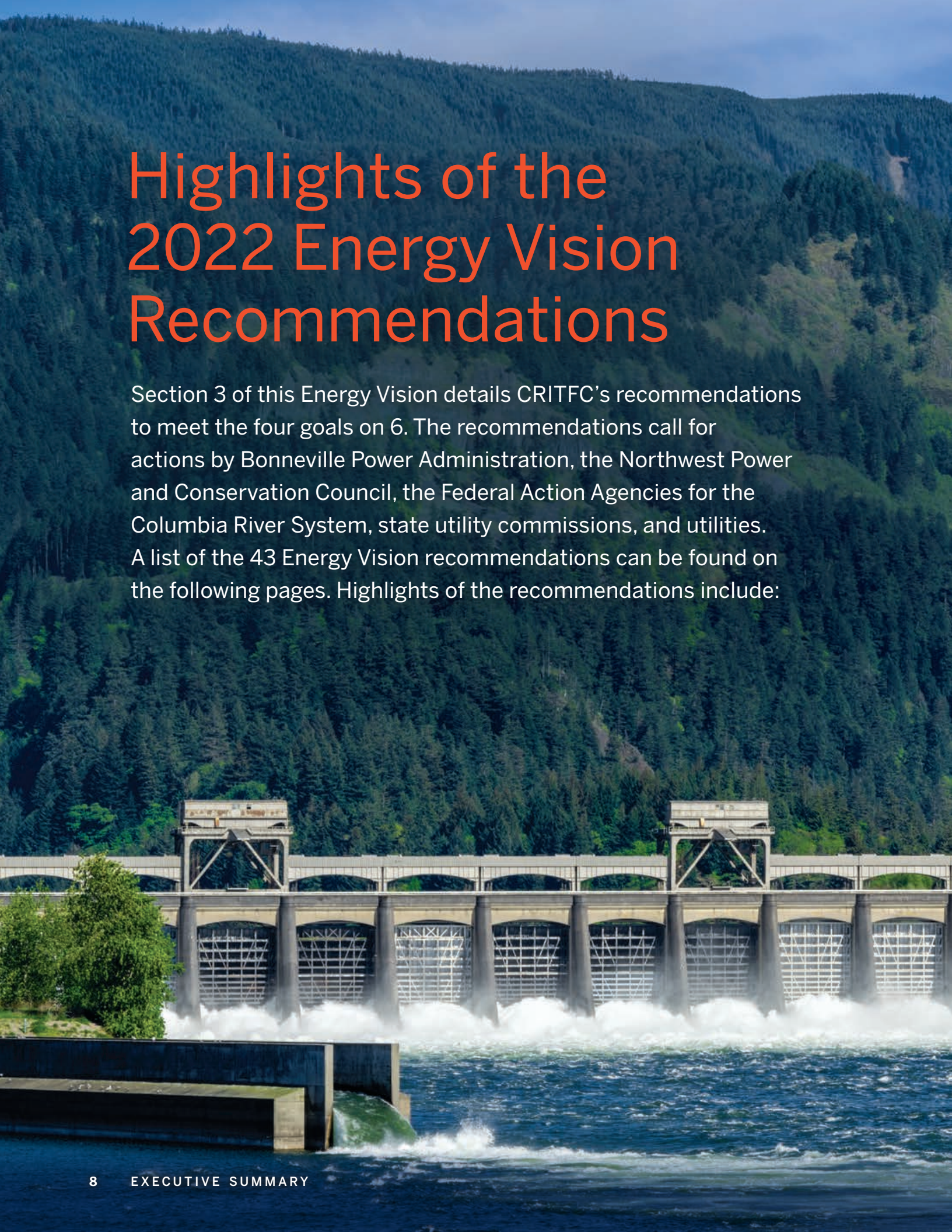
In May 2021, a coalition of 57 tribes from the Pacific Northwest adopted a resolution calling on Congress and the President to *"Invest in Salmon and River Restoration in the Pacific Northwest, Charting a Stronger, Better Future for the Northwest, And Bringing Long-Ignored Tribal Justice To Our Peoples And Homelands."* Affiliated Tribes of Northwest Indians, Resolution #2021–23 adopted at the 2021 Mid-Year Convention. Recognizing that the fate of the tribes and Northwest salmon are intertwined, the resolution called for implementing bold energy and salmon actions including "restoring the lower Snake River by breaching the four lower Snake River dams." The resolution also recognizes that "offering a solution that invests in a stronger, better Northwest that goes beyond salmon, ensuring that communities impacted by river restoration are made whole—and in doing so offering additional opportunities for tribes within other sectors—from infrastructure and technology development to energy production." A substantially similar resolution was adopted by the National Congress of American Indians in June 2021. NCAI is the oldest and largest national organization representing American Indian and Alaska Native tribal governments. These resolutions are set forth in APPENDIX B.

"The salmon was put here by the Creator for our use as part of the cycle of life. It gave to us, and we, in turn, gave back to it through our ceremonies."

— Carla HighEagle, Nez Perce, 1999

Highlights of the 2022 Energy Vision Recommendations

Section 3 of this Energy Vision details CRITFC's recommendations to meet the four goals on 6. The recommendations call for actions by Bonneville Power Administration, the Northwest Power and Conservation Council, the Federal Action Agencies for the Columbia River System, state utility commissions, and utilities. A list of the 43 Energy Vision recommendations can be found on the following pages. Highlights of the recommendations include:



Improve River Configuration and Operations

The region needs to plan for changes to reduce the damage to migrating salmon and steelhead caused by the Columbia Basin dams, including breaching the four lower Snake River dams.

Amend the Columbia River Treaty

Amend the treaty to include protections for fish and wildlife and expand the scope to include win-win opportunities to integrate renewable resources.

Reduce Peak Loads

Reduce peak demands to save both salmon and money.

Maximize Energy Efficiency

Maintain and expand energy efficiency targets and work to exceed them. Energy efficiency measures are positive for fish and wildlife.

Harness Renewable Resources

Renewable resources in combination with storage and electric load management can create an environment that is better for fish and wildlife and other tribal resources.

Strategically Site Renewable Resources

Develop a regional plan for where renewable resources should be developed and where they should not, and to provide expeditious siting with clear and uniform standards across all political subdivisions.

Increase Resource Adequacy

Prevent electricity shortages, which can reduce protection and funding for fish and wildlife.

Minimize Transmission and Distribution Systems

Load management, energy efficiency, and strategic siting of resources will reduce costs for consumers and the damage to tribal resources.

Address the Climate Crisis

Reduce greenhouse gas pollution and continue to increase energy efficiency to try to avoid the devastating effects we are facing.

2022 Energy Vision Full Recommendations

Following are the 43 recommendations CRITFC has identified in this Energy Vision to help achieve our vision of a Columbia Basin electric power system that supports abundant and sustainable fish and wildlife populations, protects tribal treaty and cultural resources, and provides clean, reliable, and affordable electricity. CRITFC will monitor the implementation of these recommendations and prepare a report in five years to evaluate whether and how the recommendations have been implemented.

River Restoration and Improved Dam Configurations and Operations

Recommendation 1: The region should prepare to implement river restoration, dam configurations, and river operations that are compatible with, and support, healthy and harvestable fish populations. These recommendations include breaching the four lower Snake River dams, spill operations at run-of-river dams, flow related operations at storage dams, structural modifications to aid salmon and lamprey passage, needed maintenance, flood control studies, actions to improve water temperatures, and capability for lower Snake River dam breaching.

Amend the Columbia River Treaty

Recommendation 2: The United States and Canada should include direct participation of the 15 tribal sovereigns in the U.S. portion of the Columbia Basin in negotiations to modernize the Columbia River Treaty in ways that restore and maintain ecosystem functions compatible with healthy and harvestable treaty-protected resources. The parties should integrate other energy resources into the treaty negotiations that have the potential to reduce carbon emissions and improve renewable resource integration while protecting fish impacted by the energy systems of the two countries

Recommendation 3: The Corps of Engineers should conduct a comprehensive study of flood risk in the Columbia Basin and the need to make regional decisions on balancing flood risk with multiple purposes of the system, including ecosystem function and effects on fish and wildlife.

Reduce Peak Loads

Recommendation 4: The Council, BPA, and utilities should include the peak savings and reductions in transmission and distribution benefits in calculating the capacity value of energy efficiency programs.

Recommendation 5: Northwest public utility commissions should implement time-of-use rates to send an appropriate price signal that captures the dramatically different costs of using electricity during different times of the day.

Recommendation 6: Utilities should use demand response to manage system loads, reducing peak loads, ensuring reliability by encouraging customers to reduce demand during peak periods, or shift loads from peak to off-peak hours.

Recommendation 7: Automobile manufactures should include systems that allow electric vehicles to schedule charging during off-peak periods.

Recommendation 8: Utilities should integrate electric vehicle charging and batteries into the power system to reduce costs to consumers and the power system and improve salmon migration.

Recommendation 9: BPA and utilities should work to improve the efficiency of electric vehicles.

Recommendation 10: The Council, BPA, and utilities should fund the incremental costs of heat pump water heaters to stimulate the adoption of this technology.

Recommendation 11: Utilities and BPA should develop and fund programs to schedule when water heaters operate.

Increase Electricity Storage

Recommendation 12: BPA and utilities should implement utility-scale battery projects.

Recommendation 13: BPA and utilities should implement incentive programs to expand the use of on-site batteries.

Recommendation 14: BPA and utilities should fund programs to reduce peak loads using the thermal mass of buildings.

Recommendation 15: The Council and utilities should not pursue potential pumped storage sites unless they are consistent with the siting criteria.

Recommendation 16: Utilities and the Council should continue to monitor green hydrogen technologies.

Maximize Energy Efficiency

Recommendation 17: The Council should increase the conservation targets in the 8th Power Plan to maintain at least the level of activity called for in the 7th Plan and work with BPA and utilities to try to exceed the targets.

Recommendation 18: The Council should monitor the implementation of energy efficiency programs to ensure that utilities meet the conservation targets.

Recommendation 19: All tribal homes and businesses should be fully weatherized by 2025 and all tribal homes and businesses should receive solar panels and battery systems that provide zero net energy by 2030.

Recommendation 20: Utilities should weatherize and achieve net zero energy for all low-income homes by 2035.

Recommendation 21: Utilities, the Northwest Energy Efficiency Alliance, and other organizations should implement comprehensive programs to improve energy management practices in the commercial and industrial sectors.

Harness Renewable Resources and Integrate/Synergize with Electricity Storage

Recommendation 22: Congress, state legislatures, the Council, and public utility commissions should review programs to reduce greenhouse gases to avoid unintended consequences.

Recommendation 23: The Council should analyze the integration of renewable resources under a range of scenarios for river operations.

Recommendation 24: Utilities and BPA should continue to pursue wind development, and the associated efforts to integrate wind power, consistent with the tribal concerns and protections for fish, wildlife, and cultural resources.

Recommendation 25: The region should expand its efforts to promote utility-scale solar energy.

Recommendation 26: BPA and utilities should fund proof of concept projects for dual use solar.

Recommendation 27: States, local governments, and utilities should expand policies to promote on-site solar systems.

Recommendation 28: The Council, Northwest legislatures, energy regulators, and utilities should consider adopting zero net energy building standards.

Recommendation 29: State and local governments should adjust building codes to ensure that they can accommodate on-site batteries.

Recommendation 30: The Council, BPA, and utilities should continue to monitor and support other promising renewable resources.

Strategically Site Renewable Resources

Recommendation 31: CRITFC and its member tribes should work with state energy and siting agencies, federal agencies, Northwest Grid, the Northwest Power Pool, and others to develop a comprehensive plan for siting renewable resources and transmission lines that builds on efforts currently being developed in the states.

Increase Resource Adequacy

Recommendation 32: The Northwest Power Pool Resource Adequacy Program should address fish and wildlife protections.

Recommendation 33: The California Public Utilities Commission and the California Independent System Operator should address reliability issues in California that could affect the Northwest.

Recommendation 34: BPA and Congress should address repayments to the Treasury to avoid curtailment of fish and wildlife protections.

Recommendation 35: The Pacific Northwest utilities, states, and federal agencies should closely monitor West Coast energy market developments to ensure that they address impacts on Columbia Basin fish and wildlife and other tribal resources.

Minimize Transmission and Distribution Systems

Recommendation 36: BPA and utilities should invest in solutions that minimize transmission and distribution expansions.

Recommendation 37: BPA, utilities, and public utility commissions should develop a transparent system to report transmission and distribution costs.

Recommendation 38: BPA and utilities should address transmission reliability.

Address the Climate Crisis

Recommendation 39: Federal, state, and local policy makers should develop programs to reduce the use of fossil fuels.

Recommendation 40: Federal and state governments should end all subsidies for fossil fuels.

Recommendation 41: Utilities, tribes, farming, and non-governmental organizations should implement pilot projects to sequester carbon dioxide.

Additional Considerations

Recommendation 42: Northwest utilities should not consider new nuclear power missions at the Hanford Nuclear Reservation without tribal consultation and consent. Evaluation of other sites for nuclear fission should consider the costs and compatibility with intermittent renewable resources and salmon protections.

Recommendation 43: Utilities and Public Utility Commissions should adopt policy to deny service for cryptocurrency mining in the Northwest.

Call for Action

The Northwest is at a critical crossroads, facing challenges to the health of the planet and the future of iconic fish and wildlife. These challenges are especially important to tribal resources that have sustained tribal people since time immemorial.

One path leads to affordable, carbon-free energy that harmonizes with the ecosystem. This future would prioritize energy efficiency, renewable resources, new storage technologies, reductions in peak loads, and other strategies that are compatible with the needs of fish and wildlife. These efforts would reduce the impacts of renewable resource projects and transmission lines on tribal resources and save consumers money.

The other path creates conflicts between renewable resources and tribal resources and results in higher costs for consumers.

Choosing the first path will require courage to act, common-ground solutions, and a commitment of resources to accomplish the hard work ahead. It will also require the humility to periodically evaluate and adjust course based on new information and understanding.

CRITFC and its member tribes are committed to working with other regional interests to lead the region to a brighter and healthier future. Affordable and reliable power is important to regional families and businesses, tribal and non-tribal. The true wealth of our region begins with the health of our rivers, fish, and the ecosystem they support, which is our culture, history, and future.

"By working together, it is my hope that we not only retain and enhance what we have, but also provide resiliency in all our tribal foods and cultural needs into the future. In working to provide for our people and our futures, we honor the sacrifices and dedication of our elders and ancestors."

— Quincy Ellenwood, Nez Perce, 2021

1 Introduction and Prologue




1.1 Introduction: Visions of the Columbia River Basin

The Pacific Northwest is facing four critical issues.

- Many Columbia Basin salmon and steelhead populations are near extinction.
- The climate crisis is already underway; without strong action, it will further reduce the survival of salmon and steelhead and damage every part of the region's economy and environment.
- Renewable resources will play a larger role in meeting future electricity needs. Under the right conditions they can reduce greenhouse gases and benefit salmon.
- Renewable resources must be properly integrated and sited to improve conditions for Columbia River salmon and other tribal resources.

The first Tribal Energy Vision in 2003 included recommendations to avoid another energy shortage that damaged fish and wildlife and the economy. In 2001, a drought—in combination with the Bonneville Power Administration's (BPA) commitment to serve more power than it could generate and the electric industry manipulation of the California energy market—resulted in a power shortage. These energy problems cost BPA's consumers four billion dollars and resulted in BPA eliminating protection measures for salmon migrating through the dams and cutting funding for fish and wildlife restoration programs.

The 2001 river actions resulted in significant losses of juvenile salmon. In 2001, just 6% of juvenile steelhead survived their in-river migration from Lower Granite Dam on the Snake River to Bonneville Dam; in most years the survival rate is 40% to 70%. This resulted in significant and lasting economic impact to tribal fishermen.

Steelhead Salmon

Chinook Salmon

The second Energy Vision in 2013 focused on reducing hydroelectric dam impacts on salmon populations and decreasing costs for consumers. It included strategies to reduce peak demands, which harm salmon and cost consumers hundreds of millions of dollars to operate expensive resources and expand transmission and distribution systems. It also identified additional energy efficiency actions that could save hundreds of millions of dollars. APPENDIX A provides more background on these prior Energy Visions.

The 2022 Energy Vision is driven by the salmon and steelhead crisis. The populations of Columbia and Snake River salmon and steelhead are at very dangerous levels for their continued existence.

- Twelve of 31 populations (nearly 38%) of Snake River spring/summer Chinook have fewer than 50 wild-origin fish and are at high risk of extinction; Upper Columbia Spring Chinook and Steelhead are at critically low levels. By 2025, a total of 24 (77%) populations are predicted to be at or below 50 wild spawners.
- A recent stay of litigation addressed river operations through July of 2022. Additional ongoing processes will address near-term and long-term modifications in the configuration and operation of the Columbia Basin dams. The energy system needs to be prepared to address and incorporate these fish and wildlife needs.
- The NPCC's 8th Power Plan modelling assumes that the hydro system will serve as the primary battery back-up for increasing solar and wind generation; effectively bringing Columbia River flow to a halt during the peak of salmon migration.

This Energy Vision also comes at a time of extraordinary changes in the electric energy system and its related environment.

- Climate change has created drought, fires and other changes affecting river operations and transmission.[1]
- Several states have enacted standards and policies to reduce greenhouse gas pollution which will change the mix of resources and increase electricity demands.
- Tribes across the nation have recognized the impacts of the Columbia River Basin's dams on the tribes of the Northwest and are calling for bold actions for restoring salmon including breaching the four lower Snake River dams.
- The new Administration, the 117th Congress and the Pacific Northwest have extraordinary opportunities to secure federal authorities and funding to implement these bold actions, and to invest in salmon recovery, river restoration and energy security throughout the region.
- Coal plants are phasing out.
- Some utilities are concerned about whether there will be adequate electricity supplies.
- Dramatic reductions in costs for renewable technologies and batteries have led to significant increases in solar and wind energy generation and storage abilities, which results in dramatic operational changes in overall generation patterns.

[1] Climate change is expected to exacerbate the currently unhealthy river temperatures in the Snake and Columbia Rivers, where relatively slow-moving water is warmed by the broad areas of the reservoir surfaces exposed to solar radiation.

- Costs have also come down for storage batteries, which can integrate intermittent renewable resources, so the power is available when it is needed.
- Energy efficiency has improved, but the Northwest Power and Conservation Council (Council or NPCC)[2] is considering reducing targets in future years.
- Increased electric transportation will require management of charging to assure environmental impacts are positive for salmon.
- Renewable energy must be appropriately priced to ensure that major changes in the west coast energy market do not damage salmon as low-cost solar power reduces river flows during the day and the dams create large flow fluctuations to serve morning and evening peak loads.

A major theme of this Energy Vision is to ensure that renewable resources in combination with increased storage, reductions in peak demand, and increased energy efficiency can provide clean, adequate, reliable, and affordable electricity and support the restoration of healthy and harvestable salmon and steelhead populations and other tribal resources caused by the electrical system. Additional energy efficiency actions and strategies to reduce the need for new transmission and distribution lines should save consumers hundreds of millions of dollars per year. However, renewable resources must be properly integrated and carefully cited to ensure the future will be better for Columbia River salmon and other tribal resources.

1.2 Vision for Columbia River Resources and Energy

CRITFC and its member tribes envision a future where the Columbia Basin electric power system supports abundant and sustainable fish and wildlife populations, protects tribal cultural resources, and provides clean, reliable, and affordable electricity.

The goals for this Energy Vision are:

- **Create a regional energy portfolio** that protects and enhances environmental quality, treaty protected resources, and restores healthy fish and wildlife populations in the Columbia Basin.
- **Prevent new and reduce ongoing damage to Columbia River Basin resources,** including fish, wildlife, water quality, and tribal cultural resources, by recognizing the relationships and interdependencies of natural and built systems including the Northwest's energy system.
- **Provide increased protection for both fish and wildlife and utility customers against unanticipated events,** such as drought, fire and market aberrations while providing an adequate, economical, and reliable electric supply.
- **Restore the lower Snake to a climate resilient free-flowing river** and mitigate climate change impacts to protect Northwest

[2] The Northwest Power and Conservation Council was created by Congress and the states of Idaho, Montana, Oregon and Washington to provide planning and policy leadership on regional electric power and fish and wildlife issues. The Council develops a [power] plan, which, if implemented, will assure the region of a safe, reliable, and economical power system with due regard for the environment. The Council also prepares a [fish and wildlife] program to protect, enhance, and mitigate fish and wildlife affected by the Columbia River hydroelectric system. NPCC Bylaws, Chapter 2, https://www.nwcouncil.org/about/bylaws.

ecosystems by replacing fossil-fuel electric generation and reducing the reliance on fossil-fuels for power, transportation, and other uses.

In 1977, four sovereign treaty tribes of the Columbia River Basin: the Yakama Nation, the Nez Perce Tribe, the Confederated Tribes of the Umatilla Indian Reservation, the Confederated Tribes of the Warm Springs Reservation of Oregon, formed CRITFC to provide coordination, management, and technical assistance to ensure that their treaty fishing rights are protected through the continuation and restoration of tribal fisheries into perpetuity. The four tribes wholly, indivisibly, and equally own and govern the affairs of CRITFC. Numerous federal court decisions have affirmed these treaty rights.[3]

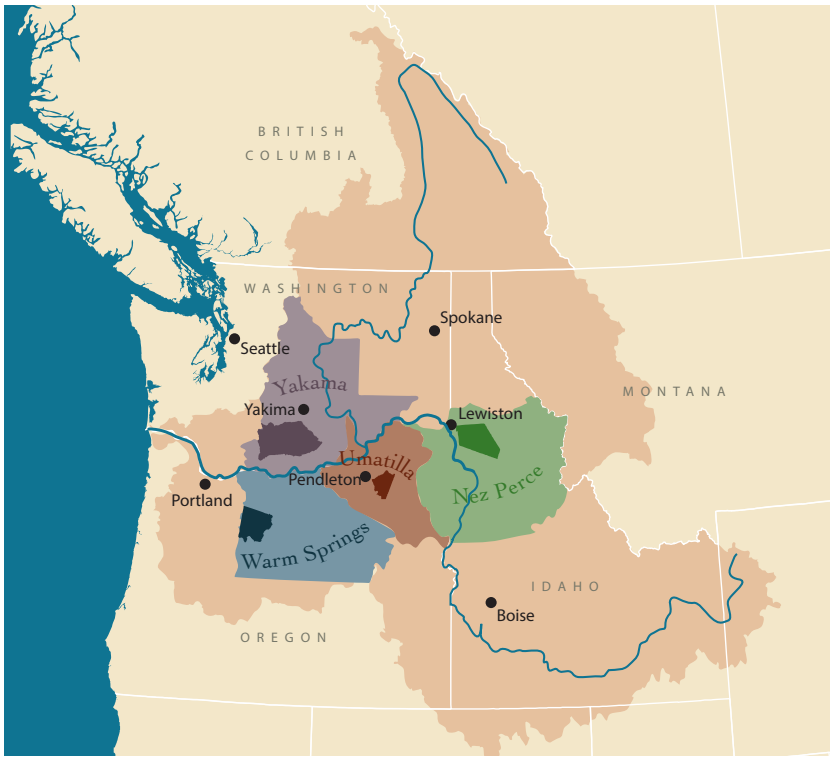
Tribes throughout the Northwest are united by salmon; by the Northwest rivers that salmon, steelhead, lamprey, and native fish depend upon; and by the interconnectedness of salmon with their ecosystems—from the orca in the ocean and Puget Sound to the nutrients which salmon supply to the furthest inland streams. All these tribal cultures and lifeways are rooted in place and tied to their homelands. Tribes simply cannot relocate to access traditional resources.[4]

APPENDIX C describes the Federal Action Agency (BPA, the Bureau of Reclamation, and the Army Corps of Engineers) obligations to rebuild fish populations under the Northwest Power Act. APPENDIX H provides a discussion of environmental management and First Foods.[5]

FIGURE 1 shows the Columbia River Basin in light brown. The ceded areas of the Yakama, Nez Perce, Umatilla, and Warm Springs tribes are shown in purple, green, brown, and blue with the current reservations in darker shades.

For the tribes and CRITFC to accomplish their mission, salmon, Pacific lamprey, and mussel populations need to be rebuilt. The dams on the Columbia and Snake rivers continue to be the main obstacles to anadromous fish restoration.

FIGURE 1. Reservations and Ceded Areas of the Yakama, Nez Perce, Umatilla, and Warm Springs Tribes



[3] For more information on the treaties, see https://www.critfc.org/wp-content/uploads/2021/11/Treaty-Rights-list.pdf.

[4] Please refer to the ATNI and NCAI resolutions referenced in footnote 1, *supra*, and set forth in APPENDIX B.

[5] Since time immemorial, the health, spirit, and cultures of the Columbia River tribes have been sustained by the water, salmon, game, roots, and berries of our homeland— our sacred "First Foods. See also *Quaempts, E. J., K. L. Jones, S. J. O'Daniel, T. J. Beechie, and G. C. Poole. 2018. Aligning environmental management with ecosystem resilience: a First Foods example from the Confederated Tribes of the Umatilla Indian Reservation, Oregon, USA. Ecology and Society 23(2):29.* https://doi.org/10.5751/ES-10080-230229.

Courtesy: NOAA Fisheries

1.3 Salmon and Steelhead Face Extinction

This update to the Energy Vision comes at a critical time because salmon and steelhead populations in the Columbia and Snake rivers are in a dire condition.

- Twelve populations of salmon and steelhead are listed as either threatened or endangered under the Endangered Species Act.
- Currently, 42% of Snake River spring/summer Chinook populations have fewer than 50 wild-origin fish. Populations this low are near extinction. By 2025, 77% of these Snake River Chinook populations are predicted to have of less than 50 wild-origin fish and be near extinction.
- Three stocks triggered NOAA's 2014 BiOp early warning and significant decline indicators: Upper Columbia Spring Chinook, Upper Columbia Steelhead, and Snake River Steelhead.
- The total abundance of salmon and steelhead in the Columbia River is at or near levels when the first Endangered Species Act (ESA) listings were registered in the mid-1990s.

Since 1987, the Council's interim goal for the Columbia River Basin Fish and Wildlife Program is to "Increase total adult salmon and steelhead runs of Columbia River origin to a 10-year rolling average of five million annually by 2025, in a manner that emphasizes increases in the abundance of the populations that originate above Bonneville Dam." Salmon and steelhead populations have averaged about one million fish over the past five years—we are nowhere close to achieving the year 2025 Program goal. More recently, the Columbia Basin Partnership based its recommendations to NOAA Fisheries on a "strong sense of urgency that immediate action is needed to address salmon and steelhead declines in the Columbia River Basin." Their Phase 2 report finalizes qualitative and quantitative goals for all salmon and steelhead, both ESA-listed and non-listed, and provides recommendations for continuing collaboration going forward.[6]

The tribes have developed recommendations for near-term and longer-term river configuration and operation actions to improve fish and wildlife survival. CRITFC has summarized many of these recommendations in SECTION 3.1 and APPENDIX C. These actions are being pursued in various decision processes.

[6] MAFAC's Columbia Basin Partnership Task Force hosted by NOAA Fisheries was initially convened in 2017. The CBP task force completed in Phase 1 report in 2018 setting forth a "Vision for Salmon and Steelhead." https://media.fisheries.noaa.gov/dam-migration/mafac_report_cbp_phase_1_recommendations_full_report.pdf. The full Phase 2 report completed in 2020 reflects years of efforts with input from a broad range of representatives including utilities, states, tribes, ports, irrigation districts and non-governmental organizations. https://s3.amazonaws.com/media.fisheries.noaa.gov/2020-10/MAFAC_CRB_Phase2ReportFinal_508.pdf?null.

1.4 Changes in the Electrical System Can Help or Hurt Salmon

Climate Crisis. Several states and utilities have adopted unprecedented plans to reduce greenhouse gases, and the federal government has adopted and is considering several programs that would reduce these pollutants as part of the Infrastructure Investment and Jobs Act and Build Back Better legislation. Renewable resources and battery storage in combination with energy efficiency can help the Northwest address the climate crisis that is already damaging salmon, steelhead, and other tribal resources. It is critical to reduce greenhouse gas pollution and continue to increase energy efficiency to try to reduce the devastating effects that salmon are facing.

Renewable Resources. The costs of renewable resources have declined dramatically, and these resources will be the major source of energy in the future. According to the Council, wind and solar currently supply about 10,000 MW of capacity in the Northwest. The Council's draft 8th Power Plan[7] recommends that the region add 3,500 megawatts of solar and wind projects by 2027, growing to 14,000 additional megawatts by 2041. Battery storage capacity is rapidly increasing, with its cost decreasing. Renewable resources in combination with storage and reductions in peak demand can ultimately improve conditions for fish and wildlife and other tribal resources.

New renewable resources must be properly sited to avoid impacts from construction and operation of these resources. Large industrial scale solar and wind projects have displaced tribal people from access to their traditional foods. Terrestrial and land-based cultural resources are at risk from transmission construction and annual vegetation management operations.

New renewable resources can and should be paired with battery storage and must be wisely integrated to make the environment better for Columbia River salmon. Solar provides energy during daylight hours and wind energy production can vary during the day. Integrating electric energy production and battery storage is complex; supplies must be matched with the changing needs every minute of the 8,760 hours in every year. However, the Columbia Basin's hydro system is in an ecosystem and has profoundly and detrimentally impacted the biological resources dependent on that ecosystem. Adding more burdens to that ecosystem through increasing over-reliance on hydro resources to integrate renewable energy sources would be irresponsible and with adequate planning is not necessary to provide reliable and affordable clean power.

Columbia Basin hydro system configuration and operation have changed and will change in the future. Recently, plaintiffs and defendant agencies of the United States in the long-running ESA litigation, *NWF v. NMFS*, filed a stay of litigation through July 31, 2022, to increase

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[7] The Northwest Power and Conservation Council develops a new Power Plan every 5 years. At time of writing of this Energy Vision, the NPCC was in the process of developing their eighth Power Plan and had released the *Draft 2021 Northwest Power Plan in the fall of 2021*, available at https://www.nwcouncil.org/sites/default/files/2021powerplan_2021-5.pdf. The final 2021 Northwest Power Plan was released during publication of this Energy Vision document and can be found at https://www.nwcouncil.org/reports/2022-3/. This Energy Vision refers to the draft document available at the time of writing.

spill for juvenile fish passage, limit "zero flow" operations, and maintain reservoirs at minimum operating pools to benefit salmon migration. At the same time, Senator Patty Murray and Governor Jay Inslee of Washington announced their intention to complete recommendations in the same timeframe to address replacing the power and other services provided by the four lower Snake River dams if they are breached.

To assume that the current configuration and "flexibility" of the Columbia and Snake River hydropower system allows for full integration of solar and wind energy overlooks and conflicts with many resource concerns. Assigning zero costs for this "flexibility" is contrary to the intent of the Northwest Power Act's to prioritize environmental quality and protection of fishery resources. Hydro flexibility has imposed significant "costs" to salmon and steelhead populations and other tribal resources.

Peak Loads. Electric energy use spikes to high levels in the morning and late afternoon. Serving these peak loads causes fluctuations in river flows that hurt migrating salmon and steelhead. Meeting these peaks is expensive. Utilities operate their most expensive resources during these periods. We estimate utilities and BPA will spend more than eight billion dollars over the next five years to expand their transmission and delivery lines, a significant amount of which is driven to meet peak uses. This Energy Vision details actions to reduce peak demands that can save salmon and money. See SECTION 3 and supporting analysis in APPENDIX E.

Renewable Resource Siting. The projected growth in renewable resources could affect tribal First Foods, wildlife, and other tribal cultural resources. The Washington Department of Fish and Wildlife reports that there are currently 30 industrial solar projects proposed for Washington with a footprint of 49,000 acres, or nearly 77 square miles. The Oregon Department of Energy (ODOE) reports that the state Energy Facility Siting Council has approved seven projects and has seven more under review. The 14 projects cover 27,969 acres or 44 square miles. Local siting processes in Oregon would likely add to this total. Other states are facing similar development.

CRITFC recommends that federal, state, and tribal governments work together on a regional plan for locating renewable resources and providing expeditious siting with clear and uniform standards across all political subdivisions. This effort could build on the 2013 criteria developed by the Department of the Interior for renewable resource development and the Council's Protected Areas for new hydroelectric dams. SECTION 3 and APPENDIX F provides a sample of criteria that could be considered in this process. APPENDICES G and H describe cultural resource and First Foods concerns.

Energy Efficiency. Energy conservation and efficiency improvements are inherently fish and wildlife friendly. They require no "steel in the

ground" in undisturbed landscapes and will not impact tribal cultural resources. They operate 24-7, and unlike wind and solar energy resources they are generally not subject to variations in weather. Unlike thermal resources they are immune from fuel price increases. Properly developed energy efficiency and conservation can benefit low-income populations including tribal peoples.

Energy efficiency programs reduce both peak demands and year-round energy needs. Energy efficiency has been proven as a reliable resource in the Northwest and has saved consumers over $70 billion. These programs have reduced the emissions of pollutants that cause climate change by an estimated 240 million metric tons. Energy efficiency also reduces the region's seasonal storage needs because the energy savings closely track energy demand. The "flexibility" of energy efficiency is extremely valuable. These programs currently employ 100,000 people in the region.

The Council has significantly reduced the energy efficiency targets in its draft 8th Power Plan, primarily because of the low cost of solar and wind energy. The Council's current models and analysis may not be able to accurately reflect the role of energy efficiency in a transformed energy market that also protects fish populations. We are concerned that without updated and reliable modeling that better addresses the role of energy efficiency, the region will regret any reduction in this valuable resource that has proven to be compatible with the river's ecosystems.

SECTIONS 2 and 3 address all these issues in more detail.

1.5 Summary of the Energy Vision Recommendations

SECTION 3 describes CRITFC's recommendations to create a future where the Columbia Basin electric power system supports abundant and sustainable fish and wildlife populations, protects tribal cultural resources, and provides clean, reliable, and affordable electricity.

- SECTION 3.1 details the planning needed to address future changes in the configuration and operation of the hydroelectric system to reduce the damage to migrating salmon and steelhead, including breaching the four lower Snake River dams.
- SECTION 3.2 calls for a fresh look at the Columbia River Treaty and improved coordination of Canadian and U.S. hydroelectric and flood control operations in recognition of the major changes in the economics and availability of other renewable resources.
- SECTION 3.3 describes actions to reduce peak electricity loads through energy efficiency, clear price signals, demand management, and storage.
- SECTION 3.4 addresses actions to secure all cost-effective energy efficiency, ensure that utilities achieve energy efficiency targets, expand low-income programs, and improve energy management practices in commercial and industrial buildings.
- SECTION 3.5 focuses on renewable resources, including actions to review and integrate greenhouse gas reduction policies, and actions to promote wind and solar generation, and other renewable resources.
- SECTION 3.6 calls for a comprehensive plan for siting renewable resources and transmission to focus development where it is appropriate, avoids sensitive areas, relieves congestion, and reduces the need for new transmission lines.
- SECTION 3.7 recommends additional actions, beyond those described above, to address resource adequacy, including increasing the Northwest Power Pool reserve standards.
- SECTION 3.8 identifies changes in BPA rate policies to protect fish and wildlife during low-water years.
- SECTION 3.9 addresses the need to monitor changes in the west coast energy market to ensure that they address impacts on Columbia Basin Fish and Wildlife and other tribal resources.
- SECTION 3.10 recommends actions that would reduce the need for new transmission and distribution lines that could save consumers hundreds of millions of dollars a year and reduce impacts on tribal resources.
- SECTION 3.11 calls for reducing reliance on fossil fuels and describes the tribes' opposition to transporting oil and coal through the region because of the dangers to fish and wildlife, cultural resources, and human health.
- SECTION 3.12 calls for pilot projects to sequester carbon dioxide.
- SECTION 3.13 describes opposition to siting new nuclear plants at the Hanford Nuclear Reservation and calls for studies of the compatibility of new smaller nuclear fission plants with intermittent renewable resources.
- SECTION 3.14 calls on utilities and utility commissions to deny service for cryptocurrency mining in the Northwest.

1.6 Tribal Leadership

The four CRITFC member tribes have applied the concepts found in the Energy Vision to their day-to-day government priorities. Their actions demonstrate leadership in reducing damage to salmon and other fish and wildlife in the Columbia Basin, reducing emissions causing climate change, and supporting a diverse and reliable energy resource mix that will lower energy costs and help recover abundant, harvestable salmon and other resident fish.

Significant changes in the environment, the energy industry, energy economics and markets, energy technologies, public awareness and government policy are bringing new opportunities for tribal energy actions. As described in **APPENDIX D**, tribes are frequently community and national policy leaders in employing ideas and technologies to solve environmental and natural resource problems. In particular, the existential environmental problem of climate change requires tribes to consider "energy" in many new ways. Environmental sustainability takes on broader and more critical meanings.

New federal legislation provides significant funding for energy efficiency and renewable resources and other actions to address the climate crisis. The Infrastructure Investment and Jobs Act nationally provides billions of dollars in energy resources support for smart grid programs, Energy Efficiency, housing weatherization, tribal climate reliance and many other measures. It will be important to structure these programs to benefit tribes.

Regionally, congressmen Simpson and Blumenauer are working on an initiative to help Columbia Basin salmon recover by restructuring mitigation policies and programs, breaching the four dams along the Lower Snake River and funding other restoration efforts.

Opportunities for Additional Tribal Leadership

- Tribes can legislate Tribal Energy Codes to create reservation goals, policies, procedures, funding, and programs to assure that the Energy Vision is implemented within the reservation.
- Tribes can apply for and appropriately manage funding from federal, state, local and private sources to meet goals and to improve application of new and cutting-edge technologies.
- Tribes can use their political leverage and longstanding cultural wisdom to influence public opinion and government policy.
- Tribes can lead by example.
- Tribes can develop partnerships with private institutions, educational bodies, local governments, utility and energy industry players, the Northwest Energy Coalition, the Bonneville Environmental Foundation, and others to further the Energy Vision and create buy-in by entities that may not otherwise be involved in improving the energy successes.
- Tribes can create local education programs for their own students and people and can work with outside educational entities to expand understanding of environmental/ energy sustainability.
- Three of the four CRITFC Tribes are working to address the damages caused by the Hanford nuclear site.
- Inter-tribal organizations have a history of partnering with specific expert entities to address specific goals important to the organization.

1.7 Closing

This Energy Vision for the Columbia River Basin defines a set of recommendations that will allow for a healthier environment for fish resources and provide better protection against unforeseen events, such as drought or other extreme weather that affect the environment and energy systems.

The Nez Perce Tribe, the Confederated Tribes of the Umatilla Indian Reservation, the Confederated Tribes of the Warm Springs Reservation of Oregon, and the Confederated Tribes and Bands of the Yakama Nation, who make up the Columbia River Inter-Tribal Fish Commission (CRITFC), believe that river management need no longer be a fish versus power fight, where one side or the other is a winner or a loser. The region can enjoy an affordable, reliable energy system and have harvestable runs of salmon that support commercial, sport, and tribal harvests.

Our Energy Vision is economically and ecologically based to meet the requirements of fish and wildlife and the energy needs of the Northwest. The Energy Vision for the Columbia Basin highlights critical concerns with the region's existing energy system and sets forth a systematic approach to address these concerns. The Vision recognizes and supports the recommendations of tribes across the Pacific Northwest and the nation for restoring salmon and steelhead.

This vision outlines a set of resources that can be developed to meet future needs in a wise and cost-effective manner while reducing the region's energy dependency on the Columbia River hydroelectric system. The Energy Vision for the Columbia Basin continues to be a companion to CRITFC's *Wy-Kan-Ush-Mi Wa-Kish-Wit* (Spirit of the Salmon) Plan for Columbia River Anadromous Fish Restoration.

2 Major Changes for Salmon and Energy




2.1 The Columbia Basin Salmon Crisis

The 2013 Energy Vision focused on reducing the peaking at the Columbia and Snake River dams to improve fish and wildlife survival. The day-to-day and seasonal operations of the hydroelectric system to meet peak and seasonal electricity loads cause fluctuations in river levels that continue to kill salmon, resident fish, and other important fish species.

This update expands on this work and provides a more detailed description of the effects of the dams on tribal resources and recommendations for near-term and long-term actions (see SECTION 3.1 and APPENDIX C). It also focuses on the need to expand energy efficiency, energy storage, reductions in peak demand, and on-site solar to ensure that new renewable resources do not create problems for fish and wildlife. The condition of salmon and steelhead stocks in the Columbia Basin do not allow the region to assume that the federal hydro system is the only battery in town.

2.1.1. Salmon Populations are Continuing to Decline

The Columbia Basin is home to one of the richest arrays of salmon and steelhead in the world, and this wealth of anadromous species holds great ecological, cultural, spiritual, and economic value. But these resources are at risk. Protecting, restoring, and effectively managing these valuable species is one of the region's greatest responsibilities.

- Twelve salmon and steelhead populations in the Columbia Basin are listed as either threatened or endangered under the Endangered Species Act.
- The total abundance of salmon and steelhead in the Columbia River has not increased significantly since the first ESA listings were registered in the mid-1990s.

One of the recent federal salmon planning initiatives in the Basin encapsulates important context. NOAA Fisheries and its Marine Fisheries Advisory Committee (MAFAC) convened the Columbia Basin Partnership Task Force from 2017 through 2020 to bring together diverse representatives from across the Columbia Basin to establish a common vision and goals for salmon and steelhead. The Task Force considered impacts across salmon and steelhead life cycles (*e.g.,* habitat, harvest, hatchery, and hydro), and ecological conditions and current and future habitat capacity. The Task Force set Low, Medium, and High goals for 27 stocks of salmon and steelhead. Recent run sizes to the mouth of the Columbia River are nowhere near the High Goal or even the Low Goal. The populations of Columbia and Snake River salmon and steelhead are at very dangerous levels for their continued existence. The group determined that to address declines in salmon and steelhead, urgent and immediate actions need to be implemented.

As pointed out by NOAA Fisheries, Upper Columbia and Snake River salmon and steelhead populations are in dire condition.

- Three stocks have recently triggered their NOAA early warning and significant decline indicators: Upper Columbia Spring Chinook, Upper Columbia Steelhead, and Snake River Steelhead.
- NOAA's life cycle modelling of future climate scenarios for Snake River spring/summer Chinook salmon populations indicates that the median abundance of spring and summer-run Chinook salmon populations could further decline substantially in the next two to three decades, which would threaten to extirpate a large number of small populations.
- NOAA Fisheries' most recent Biological Opinion for Operations of the federal Columbia River System observed similar information:
  - **Snake River Spring/Summer Chinook Abundance**

    The adult abundance of Snake River spring/summer Chinook salmon indicate a substantial downward trend in the abundance of natural-origin spawners at the ESU level from 2014 to 2019. The three years from 2017 through 2019 have shown the lowest returns since 1999. The data also show recent and substantial downward trends in abundance of natural-origin and total spawners for most of the MPGs and populations when compared to the 2009 to 2013 period.
  - **Snake River Steelhead Abundance**

    The adult abundance of Snake River Bright steelhead also indicates a substantial downward trend in the abundance of natural-origin spawners at the DPS-level from 2014 to 2019.

- **Upper Columbia River Spring Chinook**

  The Entiat, Methow, and Okanogan River Spring Chinook populations remained at high overall extinction risk, while the Wenatchee River population status was considered "maintained" as of the most recent status review (NMFS 2016d). Overall, the ESU status remained unchanged from previous status reviews and was considered at high risk.

- **Upper Columbia River Steelhead**

  Data for these populations indicate a substantial downward trend in the number of natural-origin spawners at the DPS level from 2014 to 2019.

- In coordination with Idaho Fish and Game, Oregon Department of Fish and Wildlife, National Marine Fisheries Service and others, the Nez Perce Tribe's Department of Fisheries Resource Management in prepared an extensive review and forecast of salmon and steelhead population risks in the Snake River Basin. It concluded that currently, 42% of Snake River spring/summer Chinook populations have fewer than 50 wild-origin fish. By 2025, 77% of these Snake River chinook populations are predicted to hit their quasi-extinction risk threshold of less than 50 wild fish.[8] Additional material from this review is reported in APPENDIX C.

Too often, the federal government, regional utilities, and the NPCC assume that within hard-fought fish constraints the "flexibility" of the dams in the Columbia and Snake River basins can freely integrate solar, wind and other energy supplies into grid operations. In this fashion, economic dispatch models implicitly assign zero costs for using the Columbia and Snake Rivers. **Yet the biological cost to salmon and steelhead of hydro operations is not zero.**

Hydropower is used to serve peak loads because dam operators can react to demand by adjusting water quantities sent through the turbines to generate electricity. But serving peak loads with hydropower kills millions of juvenile salmon every year. During certain times of the year, so much water is drawn down to generate electricity that salmon redds (gravel nests where salmon lay eggs) are uncovered or dewatered and their eggs die. Daily fluctuations change river water levels and juvenile fish that feed and live near the shore can be stranded and die when water levels are reduced. Migration of fish is interrupted when flows decrease at night because there is less demand for electricity and therefore less water moving through the reservoirs behind the dams. Operations outside

[8] Johnson, D., Hesse, J., Kinser, R., 2021. Nez Perce Tribe staff presentation on their analysis of Snake River basin Chinook and Steelhead—quasi-extinction threshold and call to action. https://www.nwcouncil.org/sites/default/files/2021_05_4.pdf.

of peak turbine efficiencies create cavitation and other conditions that significantly increase the mortality of fish passing through powerhouses. The projected increases in solar power, without adequate batteries or other storage, could create migration problems during many parts of the day. Fluctuations in reservoirs hurt resident fish by dewatering habitat and food supplies and reducing nutrients in the reservoirs.

Additionally, the water held behind storage dams for power generation would, under natural conditions, be in the river aiding the swift and timely downstream migration of young salmon. Saving this water for winter and summer energy production alters the natural (or normative) river conditions that aid juvenile salmon migration.

The recommendations in the 2022 *Energy Vision for the Columbia River Basin* are designed to reduce these problems while also saving money for utility customers. The Northwest electricity system has relied on the Columbia Basin dams to serve peak loads. The assumption has been that running more water through the generators is a low-cost way to meet the peak. This assumption has ignored the other costs of serving peak loads, including those related to the high costs of distribution and transmission of the electricity and the impact of peak load response on salmon survival. Transmission and distribution lines also have damaged other tribal resources, including First Foods and cultural sites. See **SECTION 3** and **APPENDIX E**.

2.1.2. Recent Spill Operations

Spilling water at the dams has proven to be the safest route of passage for juvenile salmon migrating downstream. Controversy over the timing and amount of spill to aid juvenile salmon migration has gone on for decades. A new generation of research made available by passively induced transponder tags (PIT tags) has enabled researchers to verify that juvenile salmon that avoid powerhouse encounters by passing through spillways return from the ocean as adult salmon in greater numbers than those salmon who encountered turbines or fish screens on their downstream migration. These developments have led to new programs for intentionally spilling water at the dams to improve salmon survival to adulthood.

In December 2018, the states of Oregon and Washington, the Nez Perce Tribe, Bonneville Power Administration, the Bureau of Reclamation, and the Army Corps of Engineers (Corps or Corps of Engineers) agreed in lieu of litigation to provide fish benefits, power system benefits, and operational feasibility for the 2019 and 2020 operating years. This short-term Agreement provided higher spill to benefit fish migration during periods of lower power value and lower spill occurs during periods of higher power value. In 2021, following requests for injective relief from the Court, the parties reached an interim agreement on operations of the eight federal mainstem Columbia and Snake River dams through July 31, 2022. This temporary agreement provides some increases in spill protections for migrating salmon, scales back zero generation operations noted below and restores commitments to minimum operating pool restrictions intended to facilitate juvenile salmon migrations.

2.1.3. Other Salmon Protections have been Weakened or Eliminated

While adopting flex spill arrangements as a recommended operation in the Columbia River System Operation EIS that concluded in mid-2020, the federal action agencies[9] adopted other changes that would reduce long-standing fish protections. The following changes during the Trump Administration served to increase flexibility in the operation of the hydroelectric dams, but reduced fish protections:

- Modification of winter draft limits at upper Columbia Basin storage reservoirs shifts water to generate power to meet winter electricity loads and away from the salmon migration season. For 40 years, fish managers have sought to maximize the spring freshet for fish migration and the Columbia River System Operations (CRSO). Reducing spring flows in the upper Columbia will slow migration timing.
- For the past 25 years the federal, state, and tribal fishery co-managers have requested that action agencies keep the mainstem run of river reservoirs as low as possible to decrease travel time (smaller reservoir surface area results in faster water evacuation time). The proposed action increases the opportunity to raise minimum operation pool (MOP) levels that slow fish travel times. Slower downstream migration times are associated with increased juvenile mortality.
- In the fall and winter, dam operators shut down flow at the Snake River dams at certain times of day (aka "zero generation") and allow water to pond for use at higher demand times. This operation can have a serious impact on migrating fish (adults and juveniles). The zero-generation operation was limited based on fish presence in the river and no zero generation before December 15. Now zero generation operations can occur as early as October 15 and have no constraints as to how many fish are in the river. Adult Snake River fall chinook are migrating through the end of November, steelhead are present year around and juvenile chinook can be present as late as November.
- Based on extensive research, the relationship between turbine operating efficiency and the mortality of fish passing through turbines is well understood. As a result, NOAA Fisheries has required, and dam operators now limit, turbine operations to within 1% of peak efficiency to prevent harm to migrating juvenile fish. Operating outside that range can cause cavitation and ultimately damage turbine blades.[10] The proposed action creates additional allowances for operating turbines outside the 1% range during salmon migration periods.
- For nearly 25 years it has been recognized that load following, or power peaking, operations can be detrimental to both fish and fishermen. In the winter of 2021, fish managers witnessed several consecutive days of power peaking at Dworshak Dam with daily outflow fluctuations of up to 9,000 cubic feet per second. This can dewater and damage salmon redds below the dam and move adult and juvenile fish out of the area.

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[9] The Bonneville Power Administration, U.S. Bureau of Reclamation and U.S. Army Corps of Engineers recently adopted records of decision based on the Columbia River System Operations Proposed Action, Environmental Impact Statement and NOAA Fisheries' Biological Opinion. These decisions have been challenged in federal district court by the State of Oregon and a coalition of environmental groups.

[10] The turbine blades in dams create pressure changes that cause bubbles around the blades.

Courtesy US Army Corps of Engineers

- The historic models that evaluate hydro system operations are generally operated on a daily average basis. The new spill operations are managed on an hourly basis. The action agencies have not proposed investment into updating the various models used to evaluate impacts and benefits of fish operations by adjusting to hourly time steps in their energy models.

In addition to these weakened salmon protections, BPA has also reduced the funding for other fish and wildlife measures by holding BPA's fish and wildlife costs level funded. BPA's 2018–2024 Strategic Plan sets programmatic limits at or below the rate of inflation. This has reduced, in real terms, funding available for its fish and wildlife program year after year, yet BPA's power rates were decreased 2.5%.

Energy planning and development must address the costs to the environment and manage energy resources to benefit tribal resources. The tribes have seen their salmon resources reduced from over 10 million fish to a mere fraction remaining in the river today while electricity rates in the Northwest are the lowest in the Nation. There is a better way. SECTION 3 describes the tribes' recommendations for achieving that path.

2.2

Dramatic Changes for the Energy System

The West Coast electric energy industry has gone through an extraordinary transformation since 2013. Some of the changes will result in dramatic improvements in addressing climate change that will benefit salmon and other tribal resources and begin to address the existential climate change threat. Some changes in the energy industry may have unintended consequences for fish, wildlife and cultural resources. This remainder of SECTION 2 describes the major industry changes; SECTION 3 provides CRITFC's recommendations to harmonize energy generation and transmission with the needs of fish, wildlife, First Foods, and cultural resources protection.

The federal and state policies and significant reductions in the costs of renewable resources will likely mean a change in how the region's dams will operate. Prior Energy Visions have also called for actions to reduce the impacts of the hydroelectric system on fish and wildlife by reducing peak loads and ensuring adequate energy reserve resources. However, when low-cost solar and wind energy is available, dams may be asked to store water. Electricity may be called upon from the dams to meet peak demands for several hours in the morning and several hours in the evening after sundown. If these operations result in slowing river flows for long periods during the day and night, reducing water spilled for fish passage, or operating turbines outside peak efficiency, fish will be adversely affected. Price signals need to be developed to prevent the hydropower system from being the sole battery backup for the wind and solar generators.

2.2.1. Greenhouse Emissions Policies and Standards

Concerns about the impacts of climate change, including rising temperatures, decreasing snowpack, increasing frequency and severity of extreme climate events, and changes in the magnitudes and timing of water flows caused by rising atmospheric greenhouse gas concentrations have grown since the last Energy Vision in 2013. Climate change is causing significant damage to fish and their habitat, and other tribal resources. This section describes state policies and laws designed to reduce greenhouse gas emissions.[11] The recommendations section addresses other issues to reduce reliance on fossil fuels in other energy sectors.

Washington, Oregon, and California have enacted limits on greenhouse gases from electricity generation that will mitigate climate change. In response to evolving these evolving state policies and other circumstances, many coal-fired power plants serving the West Coast have shut down or are scheduled to be decommissioned in the next few years. At the same time these thermal generation resources are being curtailed, the Northwest Power and Conservation Council is projecting a significant increase in low-cost solar and wind energy and reductions in electricity costs over the next twenty years.

WASHINGTON

The Clean Energy Transformation Act (CETA)[12] passed in 2019 requires all Washington state electric utilities to reach a 100% clean electric supply by 2045. CETA's first milestone requires the utilities to eliminate coal-fired resources from their state resource portfolios by the end of 2025. The second milestone requires utilities to be greenhouse gas neutral by 2030 with the flexibility to use electricity from natural gas if it is offset by other alternative compliance actions. By 2045, utilities must supply Washington customers with electricity that is 100% renewable or non-emitting, with no provision for alternative compliance actions.

Electric Utilities must adopt CETA by the end of 2021 with targets and plans. The Washington State Department of Commerce and Washington Utilities and Transportation Commission (UTC) play key roles on how to implement this law.

In 2021, Washington enacted the Carbon Commitment Act. It establishes a system of carbon pricing that sets economy-wide limits on carbon emissions beginning in 2023 and establishes a system to buy/sell allowances and offset credits and invest the proceeds in a range of activities that include restoration of marine and fresh waters, forest health, renewable energy, and public transportation.[13]

Washington's governor, Jay Inslee, recently proposed plans to spend $100 million annually to fund rebates for people buying electric vehicles. The proposal also increases the amount of the rebate to as much as $7,500 and expands the vehicles that are eligible. The plan also

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[11] Eighteen jurisdictions have set goals to achieve 100% clean, renewable energy. They are Arizona, California, Connecticut, Hawaii, Louisiana, Maine, Massachusetts, Michigan, Nevada, New Jersey, New York, New Mexico, Oregon, Rhode Island, Virginia, Washington, Washington, D.C., and Wisconsin. See https://www.cesa.org/projects/100-clean-energy-collaborative/table-of-100-clean-energy-states/.

[12] Chapter 19.405 RCW.

[13] https://ecology.wa.gov/Air-Climate/Climate-change/Greenhouse-gases/Reducing-greenhouse-gases/Climate-Commitment-Act.

includes $100 million in grants to state agencies, school districts, tribal and local governments, housing authorities, electric utilities, and nonprofit organizations to install solar energy and storage systems.

OREGON

In 2007, HB 3543 established the Oregon Climate Change Research Institute (OCCRI) to create science-based understanding for climate impacts, adaption, and mitigation.[14] It also created the Oregon Global Warming Commission to assess impacts of climate change and propose policies to reduce greenhouse gas emissions. The law set science-based climate emissions reduction goals for Oregon that include a reduction of carbon emissions to at least 75% below 1990 levels by 2050; however, the state is not on track to meet that goal. Oregon Global Warming Commission says Oregon will miss the 80 percent reduction mark of 80% by 2050 by 54 million metric tons carbon dioxide.[15]

In 2016, Oregon passed the Clean Electricity and Coal Transition Act[16] to transition off coal-fired power while committing to increase renewable resources. The Oregon Public Utility Commission will work with Portland General Electric and Pacific Power to develop implementation strategies to double the amount of clean renewable energy by 50% by 2040. By 2030, coal-fired resources for electric companies must be eliminated. In 2020, Oregon's largest investor-owned utility, Portland General Electric (PGE), shut its only coal power plant. The state has adopted a goal of net-zero emissions by 2040.

In 2020, Oregon's governor issued Executive Order No. 20-04 directing executive agencies to take actions to reduce and regulate greenhouse gas emissions, this specifically emphasizes the disproportionate effects that tribes will face. Governor Brown signed Executive Order 17-20 (regarding energy efficiency) and Executive Order 17-21 (regarding zero emission vehicles).

In 2021, Oregon passed HB 2021. Effective September 2021, HB 2021 requires retail electricity providers to reduce greenhouse gas emissions associated with electricity sold to Oregon consumers to 80 percent below baseline emissions levels by 2030, 90 percent below baseline emissions levels by 2035 and 100 percent below baseline emissions levels by 2040.[17] Electric companies must develop approved clean energy plans and convene Community Benefits and Impacts Advisory Group to assess the impacts of their clean energy plans on environmental justice communities and low-income ratepayers.

IDAHO

The State of Idaho has not adopted clean energy goals or regulations. However, Idaho Power has set a goal for 100% clean energy by 2045 with plans to invest in sources that take a "path away from coal."

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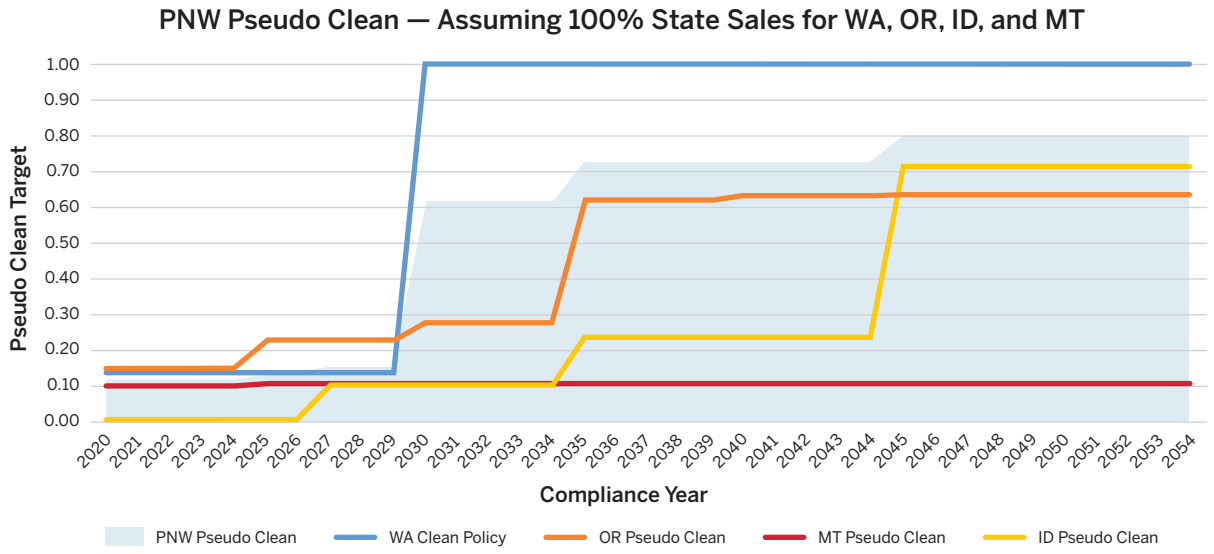
[14] Oregon Laws 2007, Chapter 907, Section 1 (narrative form).

[15] https://static1.squarespace.com/static/59c554e0f09ca40655ea6eb0/t/5fe137fac70e3835b6e8f58e/1608595458463/2020-OGWC-Biennial-Report-Legislature.pdf

[16] Senate Bill (SB) 1574-b (2016).

[17] Oregon Laws, 2021. Chapter 508

FIGURE 2. Targets for Carbon-Free Energy Production in the Northwest States



MONTANA

Several of Montana's largest cities have adopted standards to reduce greenhouse gases, including Bozeman, Helena, and Missoula. NorthWestern Energy reports that it serves Montana with an electric portfolio that is 60% carbon free and has set a goal to have an electric energy portfolio that reduces carbon by 90% by 2045, compared to 2010.[18] On May 14, 2021, Montana Governor Greg Gianforte signed House Bill 576, repealing the Montana Renewable Power and Rural Economic Development Act of 2005 and effectively annulling the Montana Renewable Portfolio Standard in its entirety.

The Northwest Power and Conservation Council prepared a chart (**FIGURE 2**) that shows the targets for carbon-free energy production in the northwest states.

CALIFORNIA

The 100 percent Clean Energy Act of 2018[19] requires California to have 50 percent of its electricity powered by renewable resources by 2025 and 60 percent by 2030, while ultimately working towards 100% zero-carbon electricity by 2045. California does not have any specific language for low-income communities but currently has multiple programs that serve low-income customers. The *2021 100 Percent Clean Energy Act Joint Agency Report* is a first step to evaluate the challenges and opportunities in implementing SB 100. This includes assessments and associated costs for the transition. This report requires a yearlong series of public workshops and comment opportunities. It was required by statute to meet with the disadvantaged communities' advisory group, who advise the energy commission and public utilities commission on energy equity issues.

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[18] https://www.northwesternenergy.com/environment/environmental-commitment/environmental-report/carbon-reduction-vision

[19] California Senate Bill 100.

BRITISH COLUMBIA

Almost all the electricity produced in BC comes from energy resources that do not depend on fossil fuels. Nonetheless, energy consumed in buildings, cars, and industrial operations represents nearly three quarters of the energy used and comes from fossil fuels. The legislated target for 2030 is a reduction of 25 million tons of greenhouse gases from the 2007 baseline. The CleanBC Plan[20] describes programs that will achieve 75 percent of that goal.

FEDERAL PROGRAMS

Congress recently passed the Infrastructure Investment and Jobs Act that provides funds for many of the actions described in the Energy Vision, including[21]:

- $7.5 billion for electric vehicle charging.[22]
- Directs states to consider greater electrification of the transportation section.
- Expanded data collection on electric vehicle integration with electricity grids.
- $5 billion for electric grid reliability research, development, and demonstration and $1 billion for rural or remote areas.
- Requires state utility regulators to consider establishing rate mechanisms to allow utilities to recover the costs of promoting demand-response practices.
- The Department of Energy will study siting electric transmission lines to designate National Interest Electric Transmission Corridors.
- Establishes a $2.5 billion revolving loan fund for new transmission lines or upgrades.
- $3 billion for Smart Grid investments.
- $10 billion in additional borrowing authority for BPA.
- $1 billion to upgrade transmission between Canada and the U.S. related to the Columbia River Treaty.
- $100 million for Northwest water storage and hydroelectric capacity.
- $10 million to study better coordination of water and power flows between British Columbia and the Pacific Northwest.
- $3.125 billion for battery processing and manufacturing.
- $200 million for electric vehicle battery recycling and second-life applications.
- $100 million for carbon capture technology.
- $9.5 billion for clean hydrogen programs.
- $75 million for hydroelectric efficiency improvements.
- $554 million for maintaining and enhancing hydroelectric facilities.
- $10 million for pumped storage hydropower wind and solar integration.
- $250 million for an energy efficiency revolving fund.
- $40 million for energy auditors training program.
- $3.5 billion for the Weatherization Assistance Program.

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[20] https://www2.gov.bc.ca/gov/content/environment/climate-change

[21] See Infrastructure Investment and Jobs Act—Section by Section Summary pdf at https://www.cantwell.senate.gov/download/iija-section-by-section.

[22] The funding will focus on rural, disadvantaged and, hard-to-reach communities. States, tribes, and local governments are eligible for the funding.

- $550 million for the Energy Efficiency and Conservation Block Grant Program.
- $505 million for energy storage demonstration projects.
- $3.5 billion for carbon capture demonstration and pilot projects.
- $264 million for wind, solar, and geothermal energy projects.
- $500 million for low-income housing energy assistance.
- $216 million for tribal climate resilience.

The Jobs Act includes $10 million to study increasing coordination of the operations of hydroelectric and water storage facilities on rivers located in the United States and Canada. The study will consider changes in electricity supply; potential reductions in greenhouse gas emissions, potential need of increased transmission capacity; and other factors for increasing bilateral coordination. A related section established an account in the Treasury "for activities to improve electric power system coordination by constructing electric power transmission facilities within the western United States that directly or indirectly facilitate non-carbon emitting electric power transactions between the western United States and Canada." The amount in the fund will be based on the five-year total of the Canadian Entitlement prior to the enactment of the Act.

The Biden Administration has also proposed approximately $550 billion in investment to accelerate a clean energy transformation in the Build Back Better legislation. It includes building electric infrastructure and efforts to support renewable energy. The bill calls for a million new affordable, energy-efficient housing units and making existing structures more energy efficient. Hundreds of billions of dollars would go toward green energy industries of the future, such as advanced battery manufacturing.

As mentioned, congressmen Simpson and Blumenauer are working on an initiative to help endangered salmon recover by breaching the four dams along the Lower Snake River and funding other restoration efforts. The initiative includes significant funds to replace the electricity the dams generate with renewable resources and energy efficiency, mitigate for the effects of dam removal, and address the needs of farmers and ranchers and local communities that depend on the current operation of the dams.

2.2.2. Coal Plants Are Phasing Out

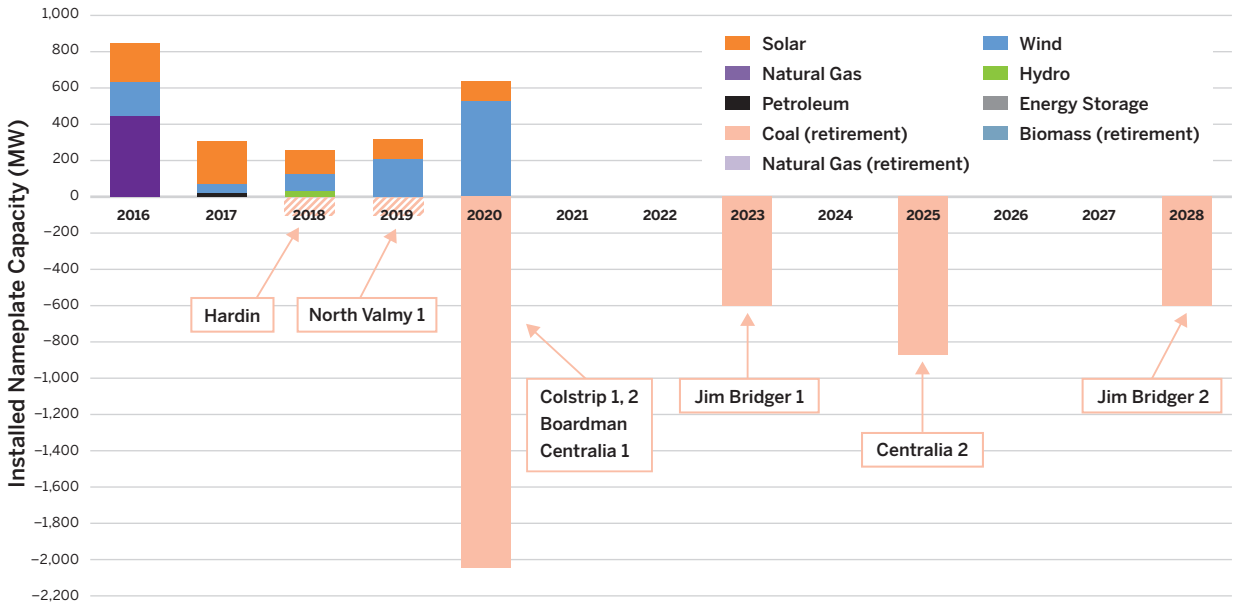
One of the results of state and federal policies has been a significant reduction in the number of coal plants serving the Pacific Northwest—the current and estimated total retirements between 2018 and 2028 is 6,184 MW (roughly the amount of power needed to serve five Seattle-sized cities). **FIGURE 3** is from the NPCC Project Database. PacifiCorp in its 2021 Integrated Resource Plan workshops stated that it plans to retire Colstrip 3 & 4 in 2025[23] and Jim Bridger 3 & 4 by 2037[24]; these four plants total 2,700 MW of capacity. To put this in perspective, there have only been a few years with minor resource reductions over the past 25 years.[25] This Energy Vision seeks to assure that these plant reductions will be served without putting more burden on the Columbia River and its fish and wildlife resources.

[23] December 2020 and August 27, 2021 workshops.

[24] July workshop.

[25] See https://www.nwcouncil.org/energy/energy-topics/power-supply

FIGURE 3. Generating Capacity Additions and Retirements Since the Seventh Power Plan (including Announced Planned Retirements)



2.2.3. Electricity Resource Adequacy Issues

Power blackouts in Texas and California have increased public concern about adequate electricity supplies. Electricity is an essential service and disruptions can threaten life and safety.

The problems in Texas were the result of extreme low temperatures and a power system that did not require utilities to weatherize their power plants or have adequate power reserves. The shortages affected 4 million households in February 2021.[26] Some Texas politicians tried to shift the blame to renewable resources—but the facts showed that the Texas renewable resources produced more energy than was projected during the cold snap.

California's blackouts during August of 2020 were much smaller, but closer to the Pacific Northwest and occurred in a power grid that is connected to the Columbia Basin. The California Public Utilities Commission and Independent System Operator are working to address outdated forecasts and planning targets that created these outages.[27]

The NPCC monitors the adequacy of electricity supplies to meet loads and calculates a "loss of load probability" (LOLP). The current Northwest standard calls for the power supply to have sufficient resources (both generating and energy efficiency) to limit the likelihood of a shortfall to no more than five percent.[28] In recent years, the NPCC analysis has shown LOLP in the 7 percent range.

The NPCC's draft 8th Power Plan finds few adequacy issues in the short term and more uncertainty later:

> *The strategy in the Draft 2021 [8th] Power Plan shows that the regional power supply will be adequate in the near term. In later years, with the retirement of more fossil-fuel burning generators, adequacy takes a more prominent role in the regional strategy, especially under certain policy scenarios that increase regional demand (e.g., decarbonization policies). For the plan analyses, the Council used climate-change projections for temperature and precipitation rather than historical climate data, and this tended to shift resource adequacy needs from winter to summer—more precipitation and lower temperatures in winter, less precipitation and higher temperatures in summer.*

The NPCC found that in the near term, electricity supplies would be adequate if utilities committed to running their thermal resources, regardless of the market price. Without such a commitment, some thermal resources might not be available because they are much more expensive than renewable resources.

By 2025, the NPCC studies show:

> *...that **off-peak** market prices rise sufficiently high (due to load growth and other factors) to prompt more regional thermal units to commit. Thus, even with the announced retirement of the Jim Bridger 1 coal plant (530-megawatts) by the end of 2023, the resulting LOLP for 2025 is zero.*[29]

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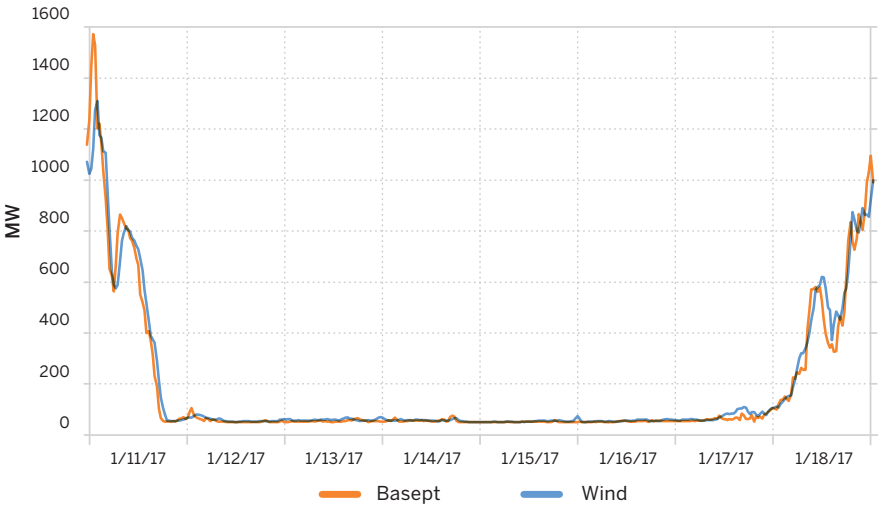
[26] *Tale of Two Grids*, see https://www.nrdc.org/experts/ralph-cavanagh/tale-two-grids-texas-and-california

[27] See Resource Adequacy Recommendations in SECTION 3.

[28] The five percent standard does not mean that there is a less than five percent change of a shortfall in a given year, rather it means that after modeling thousands of permutations of potential future conditions (*e.g.*, load forecast, weather profile, hydro conditions, etc.) it found a resource shortfall in less than five percent of those model runs.

[29] https://www.nwcouncil.org/2021powerplan_resource-adequacy-assessment

FIGURE 4. BPA Balancing Authority Total Wind Generation, Wind Basepoint, and Oversupply Mitigation (January 11–18, 2017)



Based on 30-minute readings from the BPA SCADA system for points 79687, 103349, 114476. Balancing Authority Wind Generation in Orange, Wind Basepoint in Blue. Data provided by BPA Technical Operations (TOT-OpInfo@bpa.gov).

Several studies on resource adequacy in the Northwest have raised near-term concerns. A paper by Randy Hardy and Larry Kitchen and a study by E3 describe the retirement of the coal plants that serve the region and the effects on meeting peak energy demands, especially if there is a low-water year combined with a cold snap.[30]

More recently, utilities have raised questions about the NPCC's analysis. One of the biggest issues appears to be how much can the region depend on renewable resources imported from California and the Southwest. The California Public Utilities Commission has called on utilities to acquire 11,000 megawatts of renewable resources; however, some of this power will be used to charge batteries to meet peak loads so the net addition that might be available in the Northwest is not clear. Over-reliance on California imports were a precipitating factor for the 2001 West Coast energy crisis.

Maintaining the reliability of the Northwest electricity systems will become more complex as coal and natural gas-fired power plants phase out and renewable resources play a large role. **FIGURE 4** shows wind production in the BPA service area during an extended cold spell in mid-January of 2017. Despite nearly zero wind production in the Northwest, demand was met through hydro and thermal generation. If thermal generation is removed, load goes up due to electrification of the economy and a low water year occurs, meeting demand will be a real challenge for the Northwest. Further stressing the Columbia River's ecosystems to meet this type of demand is not acceptable. Rather the Northwest Power Pool is developing a Resource Adequacy Program to address these issues and should assure resource adequacy without placing risk on the river's fish and wildlife resources. Please see the CRITFC resource adequacy recommendations in SECTION 3.

[30] Hardy and Kitchen, *Future Northwest Capacity Shortages, July 17, 2019*.

2.2.4. Significant Increases in Solar and Wind Energy

The costs of wind and solar generation have declined significantly in comparison with other new generating resources. **TABLE 1** shows costs from the Energy Information Agency *2021 Annual Energy Outlook*.

WIND ENERGY

Over the past twenty years Northwest wind energy has grown from 110 MW to 9,417 MW—about 15 percent of the region's total capacity. On an annual basis, wind power is supplying 2,978 average megawatts of power for the region—about 9 percent of the total.

TABLE 1. Estimated Unweighted Levelized Cost of Electricity (LCOE) and Levelized Cost of Storage (LCOS) for New Resources Entering Service in 2026 (2020 dollars per megawatthour)

Plant type	Capacity factor (percent)	Levelized capital cost	Levelized fixed O&M[i]	Levelized variable cost	Levelized transmis-sion cost	Total system LCOE or LCOS	Levelized tax credit[ii]	Total LCOE or LCOS including tax credit
Dispatchable technologies								
Ultra-supercritical coal	85%	$43.80	$5.48	$22.48	$1.03	$72.78	NA	$72.78
Combined cycle	87%	$7.78	$1.61	$26.68	$1.04	$37.11	NA	$37.11
Combustion turbine	10%	$45.41	$8.03	$44.13	$9.05	$106.62	NA	$106.62
Advanced nuclear	90%	$50.51	$15.51	$9.87	$0.99	$76.88	–$6.29	$70.59
Geothermal	90%	$19.03	$14.92	$1.17	$1.28	$36.40	–$1.90	$34.49
Biomass	83%	$34.96	$17.38	$35.78	$1.09	$89.21	NA	$89.21
Battery storage	10%	$57.98	$28.48	$23.85	$9.53	$119.84	NA	$119.84
Non-dispatchable technologies								
Wind, onshore	41%	$27.01	$7.47	$0.00	$2.44	$36.93	NA	$36.93
Wind, offshore	44%	$89.20	$28.96	$0.00	$2.35	$120.52	NA	$120.52
Solar, standalone[iii]	29%	$23.52	$6.07	$0.00	$3.19	$32.78	–$2.35	$30.43
Solar, hybrid[iii, iv]	28%	$31.13	$13.25	$0.00	$3.29	$47.67	–$3.11	$44.56
Hydroelectric[iv]	55%	$38.62	$11.23	$3.58	$1.84	$55.26	NA	$55.26

Source: U.S. Energy Information Administration, Annual Energy Outlook 2021

[i] O&M = operations and maintenance

[ii] The tax credit component is based on targeted federal tax credits such as the production tax credit (PTC) or investment tax credit (ITC) available for some technologies. It reflects tax credits available only for plants entering service in 2026 and the substantial phaseout of both the PTC and ITC as scheduled under current law. Technologies not eligible for PTC or ITC are indicated as NA, or not available. The results are based on a regional model, and state or local incentives are not included in LCOE and LCOS calculations.

[iii] Technology is assumed to be photovoltaic (PV) with single-axis tracking. The solar hybrid system is a single-axis PV system coupled with a four-hour battery storage system. Costs are expressed in terms of net AC (alternating current) power available to the grid for the installed capacity.

[iv] As modeled, EIA assumes that hydroelectric and hybrid solar PV generating assets have seasonal and diurnal storage, respectively, so that they can be dispatched within a season or a day, but overall operation is limited by resource availability by site and season for hydroelectric and by daytime for hybrid solar PV.

SOLAR ENERGY

Utility scale solar projects have grown from 9 MW in 2013 to 649 MW in 2019. These solar plants represent 1 percent of the installed capacity of the region's energy system. These plants provided 132 average megawatts of electricity in 2018.

FIGURE 5 was developed by the Council and shows wind and solar additions between 1998 and 2020.

The Council projects a significant increase in the future. **FIGURE 6** shows the additional renewable resources that would be built under the Council's assumed baseline conditions. It shows that

FIGURE 5. Regional Wind and Solar Brought Online

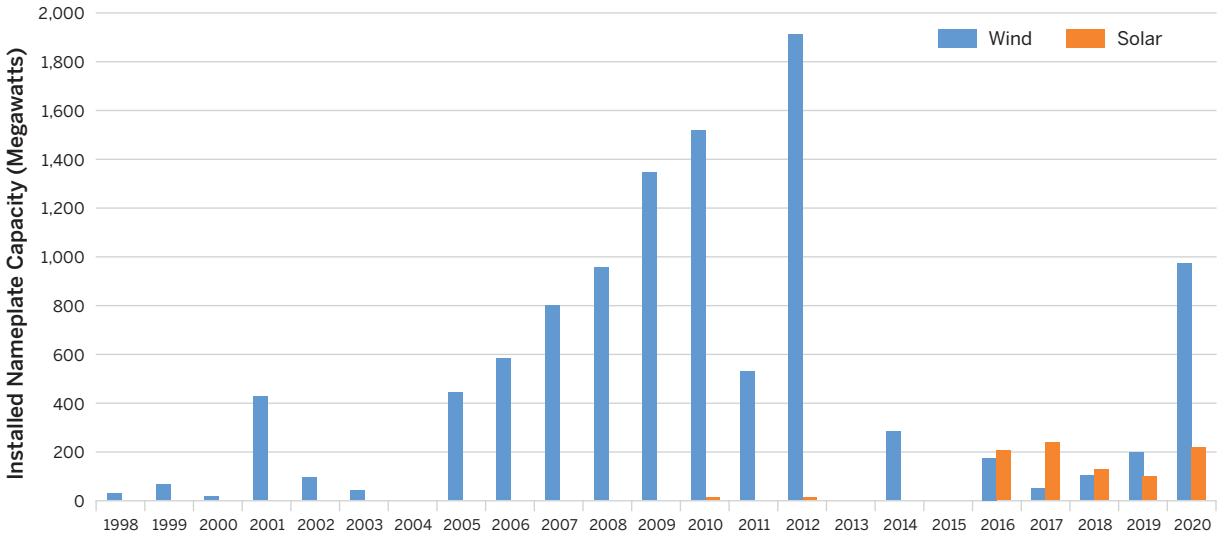
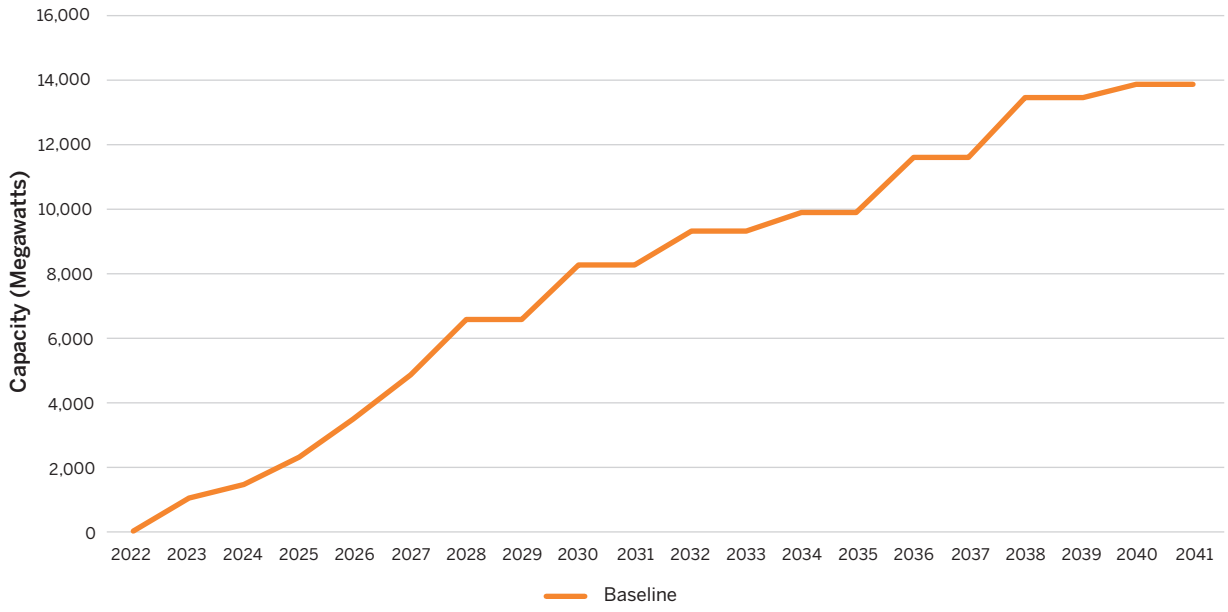


FIGURE 6. Forecast of Renewable Build



solar and wind projects could add approximately 5,000 megawatts of capacity in the northwest by 2027, growing to 14,000 megawatts by 2041.[31] The Council's draft 8th Power Plan recommends that 3,500 megawatts of these resources be built by 2027.

This growth is not unique to the Northwest. Solar and wind plants in the western energy system are also projected to increase dramatically. **FIGURE 7** is a projection by the Western Energy Coordinating Council (WECC).[32] It shows solar utility and wind projects will increase by 200,000 MW by 2028. Utility solar projects are projected to grow to 150,000 megawatts of installed capacity. Solar systems with batteries will add an additional 200,000 megawatts by 2045. It also shows wind projects increasing to 50,000 megawatts by 2045—for a total new renewable resource capacity of approximately 400,000 megawatts. The WECC projections would mean a dramatic increase. For comparison, the current energy capacity of the WECC is 276,000 megawatts from all sources; this total includes 29,000 megawatts of wind and 23,000 megawatts of solar.

A major reason for this renewable energy growth is that the costs of solar and wind energy sources have decreased significantly over the past ten years, not simply regulatory policies. The Lazard investment bank publishes a yearly summary of generation costs. Their summary uses actual transaction data—not

[31] Northwest Power and Conservation Council presentation, May 2021.

[32] The WECC is comprised of 14 western states, two Canadian provinces, and northern Baja Mexico.

FIGURE 7. WECC Buildout of Solar and Wind Plants in the Western Energy System

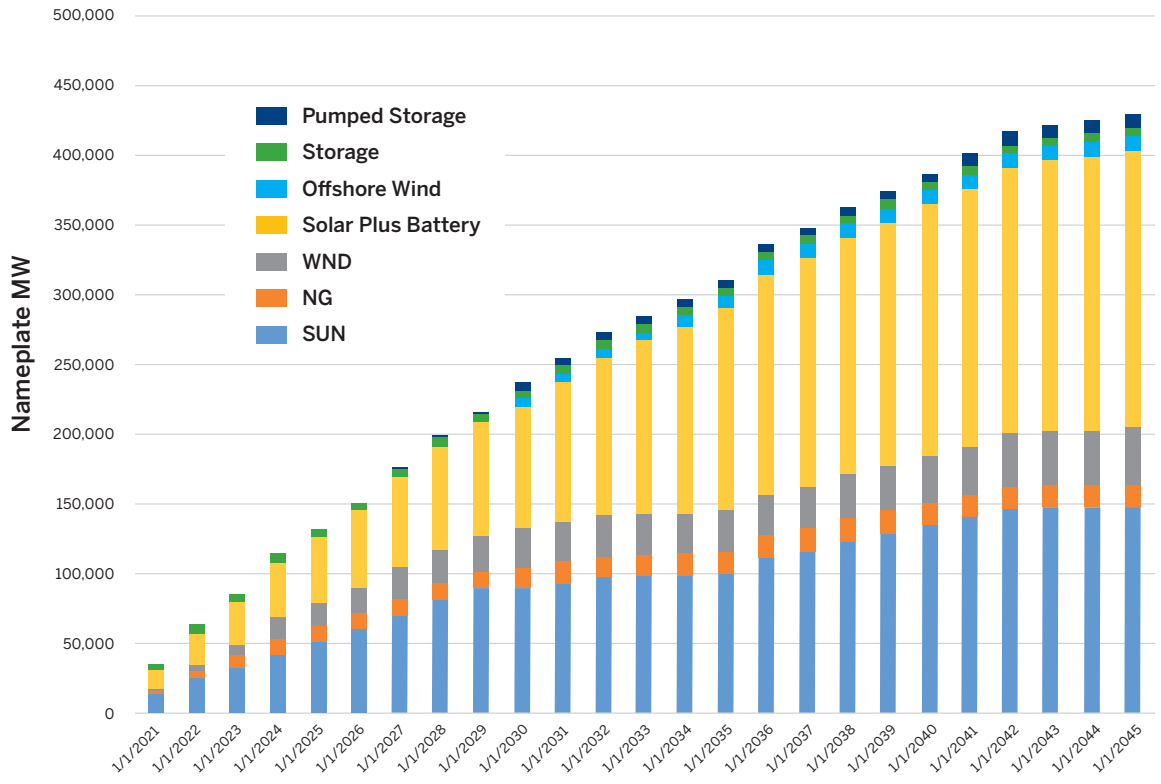
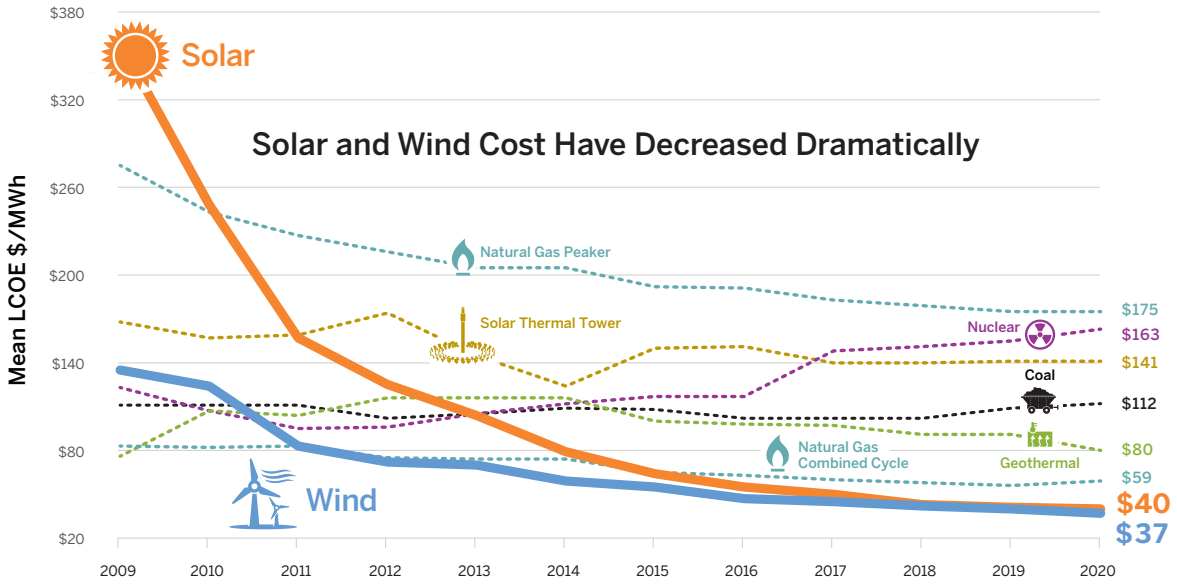


FIGURE 8. Yearly Summary of Solar and Wind Generation Costs



Source: Lazard's Levelized Cost of Energy Analysis—Version 14.0

estimates—and is commonly viewed as authoritative. The most recent chart **(FIGURE 8)** and shows costs per megawatt hour ($/MWh). The bold orange arrow shows the evolution of solar costs; the purple arrow shows wind costs.[33]

The Council has found that the costs of residential solar systems have also declined significantly and projects that these costs will continue to decrease by 7% per year. The Council's draft 8th Power Plan projects 1,513 megawatts of capacity by 2039 and 7,019 megawatts by 2045. These systems will supply electricity directly to the homes and business to meet their needs. This will decrease the demand for electricity from central station power plants. Any surplus power from these residential and commercial solar systems is sold to the local utility. The Council forecast is shown in **FIGURE 9**.

Offshore wind energy is another renewable resource that will be coming online in the Northwest in the next 10 years. The state of Oregon and the Bureau of Ocean Energy Management (BOEM) committed to offshore wind energy planning in June of 2020.[34] In March 2021, the Department of Interior and the Department of Energy and Commerce committed to establishing 30 gigawatts of offshore wind energy by 2030, and in May, the Biden Administration announced that it will focus on the first U.S. commercial-scale wind projects off the Pacific Coast.[35] California's offshore wind energy development is expected to bring in up to 4.6 gigawatts of clean energy to the grid over the next decade, enough to power 1.6 million homes.[36]

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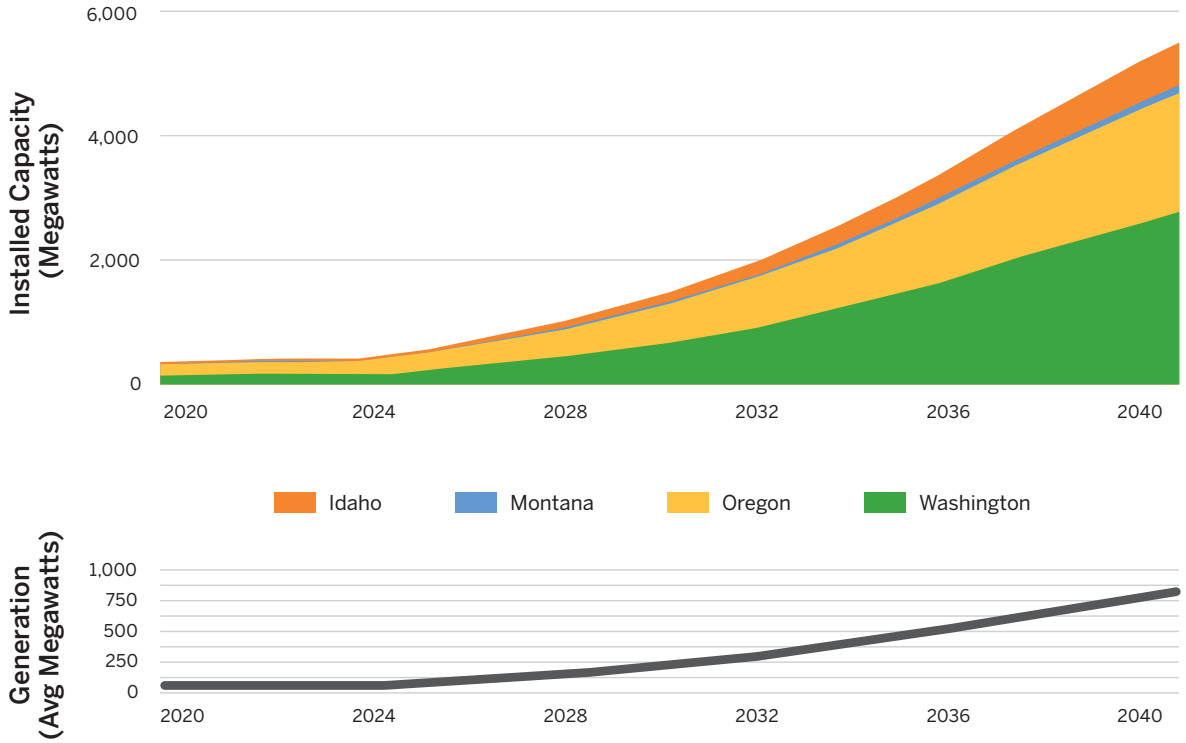
[33] Lazard's Levelized Cost of Energy Analysis—Version 14.0", Lazard Bank, October 2020, page 8. Emphasis supplied by McCullough Research."

[34] https://dailyyonder.com/from-extraction-to-sustainability-oregons-southern-coast-and-the-emerging-blue-economy/2021/09/13/

[35] https://www.northcoastjournal.com/NewsBlog/archives/2021/08/11/offshore-wind-energy-offers-tremendous-promise

[36] *Id*.

FIGURE 9. Forecast of Behind-the-Meter Solar Installed Capacity and Generation by State[37]



The impacts of integrating offshore wind energy with Columbia River hydropower are yet to be determined. The BOEM touts offshore wind as an abundant domestic energy resource and indicates that offshore winds tend to blow harder and more uniformly than on land.[38] Concerns with offshore wind development include effects on ocean fisheries, the unknown impacts to marine life and ecosystems from the existence of offshore wind turbines, and the disruption to the seabed from burying of transmission lines. The Confederated Tribes of the Coos, Lower Umpqua and Siuslaw have urged a careful approach in addressing these issues.[39]

2.2.5. Energy Efficiency Has Improved

Since 1978, energy efficiency has saved more than 7,200 average megawatts in the Pacific Northwest. That is half the region's growth in demand for electricity, or enough power for six cities the size of Seattle. These efficiency improvements have saved Northwest consumers over $70 billion dollars and the savings are growing at $5 billion per year. These programs have also reduced greenhouse gas emissions by more than 240 million metric tons.

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[37] Draft 2021 Power Plan page 3–20.

[38] https://www.boem.gov/renewable-energy/renewable-energy-program-overview

[39] https://dailyyonder.com/from-extraction-to-sustainability-oregons-southern-coast-and-the-emerging-blue-economy/2021/09/13/.

Energy Efficiency reduces peak loads.[40] The Northwest Power and Conservation Council's Regional Technical Forum estimates that from 2013 through 2019 the region has saved 1,770 average megawatts of energy through its conservation programs. These savings reduced winter peak demand by slightly more than 3,200 megawatts and just over 2,000 megawatts of summer peak demand.

2.2.6. Major Changes in the West Coast Energy Market Must Be Implemented in a Way That Helps Salmon and Steelhead

The hydroelectric system in the Northwest is currently used to help integrate intermittent wind and solar energy. As West Coast solar power grows, some energy planners assume that the Columbia River dams will help store some of this energy during daylight hours by reducing electricity production and keeping more water in the reservoirs for releases at other times. Under this assumption, the dams would release the water and generate more electricity when solar power is not available—this is projected to occur for a couple of hours in the morning and about four hours after the sun goes down. Salmon and steelhead bear the burden of operating the hydrosystem as a battery for integrating wind and solar energy; instead, by appropriate planning and implantation of wind and solar in conjunction with actual batteries, these burdens can be avoided.

The WECC-wide increase in renewables is changing historical patterns of market prices. In the past, electricity prices were higher in the summer due to high air conditioning loads across California and the southwest and lower prices occurred in the winter due to excess capacity in California and the southwest. California solar development is now depressing summer wholesale market values during daylight hours. These conditions are expected to continue as California and the Southwest develop more solar to reduce greenhouse gases and meet renewable resources standards without the ability to store excess generation.

Preliminary analysis for next Council Power Plan indicates that wholesale market prices are forecast to be low in the winter and spring, reflecting the impact of the Northwest's reliance on hydropower and increased renewables throughout the west. In prior years with a larger water run-off, the Northwest even experienced short periods of negative wholesale market prices during the spring when both hydropower and wind output created conditions of oversupply.

In the future, longer and more frequent periods of negative wholesale market prices are forecasted for not only the spring, but many hours during the winter, spring and fall seasons. The summer month prices are expected to be comparatively higher, especially during the evening hours when the sun goes down and solar generation drops to zero. But even summer prices become lower over time on an average basis because the low midday prices decrease as more solar generation is added throughout the west.

[40] Fish managers are under constant pressure by dam operators to allow turbine operations outside of peak efficiency to meet short term power system needs due to unexpected curtailment in other generating resources, weather conditions causing peak energy demand and other factors. Proactively addressing these power system demands through conservation measures, rather than excursions from hydro operating criteria is sound environmental and economic policy.

3 Recommendations

Recommendations of the 2022 Energy Vision for the Columbia River Basin

The Northwest needs to take bold action to achieve the Energy Vision for the Columbia River Basin. The recommendations in this section are intended to put the region on a path toward affordable, carbon-free energy that harmonizes with the ecosystem. These recommendations prioritize energy efficiency, renewable resources, new storage technologies, reductions in peak loads, and other strategies that are compatible with the needs of fish and wildlife. These actions would reduce the impacts of renewable resource projects and transmission lines on tribal resources and save consumers money.

These actions will move the region in the direction of addressing the climate crisis and transitioning the electricity system to be compatible with healthy and harvestable salmon populations and to be less damaging to other tribal resources.

3.1
River Restoration and Improved Dam Configurations and Operations

As Congress acknowledged in 1980, the survival of the Basin's salmon is substantially dependent on the environmental conditions resulting from hydroelectric system operations in the Columbia Basin. The federal and non-federal hydro projects in the Basin have continually adapted their configuration and operations to improve the survival of affected fish and wildlife populations. However, the current anadromous fish resources in the Basin are imperiled with a very uncertain future. Future physical and operational hydro project adaptations are continually being considered by tribal, state, and federal sovereigns.

RECOMMENDATION 1

The region should prepare to implement river restoration, and dam configurations and operations that are compatible with, and support healthy, harvestable fish populations, as detailed in this section and APPENDIX C. These recommendations include breaching the four lower Snake River dams, spill operations at run of river dams, flow related operations at storage dams, structural modifications to aid salmon and lamprey passage, needed maintenance, flood control studies, actions to improve water temperatures, and capability for lower Snake River dam breaching.

- Near-term operations characterized by maximized spill during the spring, moderate spill during the summer, and low-level spill during the fall and winter at lower Snake and lower Columbia projects.
- Long-term operations characterized by breached lower Snake projects, and maximized spill during the spring, moderate spill during the summer, and low-level spill during the fall and winter at lower Columbia projects.
- Management of reservoir pools at their minimum elevations (MOP) during spring and summer periods.
- Minimization and/or elimination of within day load following (power peaking), including elimination of extreme zero-flow (zero generation) operations.

- Seasonally manage/shape flows in ways the reflect natural hydrograph patterns and processes.
- Maintain and improve existing fish passage facilities at the federal Columbia and Snake River dams.
- Allow for fish-based Total Dissolved Gas (TDG) waivers year-round.
- Move the Corps of Engineers' annual systemwide "Control flow" for the Columbia River at The Dalles to 450,000 cfs (bankfull) and gradually ramp up to 550,000 cfs (flood-flow).
- Secure three to five million acre-feet of storage in Canadian Columbia Basin reservoirs to be used for salmon migration support.
- Implement ecological rule curves that store additional water in the upper reservoirs (primarily at Grand Coulee) to preserve adequate flows for migrating juveniles and adults during the spring and summer months.
- Improve adult and juvenile passage for Pacific Lamprey at the dams.
- Develop a long- and/or short-term sediment budget model throughout the Columbia River Basin with specific focus on the Cold-Water Refuges (CWR) along the river.
- Maintain energy reserves to meet fish and wildlife obligations. Increasing planning reserve margins, reducing peak loads, storage, demand response, and increasing energy efficiency and renewable resource development will all help reduce risks to fish and wildlife and the region's economy during low-water years.
- Implement EPA's 2021 TMDL for Temperature in the Columbia and Lower Snake Rivers.

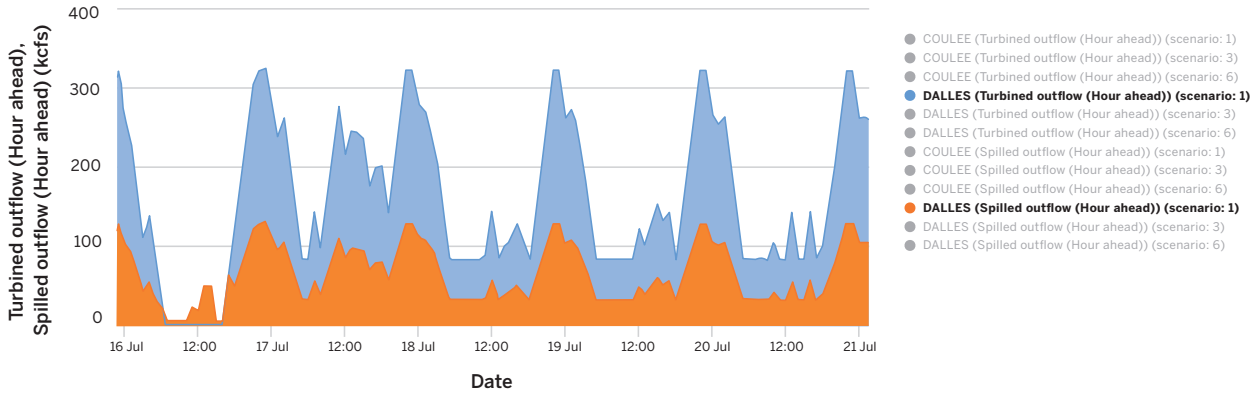
Because the future is inherently unknowable, energy planners long ago built a range of potential futures into their planning, including variations in energy demand, climate, and new energy resource development. But this planning has not assumed future variations in planned hydro system configurations and operations needed for fish survival. There is no legal requirement for this practice. Since the current status of salmon and steelhead populations are still not improving, it is certain that additional constraints will be sought by sovereigns and others.[41] Energy and related planning should anticipate a range of potential biological conditions and needed environmental actions and operations over time to improve anadromous fish survivals.

Energy planners often refer to fish operations as "constraints" and have assumed that in the absence of a defined fish operation, the energy system and hydro operations will be unconstrained for anadromous fish needs and optimized for power production. This can lead to aberrant circumstances unlikely to be tolerated by environmental managers. For example, a sampling of current GENESYS modeling analysis for a one-week period in July 2031 **(FIGURE 10)**, indicates that Columbia River flows below The Dalles Dam could approach zero kcfs during daylight hours, presumably due to the amount of solar energy produced at that time.

Compared to current conditions, this drastic operational change would have implications for water temperature increases, delayed salmon

[41] On October 21, 2021, the United States, plaintiffs and aligned amicus in *NWF v. NMFS* filed an Unopposed Motion to Stay Litigation with a short-term agreement for operations of the Columbia River System. The agreement includes planned Spring fish passage spill operations for 2022, planned Fall/Winter Spill Operations, reservoir operations and other matters.

FIGURE 10. Sampling of Current GENESYS Modeling Analysis for a One-Week Period in July 2031



migrations, treaty fisheries and spill operations at other lower Columbia River dams, such as Bonneville Dam where spill is managed to set flow levels.[42] Such operations are highly unlikely to be tolerated.[43]

Given the imperiled condition of fish stocks impacted by Federal Columbia River Power System (FCRPS) dams and other important non-federal dams in the Basin, it is prudent to assume variations in hydro configuration and operation due to modified fish constraints going forward. The following sections describe actions that may be needed to sustain these species.

3.1.1. Actions for the Columbia River System

MAINSTEM SNAKE AND COLUMBIA RIVER DAM OPERATIONS

RECOMMENDATION 1.1:

Increase hours of expanded spill.

Near-term operations should be characterized by maximized spill during the spring, moderate spill during the summer, and low-level spill during the fall and winter at lower Snake and lower Columbia projects. Long-term operations should be characterized by breached lower Snake projects, and maximized spill during the spring, moderate spill during the summer, and low-level spill during the fall and winter at lower Columbia projects. Future spill management

[42] The U.S. Environmental Protection Agency's comments on the draft Energy Vision emphasized that Columbia River warming water temperatures have prompted EPA to issue TMDL limitations for hydro system operations. Changes in operations that would increase water temperatures, such as lower flows during summer daylight hours, would run counter to the policies of the Clean Water Act.

[43] Fishery managers have been calling for higher flows in the spring and summer to help young salmon migrate from their natal streams to the ocean for more than forty years. Imagine the challenges to a juvenile salmon trying to migrate down the Snake and Columbia if the rivers only flow for a few hours in the morning and evening while the rest of the day the river slows to store energy from solar projects. Rapid increases and decreases in flow have also been shown to stop or delay adult fish migration. The changes in flow projected in the Council analysis could make these migration problems much worse in future years.

should include minimum volumetric spill levels developed for each dam to address threats of zero flow operations and large swings in power peaking that is being predicated for future hydro operations.

RECOMMENDATION 1.2:
Allow for increased total dissolved gas waivers year-round.

To support the Flex Spill Operations Agreement, the states removed the forebay TDG limit for spring 2019 operations, allowing operations to be curtailed only by the 120% TDG tailrace limit.[44] For 2020, the states raised the tailrace limits to 125% TDG for the spring passage season, allowing for even more spill at each dam.[45] These increases in TDG waivers should be enacted year-round and allowed for purposes other than fish passage to allow for more flexibility in water management and flood control operations.

RECOMMENDATION 1.3:
Reduce power peaking.

Reduce Power Peaking at passage dams during emergence and migration periods to reduce stranding of fry and smolts. This operation is currently implemented below Priest Rapids Dam with tremendous success for the Hanford Reach Fall chinook population. Power peaking can also cause temporary disturbance or oscillation in the water level that can confuse downstream and upstream migrants and increase travel time.

RECOMMENDATION 1.4:
Prohibit periods of zero flow.

Periods of very low or zero flow are currently allowed and are not based on biological triggers, such as the number of fish present in the river. Zero flows should only be allowed when biological triggers have been met to ensure there is little to no risk to migrants. Constraints need to be integrated into the power operations to maintain minimum levels of flow when fish are present in the system.

RECOMMENDATION 1.5: Expand and modify periods of spill for adult passage.

Increase periods of planned spill during fall, winter, and early spring seasons to aid adult salmon and steelhead overshoots, as well as to aid kelt migration during the early spring prior to the initiation of the spill season.

[44] For a more detailed explanation, see the Corps of Engineers' Fish Operation Plan for 2019 at 2, available at http://pweb.crohms.org/tmt/documents/fpp/2019/final/FPP19_AppE.pdf.

[45] See http://pweb.crohms.org/tmt/documents/fpp/2020/final/FPP20_AppE_FOP.pdf for more details.

OTHER HYDRO-ACTIONS TO IMPROVE SALMONID SURVIVAL

RECOMMENDATION 1.6: Implement structural modifications at Grand Coulee to allow drum gate maintenance to occur regardless of flow year and reduce the required draft to perform the work.

This draft can have large impacts in early spring flows or put the region in the position to have to choose between spring and summer flows since it may preclude providing adequate flow during both time periods.

RECOMMENDATION 1.7: Operate Dworshak Dam on the North Fork Clearwater River to better mimic the spring freshet.

Current flood control drafts occur early in the winter when there is little information on what type of flow year will be realized. This can easily lead to excessive deep drafts that make it challenging to achieve refill, let alone provide spring flow augmentation.

RECOMMENDATION 1.8: Install additional turbines at key projects.

Install additional turbines at projects such as Libby and Dworshak to allow for more flexibility in moving water and reduce the risk of over drafting due to project limitations. This would allow the operators more time before selecting target elevations. This would allow for more climatological data to be considered to ensure that optimum reservoir operations are realized.

RECOMMENDATION 1.9: Implement EPA's 2021 TMDL for temperature in the Columbia and Lower Snake Rivers.

EPA's TMDL identified that the Federal Columbia River Power System is a primary source of thermal impairment. Dam impoundments have significantly contributed to warming of the Columbia and Snake Rivers in the summer and fall due to increased river surface area and increased time for water to travel through the reservoirs that result in increased heat inputs. Significant changes to dam operations to limit thermal impairments are expected.

RESERVOIR OPERATIONS: STORAGE PROJECTS

RECOMMENDATION 1.10: Implement modified flood control during years with lower seasonal snowpack.

Modeling has shown that modified flood control is important during low snow years when flood control is not as much an issue, but spring/summer flows are at risk from diminished runoff. During years of high snowpack, there is generally sufficient water for spring/summer migrations, but a higher flood risk that must be controlled by releasing more water during the winter. Modifying flows in low flow years allows more water to be shifted into the spring and summer and supports juvenile migration with shorter downstream travel times. A more natural or "normative" hydrograph that is more in tune with the salmon's life cycle and accommodates the coming changes to basin hydrology due to future climate change impacts. Such a change in lower Columbia River flood risk exceedance may slightly raise flood risk while still providing reasonable flood control protection at levels far below those envisioned by our Canadian neighbors who operate 40% of the water storage in the Columbia Basin.

RESERVOIR OPERATIONS: RUN OF RIVER PROJECTS

RECOMMENDATION 1.11: Operate at minimum operating pool.

Ensure that projects are operated at Minimum Operating Pool (MOP) throughout the migration season to reduce pool volumes and decrease water particle travel time which aids in decreasing migration time. A lower pool elevation creates more flow and more closely resembles a river environment.

FISH PASSAGE IMPROVEMENTS AND MAINTENANCE AT FEDERAL COLUMBIA AND SNAKE RIVER DAMS

RECOMMENDATION 1.12: Maintain and improve the existing fish passage facilities at the federal Columbia and Snake River Dams.

The Corps of Engineers recognized the need for $42 million of capability related to capital improvement needs in 2022 for fishways at the eight mainstem Columbia and Snake River dams (see also APPENDIX C).[46] However, the president's budget allocated only $3.5 million total for Corps' FY2022 capability for the Columbia and Snake River. This is the lowest amount ever requested by a president for the Corps' Columbia River Fish Mitigation program over the past 30 years. Moreover, the Corps' operations and maintenance budget for these fishways that are funded by a complex arrangement between the Corps and BPA have remained unadjusted for inflation.

The Corps' Columbia River Fish Mitigation program, its Fish Passage Operations and Maintenance program, Lamprey passage and Estuary habitat actions are guided by advice from state, tribal and federal experts operating through the following committees organized by the Corps' Northwestern Division:

- System Configuration Team (SCT)—Prioritizes capital expenditures from within the CRFM program.
- Fish Passage Operations and Maintenance committee (FPOM)—Identifies and prioritizes operations and maintenance needs at all Columbia River System projects.
- Lamprey Technical Workgroup—This workgroup has developed near term and long term for juvenile and adult lamprey passage needs at the mainstem dams.
- Expert Regional Technical Group (ERTG) Process for Columbia River Estuary Habitat—Developed evaluation criteria for funding habitat improvements in the Columbia River Estuary.

The hydropower dams require significant investment to maintain operations and functions. For some reason, the dam operators understand the need to maintain turbine maintenance and replacement yet forgo mandatory maintenance and upgrades to fishways. The annual costs to maintain the fish passage system through the CRSO as identified through these expert sources and spread over eight years, from 2023 through 2031, totals about $90 million per year.

[46] The eight dams are: Lower Granite, Little Goose, Lower Monumental, Ice Harbor, McNary John Day, The Dalles and Bonneville.

Specific actions are detailed in the following TABLE 2.

TABLE 2. Eight-Year Total Costs for Fishway Improvements, Operations and Maintenance and Related Fish Impacts Mitigation (Millions $)

Fish ladder repairs and improvements	$ 160,365
Spillway repairs and improvements	176,250
Lamprey passage	165,145
River mouth sediment and cold water refugia actions	12,000
Fish screen and juvenile bypass screen maintenance	132,785
Survival & Monitoring Studies (spill operations and turbine improvements)	50,550
Avian predation deterrents	31,200
Estuary work	6,500
Total (8-year planning budget)	**$ 734,795**

In contrast to these needs, funding for these programs has declined and is uncertain going forward. At the same time the cost of labor and materials such as aluminum and steel continue to rise. Running these dams harder for energy production while reducing fish maintenance needs is not consistent with the parity provisions of the Northwest Power Act.

3.1.2. Snake River Dam Breaching

RECOMMENDATION 1.13: Restore the Lower Snake River to a climate resilient, free-flowing river by breaching the four lower Snake River dams.

The Columbia Basin Tribes, as salmon people, have suffered tremendously from the construction and operation of dams in the Columbia River. As dams were planned and then constructed, the tribal voice of opposition was disregarded or ignored. The Tribes were told that their lost fish and fishing sites would be replaced; something that has never occurred. The Columbia's dams were literally built on the backs of salmon and tribal culture.

The Snake River Basin, because it is the largest source of spring Chinook, steelhead, and historically, fall Chinook that travel through the Tribes' treaty fishing areas on the mainstem Columbia River, has been of special significance to the CRITFC Tribes. The Snake River's four lower mainstem dams have been especially harmful in the demise of this large, productive basin's wild spawning salmon and steelhead resources. The General Council of the Umatilla Tribe and the Nez Perce Tribal Executive Committee, with responsibilities for aboriginal lands and fish resources in tributaries of the Snake River, have adopted resolutions supporting removal of the Snake River dams—the Umatilla General Council in 2021[47], and the Nez Perce in 1999.[48] In recent years, the Tribes' understanding of the permanent damage caused

[47] Umatilla General Council Resolution 21-002

[48] NPTEC Resolution NP 99-140

by these dams has received more acceptance and attention.

In March 2020, the State of Washington released, its *Lower Snake River (LSR) Dams Stakeholder Engagement Report.* The intent of the report was to capture Washington perspectives on the potential positive and negative impacts (social, economic, and environmental), as well as opportunities gained and lost, of either retaining the dams or breaching them. Section 5 in the report addressed the potential energy consequences of removing the dams and identified several questions to address in assuring that Washington state can meet its energy needs with a decarbonized power generation system as the population grows, the climate changes, and without the power from the lower Snake River dams.[49]

In the Spring of 2021, both the Affiliated Tribes of Northwest Indians and the National Congress of American Indians passed resolutions calling for bold actions to protect salmon, including restoring the lower Snake River by breaching the four lower Snake River dams.[50]

On October 15, 2021, Washington's Governor Jay Inslee and Senator Patty Murray reported that they are exploring options to breach the lower Snake River dams and replace the benefits they provide. Recognizing "the urgency of tackling this longstanding challenge as salmon runs continue to decline," they wrote, their recommendations will be finished by the end of July 2022. Before that, they plan to conduct "robust outreach" to hear from communities across the Northwest, including tribes who say their fishing rights—guaranteed by treaties—are being undermined by declining salmon runs.[51]

Moreover, Congressman Mike Simpson (R-ID) posted the following observations concerning the region's energy future without the Lower Snake River dams on his congressional web page:

- **MYTH:** The power from the four LSR dams cannot be replaced.
- **FACT:** Recent advancements in energy storage will be key to replacement power. This plan invests 10 billion dollars in firm clean power replacement such as; pump, battery storage, small modular reactor, or other technologies.
- **MYTH:** Once the dams are breached, replacement power might not be online.
- **FACT:** All replacement power must be online prior to any breaching. Also, the dam infrastructure will remain in place, only the earthen berms around the dams will be removed, so if salmon do go extinct, the dams could be restarted.[52]

This unprecedented attention and the calls for breaching the Lower Snake River dams warrants planning and accommodation by the region's utilities and energy systems' analysts. Further discussion follows.

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49 https://www.governor.wa.gov/sites/default/files/Final%20Draft%20LSRD%20Report.pdf.

50 The resolutions are set forth in **APPENDIX B**.

51 The statement laid out one potential roadmap for legislation in Congress to authorize breach that involves the Water Resources Development Act. https://www.tri-cityherald.com/news/local/article255030822.html#storylink=cpy

52 https://simpson.house.gov/uploadedfiles/myth_and_facts_.pdf.

BACKGROUND ON THE FOUR LOWER SNAKE RIVER DAMS

Lower Granite, Little Goose, Lower Monumental and Ice Harbor, the four lower Snake River dams (LSRD), were constructed between 1962 and 1975. Almost immediately after construction, declines in Snake River runs of salmon and steelhead were observed. Congressional testimony of fishery experts in 1979 led to adoption of fish provisions in the Northwest Power Act. Among other things, the Northwest Power Act was intended to forestall the need to list salmon and steelhead under the Endangered Species Act. By the mid-nineties, however, Snake River sockeye, spring/summer chinook and steelhead were listed as either endangered or threatened under the ESA. As described earlier, wild spawning runs of Snake River Chinook and Steelhead are at their lowest levels in written history. In September 2020, NOAA Fisheries observed that warming Snake River water temperatures in the section of the river impounded by the LSRD pose a catastrophic threat to Snake River sockeye salmon.[53]

The LSRD produce approximately 10% of BPA's annual energy portfolio (~900aMW) and approximately 3% of the Northwest's annual energy production from all sources.[54] A portion of the LSRDs energy capability is used as reserves to ensure BPA has enough capacity to provide power reliability for utility customers. During cold snaps or during emergency situations when energy production from other forms of generation may be negligible or unavailable, the LSRD can produce 10% of BPA's total capacity for 10 hours a day over a five-day period provided there is adequate river flow.

The LSRD each have relatively little water storage and typically operate within a limited range of forebay elevations often described as "run of river". Their power output is seasonal and weather dependent. This seasonal output generally does not align with the periods when the power is needed the most. Peak seasonal output is in the spring, whereas peak demand on the federal system is likely to occur in the late summer and winter. Due to these variations, the LSRD produce about one-third of their nameplate capacity.

TABLE 3. Lower Snake River Dam Capacity Summary

	Nameplate Capacity (MW)	20-year Average Capacity Factor (%)	In-service Year
Ice Harbor	603	34%	1962
Lower Monumental	810	34%	1969
Little Goose	810	32%	1970
Lower Granite	810	32%	1975
TOTAL	**3,033**		

[53] https://www.fisheries.noaa.gov/feature-story/warming-poses-catastrophic-threat-snake-river-sockeye

[54] The total Pacific Northwest annual energy production, including energy efficiency, has exceeded 30,000 average megawatts since 2011. https://www.nwcouncil.org/sites/default/files/2021powerplan_2021-5.pdf.

STUDIES REGARDING BREACHING THE SNAKE RIVER DAMS

The federal government has considered options for breaching the four Lower Snake River dams in three environmental impact statements (EIS), including:

- The System Operation Review EIS published in 1995,[55]
- The Lower Snake River Juvenile Salmon Migration Feasibility Study and final EIS published in 2002,[56] and
- The Columbia River System Operations EIS published in 2021.

Recognizing the threats to salmon posed by warming Snake River water temperatures, the U.S. EPA conducted modeling analyses to consider the temperature effects of removing the LSRD. EPA found that:

- The free-flowing scenario results in a significantly cooler Lower Snake River by 1–2°C during the period when the Snake River currently typically exceeds 20°C (mid-July—mid September).
- The free-flowing scenario significantly reduces the number of days that exceed a daily average of 20°C.
- The cooler daily average temperatures in the summer and fall under the free-flowing scenario as noted above will result in cooler temperatures for a few migrating adult sockeye in July, for a significant number of adult steelhead in July, August, and September, and for a significant number of adult fall Chinook in August and September.

In 2018, Energy Strategies, LLC was commissioned by the Northwest Energy Coalition to conduct a study to test the technical feasibility of replacing the LSR Dams with a clean energy portfolio while ensuring the reliability, stability, and adequacy of the Northwest power system. The study utilized a suite of analytical tools familiar to energy planners in the Northwest, such as the GENESYS model that is relied upon by the Northwest Power and Conservation Council in developing its Power Plans.[57] The goal of the Energy Strategies, LLC study was to facilitate understanding around the technical feasibility of the replacement portfolios and to provide information surrounding their relative costs and potential impacts to greenhouse gas emissions in the region.[58]

The Energy Strategies, LLC study also used the Northwest Power and Conservation Council's 7th Power Plan and its Regional Portfolio Model data as the primary sources for determining the levels of energy efficiency, demand response and resource costs available to replace the LSR Dams. Key findings from the report included:

1. Dam replacement using clean resources is achievable from both a technical planning regional reliability/adequacy standpoint and from a resource availability standpoint.

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[55] https://www.bpa.gov/efw/Analysis/NEPADocuments/nepa/System_Operation_Review/pdf/FinalEISSummary.pdf. The EIS System Operation Strategies considered "drawdown" of the lower Snake River dams to natural river levels on a temporary (SOS 5b) and permanent basis (SOS 5c).

[56] https://www.nww.usace.army.mil/Library/2002-LSR-Study/

[57] The GENESYS model was developed to simulate the operation of the regional power system in order to assess the adequacy of the power supply. GENESYS is also used to assess the impacts and costs of non-power related constraints placed on the operation of hydroelectric facilities. The majority of these constraints are intended to protect, mitigate and enhance fish and wildlife populations that could be threatened by the hydroelectric system. https://www.nwcouncil.org/energy/energy-advisory-committees/system-analysis-advisory-committee/genesys-–-generation-evaluation-system-model

[58] https://nwenergy.org/wp-content/uploads/2018/04/LSRD_Report_Full_Final.pdf.

2. The total costs of the clean energy replacement portfolios, particularly the balanced portfolios that include both new wind/solar and demand-side measures, are relatively small compared to the total projected costs of the Northwest power system.
3. If clean replacement portfolios are implemented in conjunction with GHG reduction policies, substantive net reductions in emissions are possible.
4. The clean replacement portfolios met reliability criteria under peak summer and winter conditions and did not create any new reliability issues.
5. The replacement portfolios provided the region with enhanced resource adequacy compared to the LSR Dams.

The Council is now on the verge of adopting its 8th Power Plan. Energy resource costs and markets have changed dramatically since the 7th Power Plan was adopted.[59] Key differences between the 7th and 8th Power Plans include significant decreases in wind and solar renewable resource costs **(TABLE 4)**. These differences are likely to make replacing the energy and capacity provided by the four dams even more feasible.

For example, the 2018 Energy Strategies, LLC study considered a low-cost sensitivity alternative that anticipated installed capital cost declines would occur for certain power resources by 2026 for wind (–20%), solar (–30%), Li-ion batteries (–40%) and conservation (–20%). The sensitivity study showed reductions in total annual costs from 2% to 17% for the portfolios needed to replace the energy provided by the lower Snake River dams. The costs of wind and solar forecasted in the 8th Power Plan have decreased by almost twice the cost decreases used in the Energy Strategies sensitivity study. As CRITFC recommended to the NPCC, the 8th Power Plan should consider a future Northwest energy scenario where the LSRD are breached.[60] Other planning in the Pacific Northwest such as the Washington EFSEC's Transmission Corridor Planning Workgroup,[61] Northern Grid,[62] the Oregon PUC's distribution system planning docket[63] and the Northwest Power Pool's Resources Adequacy studies[64] should also address these scenarios in their analyses.

TABLE 4. Key Differences Between the 7th and 8th Power Plans

Resource	Seventh Plan (2016$/kW)	Eighth Plan (2016$/kW)	Trend
Onshore Wind	$2,382	$1,450	47% decrease
Solar PV	$2,566 $1,792 (low cost)	$1,350 (E. Cascades); $1,465 (W. WA)	60% decrease

[59] "Never in the 40-year history of the Northwest Power and Conservation Council have we seen such dramatic changes in the future power supply than what the Draft 2021[8th] Power Plan outlines." https://www.nwcouncil.org/sites/default/files/2021-6.pdf.

[60] See CRITFC's letters to the NPCC regarding the development of its 8th Power Plan, posted at https://critfc.org/tribal-treaty-fishing-rights/policy-support/public-documents/?topic_area=energy-vision.

[61] https://www.efsec.wa.gov/energy-facilities/transmission-corridors-work-group

[62] https://www.northerngrid.net

[63] https://www.oregon.gov/puc/utilities/Pages/Distribution-System-Planning.aspx

[64] See APPENDIX I setting for CRITFC's comments to the Northwest Power Pool.

3.1.3. Additional Long-Term Actions for the Columbia River System

RECOMMENDATION 1.14: Future energy planning should recognize that, in the long-term, hydro actions will continue to evolve.[65]

As the region and the West look forward to their energy futures, this planning should enable, and certainly not foreclose the actions described below so that they are available to address the needs of key species.

- Move the Corps of Engineers' annual systemwide "Control flow" for the Columbia River at The Dalles to 450,000 cfs (bankfull) and gradually ramp up to 550,000 cfs (flood-flow) to benefit juvenile salmon, steelhead and lamprey migrating during Spring and early summer periods, as well as creating suitable spawning conditions for sturgeon.
- Secure three to five million acre-feet of storage in Canadian Columbia Basin reservoirs to be used for salmon migration support.
- During dry years (*i.e.*, years with low snowpack) when downstream flood risk is diminished, implement ecological rule curves that store additional water in the upper reservoirs (primarily at Grand Coulee) to preserve adequate flows for migrating juveniles and adults during the spring and summer months.
- Improve adult and juvenile passage for Pacific Lamprey at the dams.
- Develop a long- and/or short-term sediment budget model throughout the Columbia River Basin with specific focus on the Cold-Water Refuges (CWR) along the river.
- Maintain energy reserves to meet fish and wildlife obligations. Increasing planning reserve margins, reducing peak loads, storage, demand response, and increasing energy efficiency and renewable resource development will all help reduce risks to fish and wildlife and the region's economy during low-water years. Until these provisions are in place, the region may need to rely on existing thermal resources to avoid another year like 2001. We note that several natural gas-fired resources have been built during the past 20 years and there may be some potential to serve some of them with renewable natural gas. CRITFC strongly supports shutting down all fossil fuel resources to address the climate crisis; however, ensuring robust fish and wildlife protections during a dry-water year is a higher priority than short-term operations of thermal resources in the near term needed to maintain fish and wildlife protections.

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[65] A comparison of Fish Operations Plans (FOPs) from the Corps of Engineers for the last 15 years is illuminating. See http://pweb.crohms.org/tmt/documents/fpp/ for annual FOPs (included as appendices to their annual Fish Passage Plans). For instance, in 2005, under a Court Ordered Spill Injunction, spring spill shifted to 24-hour spill at all eight of the CRS projects, and spill was added in the summer at the Snake River projects (http://pweb.crohms.org/tmt/documents/fpp/2006/sections/E_BIOP_Spill.pdf). This was a major change in operations that lasted for 10 years. In 2017, another Court Ordered Injunction increased the 24-hour spill to the 115% forebay and 120% tailrace maximum spill limits set out by state Total Dissolved Gas (TDG) Waivers (http://pweb.crohms.org/tmt/documents/fpp/2017/final/FPP17_AppE.pdf). Under the Flex Spill Operations Agreement, finalized in 2019, spill was no longer tied to forebay monitors but allowed up to tailrace limits (at most dams) for 16 hours per day and then reduced to the performance spill levels for 8 hours (http://pweb.crohms.org/tmt/documents/fpp/2019/final/FPP19_AppE.pdf). In spring 2020, the tailrace TDG limit was increased from 120% to 125% at most dams. http://pweb.crohms.org/tmt/documents/fpp/2020/final/FPP20_AppE_FOP.pdf. The Flex Spill Operations Agreement expired when the 2020 BiOp for the CRSO was finalized, however the Proposed Action and BiOp have—at least initially- adopted the spill operations outlined in the Flex Spill Agreement with spill levels now caped at 125% TDG as measured by the tailrace monitors. However, future operations of the CRS projects are subject to modification through adaptive management, potential litigation outcomes, and ongoing negotiations of new Accord agreements.

3.2 Columbia River Treaty

RECOMMENDATION 2

The United States and Canada should include direct participation of the 15 tribal sovereigns in the U.S. portion of the Columbia Basin in negotiations to modernize the Columbia River Treaty in ways that restore and maintain ecosystem functions compatible with healthy and harvestable treaty-protected resources. The parties should integrate other energy resources into the treaty negotiations that have the potential to reduce carbon emissions, improve renewable resource integration while protecting fish impacted by the energy systems of the two countries.

RECOMMENDATION 3

The Corps of Engineers should conduct a comprehensive study of flood risk in the Columbia Basin; and the need to make regional decisions on balancing flood risk with multiple purposes of the system, including ecosystem function and effects on fish and wildlife.

The Columbia River Treaty between the United States and Canada in came into full force and effect on September 16, 1964.[66] The dual Treaty purposes were to optimize hydroelectric power production through the U.S. system and to provide coordinated flood control. Ecosystem function, including protection of fish and wildlife and other tribal trust resources are not currently a purpose of the Columbia River Treaty. The Treaty has no end date but may be terminated by either party providing a ten-year notice of an intent to terminate the Treaty.

The United States and Canada initiated formal negotiations to modernize the Treaty in May 2018. U.S. negotiators are being guided by the U.S. Entity Regional Recommendation for the Future of the Columbia River Treaty after 2024 (Regional Recommendation), submitted to the U.S. Department of State on December 13, 2013, as well as by specific authorities developed by the U.S. Department of State as provided under statute. Canadian negotiators are being guided by the Columbia River Treaty Review B.C. Decision (B.C. Decision). Both documents recognize the need to address ecosystem

[66] The U.S. Senate ratified the Treaty in 1961 but Canada did not ratify the Treaty until 1964, after an exchange of diplomatic notes on January 22, 1964, that provided how the Treaty's flood control provisions were to be implemented by the parties and that laid out the terms for the sale of the first 30 years of Canada's share of the downstream power benefits (Canadian Entitlement). These terms were adopted as part of the Treaty by protocol, which also included the specific details of the sale of the Canadian Entitlement. In 1963, Canada and the Province of British Columbia entered into an agreement regarding the implementation of the Treaty by the Province, that recognized that all the benefits of the Treaty were to be retained by the Province and that required the concurrence of the Province on any Treaty-related actions by Canada, including Treaty termination.

function under the Treaty. Both documents also predate the dramatic changes in renewable resource portfolios forecasted to occur throughout western North America by the WECC.

If the Columbia River Treaty is not modernized through negotiations before September 16, 2024, Canada will no longer be obligated to provide coordinated flood control management and protection to the U.S. After 2024, the U.S. will have to call upon Canada to provide flood control, which Canada interprets the Treaty to first require the United States to use all the storage facilities in the United States before calling upon any flood control relief from Canada. The U.S. will also have to pay Canada for operational and opportunity costs of providing flood control services.

The Canadian view, requiring that the U.S. first utilize all of its available storage, would put at risk several dam and reservoir operations developed to integrate ecosystem function into U.S. hydropower operations that would substantially impact fish and wildlife resources beginning in 2025. Importantly, Canada also believes that, pursuant to Treaty terms, the U.S. could not call upon Canada for this type of flood control assistance after September 2024 unless the flows at The Dalles Dam were expected to exceed 600,000 cubic feet per second (cfs); the U.S. Army Corps of Engineers notes that flood damages to areas below The Dalles Dam begin when flows exceed 400,000 cfs and that substantial damages occur downstream when flows exceed 600,000 cfs.

An analysis prepared by the U.S. Entity (BPA and the Corps of Engineers), working with other federal agencies, the Columbia Basin tribes, and the States of Oregon, Washington, Idaho, and Montana (Northwest States), indicates that this change in flood control operations at several dams and reservoirs throughout the basin would have significant effects on resident fish and cultural resources in the Grand Coulee, Hungry Horse, Libby, and Dworshak reservoirs. Refilling the deep draw downs in theses reservoirs will also further reduce the spring freshet for salmon migration. The Columbia Basin Tribes Coalition[67] is concerned about the adverse impacts to resident fish and tribal resources in these reservoirs and reductions in migration flows for salmon and steelhead.

It is also possible that the flood control operations could change operations of the upper Yakima River storage dams (including Keechelus, Kachess, and Cle Elum lakes), and other storage reservoirs that could be drawn down significantly in late winter to early spring timeframe to prepare for the spring runoff. These potential operational changes would need to be implemented at all reservoirs throughout the Columbia River basin above The Dalles Dam before the U.S. could call upon Canada for flood storage operations.

The Columbia Basin Tribes Coalition developed a common views document in 2010 and the fifteen Columbia Basin tribes are working together to avoid these damaging changes in flood control operations. During the development of the Regional Recommendation the Columbia Basin

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[67] The Burns Paiute Tribes, the Coeur d'Alene Tribe, the Confederated Salish and Kootenai Tribes of the Flathead Reservation, the Confederated Tribes of the Colville Reservation, the Confederated Tribes of the Umatilla Indian Reservation, the Confederated Tribes and Bands of the Yakama Nation, the Confederated Tribes of the Warm Springs Reservation of Oregon, the Cowlitz Indian Tribe, the Kalispel Tribe of Indians, the Kootenai Tribe of Idaho, the Nez Perce Tribe, the Fort McDermitt Paiute Shoshone Tribes, the Shoshone Bannock Tribes of the Fort Hall Reservation, the Shoshone Paiute Tribes of the Duck Valley Reservation, and the Spokane Tribe, with support from the Columbia River Inter-Tribal Fish Commission, Upper Columbia United Tribes and the Upper Snake River Tribes tribal organizations, have been working together to consider the effects and alternatives related to the Columbia River Treaty. In June 2018, the Yakama Nation announced that it would be speaking for itself on all issues related to the Columbia River Treaty from that point forward.

tribes worked with the U.S. Entity and Northwest states to explore ways to modify the treaty to improve conditions for salmon, steelhead, and resident fish and reduce flood control costs. The Columbia Basin tribes continue to coordinate with the U.S. negotiating team on these issues. Before the treaty's 50-year control of the river gives way to a new era, the progressive Regional Recommendation, which reflects the evolution of societal values that have occurred since 1964, must provide the framework upon which the negotiations with Canada proceed to conclusion to modernize the Treaty. A modernized treaty should provide equally for ecosystem requirements, hydropower operations and flood-risk management. Equal consideration of improved spring migration of salmon, seasonal flushing of the estuary, resident fish requirements and salmon passage at all historic locations are all needs of the Columbia River basin that should be included in a new treaty.[68] The elements of this Energy Vision are intended to complement a modernized Columbia River Treaty.

The original treaty negotiations focused on economic issues associated with sharing the several hundred megawatts of electricity generated through coordinating the Columbia River's flow at the border to optimize power generation through the U.S. hydropower system. These benefits were calculated almost 60 years ago, and the energy situation has changed significantly. Some U.S. utilities argue that they have fully paid Canada for the benefits. Canada might argue that a number of U.S. commitments in the treaty, including several large reservoirs and the construction of many nuclear and coal plants, did not occur.

While determining how—or if—these downstream power benefits of the Treaty should continue under a modernized Treaty these issues should not be the primary focus of the talks.[69]

Rather, it is time to expand the discussion to address the new realities in the west coast energy system. The Council projects that 14,000 megawatts of renewable resource generation will be built in the Northwest over the next 20 years and there are opportunities to coordinate and integrate those resources that provide win-win outcomes. For example, our analysis shows that 1-million-acre feet (MAF) of Mica storage capacity in Canada would firm 4,782 megawatts of wind energy over one year. The current treaty does not address these integration opportunities.

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[68] See **APPENDIX C**.

[69] Canada's 50% share of these benefits is known as the Canadian Entitlement.

The current treaty also does not address all the storage in British Columbia. For example, the W.A.C. Bennett Dam and Williston Reservoir on the Peace River was completed in 1968 and added 32 MAF of storage to the region—approximately 40% of total storage.

The negotiations should explore win-win options to coordinate generation and use storage to integrate the major renewable resource development that is projected over the next 20 years. The negotiations need to integrate the 50 MAF of Canadian storage in the Columbia and Peace River systems into the modernized treaty. Clearly, this will benefit the Canadians financially and could provide major energy, environmental, and operational benefits in the Pacific Northwest.

Taking a big picture view of the coordination of all the major hydroelectric dams and storage reservoirs in Columbia Basin should lead to the following priorities for a modernized treaty: (1) treaty rights of all Columbia Basin tribes and First Nations, (2) flood control, (3) ecosystem function, (4) capacity, and (5) energy. CRITFC will continue to consult with Indigenous Nations in Canada and the US State Department on these issues.

3.3 Reduce Peak Demand

Controlling energy demand during times of peak energy usage needs to be a priority for the region. Electric supplies must meet energy demand every second of the day. Electricity demand peaks in the mornings as individuals and business begin their day to heat or cool buildings and in the late afternoons when people come home and need to heat or cool their houses, prepare dinner, and turn on other appliances. These daily peaks get larger on very cold or very warm days because it takes even more energy to heat and cool buildings.

Cutting peak demand will reduce damage to salmon and steelhead. River fluctuations disrupt migration and increase exposure to predators. Reducing peak demand will also reduce greenhouse gas emissions from thermal power plants.

There are quantifiable benefits to consumers from reducing peak loads. For the electrical system, lower demand on peaks translates into fewer capital resources that are needed to serve loads. The grid can serve the same total energy needs with fewer generating plants and a smaller investment in new transmission and distribution lines over time if peaks are lowered. Line losses and ancillary services can also be reduced with lower demand.

APPENDIX E describes the high cost of the transmission and distribution system associated with meeting peak demand. For example, serving the highest 600 hours during a year (out of 8,760 hours) is estimated to cost between $0.50 and $1 per kilowatt hour, compared to the average costs residential customers pay of about $0.08 to $0.12 per kilowatt hour. These high transmission and distribution costs get averaged into everyone's electric bill.

The analysis of the cost effectiveness of energy efficiency, storage, and other demand response actions should incorporate more accurate costs for the transmission and distribution systems needed to meet peak loads. The Council's analysis for the draft 8th Power Plan appears to use an average rate for transmission in the region of $31 per kilowatt per year and the average distribution cost of $26 per kilowatt year[70] in calculating the benefits of deferring construction. CRITFC's analysis estimates that the transmission and distributions costs of serving the top 600 hours (out of 8760 per year) is between $80 and $100 per kilowatt year.[71] Using these higher costs when calculating the value of deferring peak loads would likely improve the cost effectiveness of actions that reduce peak loads.

Reducing peak demand would also defer or eliminate the need for some new transmission and distribution systems. For example, BPA and four Northwest investor-owned utilities spent more than $8 billion on transmission and distribution systems over the past five years. Future expansions will add significant costs and can adversely affect sensitive resources along power line routes. See SECTION 3.10 and APPENDIX E for more information on transmission and distribution costs.

As discussed above, the region is currently valuing the "flexibility" of the hydroelectric system at zero, but we know the changes projected for the system will have devastating effects on fish and wildlife. The evaluation of programs to reduce peak demand must address these impacts on fish and wildlife and other tribal resources.

Adopting technologies that allow for peak load control may have significant advantages for fish passage. Once in place to control peak loads, it is a small step to use them to shape loads on a continual basis. Shaping loads could then translate into reducing energy demand pressures that compete with salmon and steelhead.

By 2030, according to one estimate, the United States will have nearly 200,000 megawatts of cost-effective load flexibility potential, equal to 20% of estimated U.S. peak load. That is three times the existing demand response capability, with savings for consumers from avoiding utility system costs estimated at $15 billion annually. This flexibility, largely by use of technology for managing energy use in buildings, can help cost-effectively address several grid challenges, from growth in peak demand, to higher levels of variable renewable energy generation, to increasing electrification of transportation and other loads.[72]

As energy systems acquire the general ability to control loads, we can envision a time when loads can be shaped to harmonize with electricity supplies and the hydro system configurations and operations needed for fish and wildlife.

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[70] Northwest Power and Conservation Council memorandum *Updated Transmission and Distribution Deferral Value for the 2021 Power Plan*, March 5, 2019.

[71] Draft *Energy Vision for the Columbia River Basin,* Appendix E.

[72] Hledik, R., A. Faruqui, T. Lee, and J. Higham. 2019. The Brattle Group. "The National Potential for Load Flexibility: Value and Market Potential Through 2030." https://brattlefiles.blob.core.windows.net/files/16639_national_potential_for_load_flexibility_-_final.pdf.

Several utilities have experienced flat or declining peak winter loads, while their summer peak loads have increased slightly.[73] The region needs to build on these efforts to reduce future peak loads. These efforts will reduce costs, improve salmon survival, and improve the reliability of the electric system.

3.3.1. Energy Efficiency Reduces Peak Demand

RECOMMENDATION 4

The Council, BPA, and utilities should include the peak savings and reductions in transmission and distribution benefits in calculating the capacity value of energy efficiency programs.

Energy efficiency programs continue to be among the lowest-cost ways to meet future energy needs. They have the added benefit of reducing peak demand. Extensive regional experience shows that balanced energy efficiency portfolios disproportionately save electricity during peak periods. A well-insulated home or office requires less heat in the winter and less air conditioning in the summer. Energy efficiency is "fish friendly". It is the energy resource that has the least potential to damage tribal resources. **TABLE 5** shows the NPCC analysis of the energy efficiency savings between 2016 and 2019. It shows that the total savings were 857 average megawatts. These programs resulted in 1,683 megawatts of peak savings in the winter and 1,042 megawatts in the summer.

TABLE 5. Capacity Savings by End Use—All Sectors Combined

	Sum of Winter MW Savings	Sum of Summer MW Savings
Lighting	698.06	445.43
HVAC	519.19	145. 70
Whole Bldg/Meter Level	185.24	133.75
Unknown	59.56	47.57
Process Loads	47.83	49.15
Electronics	45.71	37.14
Water Heating	44.68	25.12
Refrigeration	40.84	44.73
Motors/Drives	22.12	21.13
Compressed Air	14.88	14.77
Utility Transmission System	1.62	1.57
Food Preparation	1.31	1.23
Facility Distribution System	0.97	1.00
Utility Distribution System	0.67	2.91
Irrigation	0.60	70.97
Grand Total	**1,683.28**	**1,042.17**

These programs have the added benefit of matching electric energy growth. As the number of new homes and business are built and new efficient appliances are added, the energy and capacity savings increase.

The Council's draft 8th Power Plan assumes a total additional conservation potential of 5,103 average megawatts in 2041 that "saves 9,105 megawatts of summer peak and 8,511 megawatts of winter peak."[74]

The Lawrence Berkeley Laboratory collected data on costs, energy savings and peak demand

[73] For more information, see **APPENDIX E**.

[74] https://www.nwcouncil.org/2021powerplan_conservationpotential.

savings for electricity efficiency programs for 36 investor-owned utilities and other public agencies in nine states (Arizona, Arkansas, California, Colorado, Illinois, Massachusetts, Maryland, New York, and Texas) for 2014 to 2017.[75] The savings during the study period averages $0.029/kilowatt-hour (kWh) and varies by a factor of three ($0.013/kWh to $0.039/kWh) across the nine states. The report states:

> *Based on this initial study, electricity efficiency programs appear to be a relatively low-cost way for utilities to meet peak demand, compared to the capital cost of other resources (Lazard 2018; EIA 2019) that can be used to meet peak demand. However, many energy efficiency technologies, such as more efficient light bulbs, are "passive" and are not dispatchable. In such cases, efficiency resources do not provide the same services as a natural gas peaking turbine, making comparisons between these resources complex. At the same time, our results suggest that electricity efficiency programs that reduce peak demand merit strong consideration by utilities and regional grid operators. Further, "active" efficiency measures such as lighting controls enable active management of efficiency resources, offering additional grid services.*

These cost-effectiveness calculations should also consider the very high costs of transmission and distribution systems that serve these peak loads as discussed above and in SECTION 3.10 and APPENDIX E.

3.3.2. Using Pricing to Reduce Peak Loads

RECOMMENDATION 5

Northwest public utility commissions should implement time-of-use rates to send an appropriate price signal that captures the dramatically different costs of using electricity during different times of the day.

More must be done to provide consumers with an accurate price signal for the cost of electricity at different times of the day and different months of the year. CRITFC calls on Northwest utilities and utility commissions to implement time-of-use pricing for all consumers based on the total costs of serving electricity needs.

Currently, all commercial, industrial, and agricultural customers served by investor-owned utilities in California are required to be on a time-of-use plan. Residential customers can choose to be on a time-of-use plan, by contacting their utility. The California Public Utility Commission states:

[75] https://emp.lbl.gov/publications/peak-demand-impacts-electricity.

If customers have energy usage that can be shifted from peak hours to off-peak hours, they may be able to reduce their energy bill by switching to a time-of-use rate plan. For example, customers could run large appliances like dishwashers and washing machines at off-peak hours. Electric vehicle owners may also benefit from switching to a time-of-use rate plan if they charge their vehicles overnight.

According to the California Public Utilities Commission, time-of-use pricing encourages the most efficient use of the electric energy system and can reduce the overall costs for both the utilities and customers by sending prices signals about the actual cost to serve loads at different times. Time-of-use rates vary according to the time of day, season, and day type (for example, weekday or weekend/holiday). Higher rates are charged during the peak demand hours and lower rates during off-peak (low) demand hours. In California, rates are also typically higher in summer months than in winter months. The California Independent System Operator has prepared a detailed analysis of the time of use periods in California.[76] The California PUC states: "This rate structure provides price signals to energy users to shift energy use from peak hours to off-peak hours."[77]

This time-of-use pricing should also incorporate the high costs of transmission and distribution to serve peak loads. This issue is discussed in more detail below.

Sending a clear price signal about the true costs of meeting peak loads will reinforce the recommendations on demand response, storage, and other strategies discussed below.

3.3.3. Demand Response and Load Management

Integrating renewable resources with the region's electricity needs will require better management of electricity loads. This section describes several important actions.

LOAD MANAGEMENT

RECOMMENDATION 6

Utilities should use demand response to manage system loads, reducing peak loads, ensuring reliability by encouraging customers to reduce demand during peak periods or shift loads from peak to off-peak hours.

Utilities and BPA should pursue actions to manage loads by shifting them to times when renewable power is available and to minimize impacts on fish and wildlife. These actions will reduce costs and environmental impacts.

The Council's 7th Power Plan (2016) identified significant potential to reduce or shift peak demands. It found:

The Seventh Power Plan assumes the technically achievable potential for demand response in the region is over eight percent of peak load during winter and summer peak periods by 2035. This assumption is based on the Demand Response Program Potential Study commissioned by the Council and feedback from regional stakeholders. This figure represents approximately 3,500 megawatts of winter

[76] http://www.caiso.com/market/Pages/ReportsBulletins/RenewablesReporting.aspx.

[77] California Public Utilities Commission, see https://www.cpuc.ca.gov/general.aspx?id=12194.

peak load reductions and nearly 3,300 megawatts of summer peak load reductions by the end of the study period. In addition, the study identified additional potential for summer and winter demand response that could be available by the end of the study period to provide for load and variable generation balancing services.[78]

The Council's draft 8th Power Plan significantly reduced the estimates for demand response, primarily because it was not as cost effective as renewable resources.

The Council recommends utilities examine two demand response products: residential Time-of-Use (TOU) rates and Demand Voltage Regulation (DVR) as a means to offset the electric system needs during peaking and ramping periods and to reduce emissions. A given utility's time of need may differ from the region's, but these products are likely still part of a cost-effective strategy. Our assessment shows about 520 megawatts of DVR and 200 megawatts of TOU available by 2027.[79]

As discussed elsewhere, the flawed assumption that the hydroelectric system can integrate all the new renewable resources at low or no cost creates an artificially low cost that crowds out resources like demand response. The analysis of these measures should fully consider the environmental benefits and significant cost savings from reducing the need for transmission and distribution to serve peak loads. Including an accurate accounting of the environmental impacts associated with the "steel in the ground" these costs of renewable resource and transmission construction is likely to make more demand response and related measures cost effective. Viewed from a broader perspective, the federal and state environmental policies, such as carbon reduction and endangered species preservation, are not limited by cost-effectiveness thresholds.

CRITFC urges the Council to expand demand voltage reduction and time of use programs and consider other demand response programs as alternatives to batteries or other storage devices. For example, innovators like OhmConnect are marketing their free demand response assistance as a way of reducing energy blackouts in California.[80]

Utilities should pursue demand response in residential and commercial buildings and other sectors. For example, Idaho Power and PacifiCorp are running demand response programs for air conditioning cycling and irrigation pumping. These programs are designed to reduce summer peak demands.

ELECTRIC VEHICLES

RECOMMENDATION 7

Automobile manufactures should include systems that allow electric vehicles to schedule charging during off-peak periods.

Electric cars and plug-in hybrid cars should be a win-win-win for consumers, the environment, and salmon. Electric vehicles have very low operating and maintenance costs, reduce greenhouse gases and other air pollution, and reduce dependence on foreign oil. If owners charge car batteries at times that help integrate renewable resources and improve salmon survival the region can achieve these benefits.

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[78] https://nwcouncil.org/7thplan, page 14–2.

[79] Draft 2021 Power Plan, page 6–41.

[80] https://www.ohmconnect.com/about-us.

Auto manufacturers should provide scheduling software that can control when the cars charge and promote its use (these systems are already standard on some electric vehicles). If timers are not incorporated and used, drivers might start charging when they get home from work and add to peak energy demand. This would make things worse for consumers, the power system, and salmon.

RECOMMENDATION 8

Utilities should integrate electric vehicle charging and batteries into the power system to reduce costs to consumers and the power system and improve salmon migration.

Utilities should install smart meters that would charge electric vehicles when there is low-cost surplus power and use electricity from those vehicles' batteries during peak periods. In these "vehicle to grid" systems, a electric vehicle owner could get a discount on the electricity, and this could be a cost-effective way to meet peak and provide storage at a lower-cost than utility-scale batteries.[81] This approach could also reduce the need for new transmission and distribution lines. These efforts will require improvements in information sharing so charging could be scheduled during the optimum time to reduce environmental impacts.

Electric vehicles should also be integrated with on-site solar systems to charge vehicles while the sun is shining and use their batteries when the sun goes down or during extended shortages. For example, the 2022 Ford F-150 Lightning battery could power an average home for about three days.[82]

RECOMMENDATION 9

BPA and utilities should work to improve the efficiency of electric vehicles.

An analysis by Amory Lovins concludes:

> *Efficiency gains achievable by integrative design of whole light-duty vehicles can be severalfold larger, yet cheaper, than those predicted by canonical incremental technology-by-technology analyses. This means that US and international efficiency standards rest on overly conservative analyses; electrification can be cheaper and faster than conventionally assumed; and the efficiency potential predicted by groups like the US National Research Council and assumed in climate-mitigation assessments need major revision, aided by evaluation processes that better assess whole-vehicle design and early signals from concept vehicles.*[83]

Current electric vehicles have high EPA miles per gallon (electric equivalent) ratings compared to internal combustion engines. For example, a Tesla Model 3 has a combined

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[81] Clean Vehicles as an Enabler for a Clean Electric Grid: https://iopscience.iop.org/article/10.1088/1748-9326/aabe97.

[82] https://www.motortrend.com/news/2022-ford-f-150-lightning-electric-truck-charging-generator-power/

[83] Lovins, A., "Reframing Automotive Fuel Efficiency," 2020, https://doi.org/10.4271/13-01-01-0004.

rating of 142 MPGe and a Hyundai Ioniq is rated at 133 MPGe.[84] Increasing the efficiency several fold would stimulate the adoption of these vehicles and reduce impacts on the electricity system.

HOT WATER HEATERS

RECOMMENDATION 10

The Council, BPA, and utilities should fund the incremental costs of heat pump water heaters to stimulate the adoption of this technology.

Heat pump water heaters are more efficient than conventional systems and provide both energy and capacity savings in new houses. The conversion of existing houses to heat pump water heaters will also provide benefits. The Council's 7th Power Plan estimated that cost-effective conversions from electric resistance to heat pump water heaters would reduce peak demands by 1,250 megawatts during winter (January) and just over 1,850 megawatts in summer (August) by 2035. These systems come with built-in demand reduction capability to help reduce peak loads.

Utility incentive programs would increase market penetration and likely drive down costs. This was the experience with "new technology" such as six-inch wall insulation and R-50 windows in the 1st Power Plan in 1983. BPA and utilities paid the added costs of these measures, suppliers started stocking them, manufactures mass produced them, subcontractors learned to install them, and the costs came down.

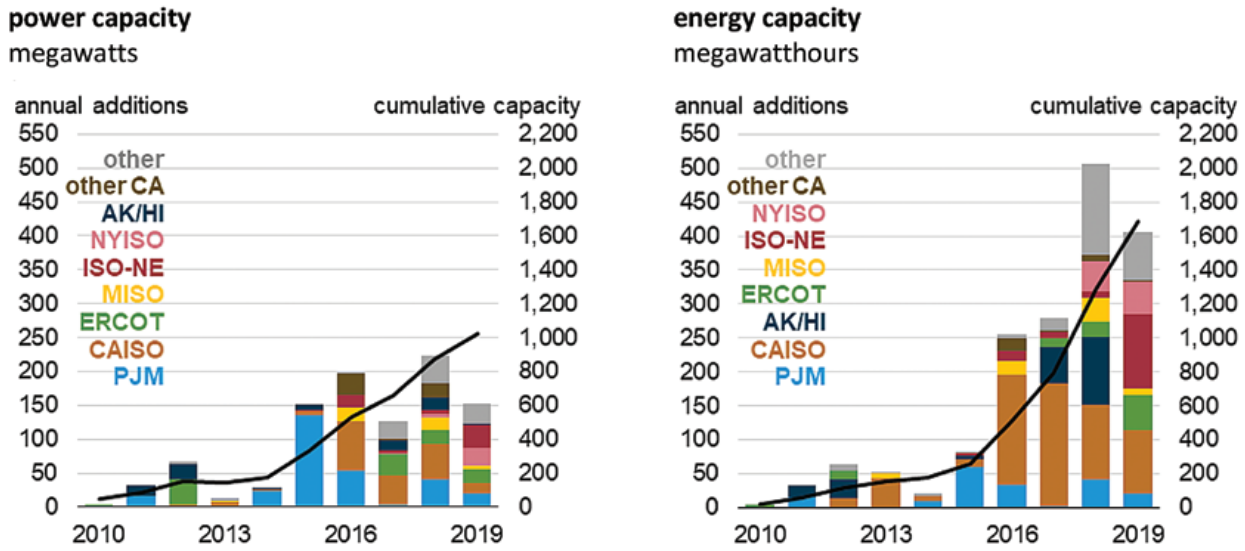
RECOMMENDATION 11

Utilities and BPA should develop and fund programs to schedule when water heaters operate.

Time-of-day water heating technology is commercially available. Water pre-heated during the middle of the night, can last through the morning peak use period. This technology can be used in today's hot water heaters, and can be made more effective in replacement tanks, by increasing the size of the water tanks. More sophisticated and easy to use demand-response enabled equipment is also coming onto the market, thanks to state-level standards passed in Oregon and Washington for CTA-2045 compliant water heaters for the residential market. To get the benefits of the peak reduction potential, however, utilities will need to develop customer-centric demand response programs.

[84] https://www.fueleconomy.gov/feg/evsbs.shtml.

FIGURE 11. Large-Scale Battery Storage Capacity by Region (2010–2019)



Source: U.S. Energy Information Administration, 2019 Form EIA-860, *Annual Electric Generator Report*

3.3.4. Increase Electricity Storage

Integrating renewable resources with the region's electricity needs will require significant energy storage. This section describes several important actions to secure energy storage by fish friendly means.

UTILITY-SCALE BATTERIES

RECOMMENDATION 12

BPA and utilities should implement utility-scale battery projects.

FIGURE 11 from the U.S. Energy Information Agency shows the expansion of utility-scale batteries between 2010 and 2019.

The growth of these batteries is expanding quickly as costs come down.[85] California will have 3,000 megawatts of utility-scale batteries to store electricity to meet peak demands online by the end of 2021. These lithium battery systems store power from solar plants during the day and can provide four hours of electricity when the sun sets.

New battery technologies, such as those based on iron flow chemistry, are on the horizon that may reduce the need for the use of precious metals in energy storage.[86] An iron flow battery has six-to-twelve-hour storage cycles, are scalable to 2000-megawatt hour systems, and have a 25-year operating life.[87] These and other technologies can provide reliable energy storage and do not require the rare earth minerals of lithium batteries. The WECC projections show approximately 200,000 megawatts of solar and battery projects by 2045.

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[85] See Oregon Department of Energy 2020 Biennial Energy Report Utility Scale Storage Technology Review.

[86] https://www.bloomberg.com/news/articles/2021-09-30/iron-battery-breakthrough-could-eat-lithium-s-lunch.

[87] https://essinc.com/iron-flow-chemistry/.

These batteries could help address some reliability and renewable resource integrations issues in the Northwest. Winter peaks often last more than twelve hours and will likely require a combination of storage, improved efficiency measures, demand management, and other strategies to serve these electricity needs, especially in low-water years (please see SECTION 3.7 on Resource Adequacy).

Northwest utilities should review the experience with these batteries and begin construction of systems at strategic locations. For example, these batteries could be located near load centers or near major generation and transmission hubs to reduce the transmission and distribution costs.

The Council's draft 8th Power Plan discusses the role of batteries but does not call for actions to promote their use. It is CRITFC's understanding that the Council did not find them cost effective compared to other alternatives. As discussed elsewhere, the Council is assuming the hydroelectric dam reservoirs can be used as a huge battery at low or no costs (except to salmon). This flawed assumption prejudices the cost effectiveness of storage technologies that do not increase the mortality of migrating salmon. It is also contrary to the Northwest Power Act's mandate for due consideration to environmental impacts in the Council's energy planning processes.[88]

ON-SITE BATTERIES

RECOMMENDATION 13

BPA and utilities should implement incentive programs to expand the use of on-site batteries.

On-site generation and home and business storage systems are becoming commercially available. For example, Tesla has a Solar Roof and Powerwall system to generate and store electricity for a house. The Powerwall also tracks National Weather Service alerts for severe weather and fully charges the battery in case of a forecasted power outage. The system also has time-based controls to use stored power when grid costs are expensive and net metering credits for excess solar energy sent to the grid.

The Oregon Legislature passed a bill in the 2021 session to allocate an additional $10 million for the solar and storage rebate program to help bring down the costs of these systems. The rebates may cover up to 40 percent of the net cost for a residential system installed for a customer that is not considered low- or moderate-income, up to 60 percent of net cost for a low- or moderate-income customer, and up to 50 percent for a low-income service provider.[89] Other states should establish such programs.

FIGURE 12, prepared by Lazard Bank, shows the unsubsidized levelized cost of storage alternatives.[90]

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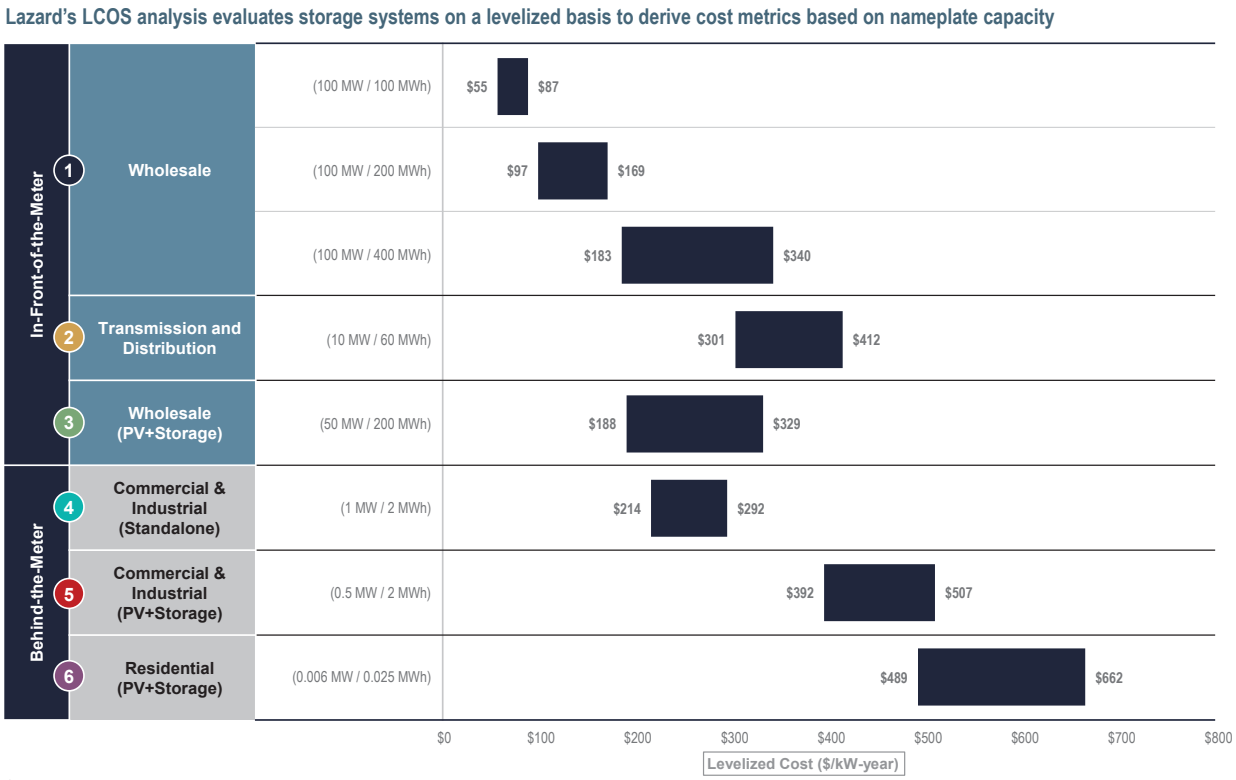
88 For more details, see CRITFC's letters to the NPCC posted at https://critfc.org/tribal-treaty-fishing-rights/policy-support/public-documents/?topic_area=energy-vision.

89 https://www.oregon.gov/energy/Incentives/Pages/Solar-Storage-Rebate-Program.aspx.

90 Lazard's Levelized Cost of Storage Analysis—Version 6.0, Lazard's Bank, 2020, page 5.

FIGURE 12. Unsubsidized Levelized Cost of Storage Comparison—Capacity ($/kW-year)



Source: Lazard estimates

SPACE HEATING AND COOLING STORED IN BUILDINGS

RECOMMENDATION 14

BPA and utilities should fund programs to reduce peak loads using the thermal mass of buildings.

Heating and cooling effects can be stored in building mass, including mass that may have been added for this specific purpose. The technique of using thermal mass (*e.g.*, properly located rocks, concrete, or other material) to store heat and cold is ancient but may be coming back in style as Northwest universities include energy efficient building design courses in their renewable energy engineering programs.[91] Adding mass to residential buildings is being tested in regional pilots. Storage of heating and cooling in buildings to meet these needs through peak periods has possibilities for around the clock applications similar to hot water storage.

Commercial buildings generally have a high mass, so they can be pre-heated and pre-cooled by using off-peak energy prior to the buildings

[91] The University of Oregon has created an Energy Studies in Buildings Laboratory with programs in Eugene and Portland employing and educating students in building designs that address climate change needs of society. See https://esbl.uoregon.edu. The Oregon Institute of Technology was the first university in the nation to offer a renewable energy engineering degree including coursework in energy efficient building design. See http://catalog.oit.edu/preview_program.php?catoid=9&poid=2030.

being occupied in the morning. The potential for saving on transmission and distribution, generation, line losses, and ancillary services is very large.

With appropriate incentives for building owners, web-based thermostat controls can enable existing buildings to store energy for heating and cooling. These controls allow a utility dispatcher to pre-heat and pre-cool buildings thereby shifting the power consumption to an off-peak period. This is an example of using the thermal mass already in the building as a storage medium. Once the platform that enables these web-based controls is in place, all energy devices using these controls could be operated for energy management purposes.

PUMPED STORAGE

RECOMMENDATION 15

The Council and utilities should not pursue pumped storage sites unless they are consistent with the siting criteria described in SECTION 3.6.

Pumped storage sites use electricity during surplus or low-cost periods to pump water into a reservoir for release through a generator to meet peak loads. These projects have experienced significant economic and environmental challenges in the past. Large reservoirs can affect tribal fish and wildlife and cultural resources. For example, a project proposed near Goldendale, Washington would affect Yakama Nation cultural, archeological, ceremonial, monumental, burial petroglyph, and ancestral use sites. The project is opposed by the Yakama Nation. Reservoirs may also create greenhouse gas emissions due to the annual cycles of decomposing of aquatic vegetation.

The NPCC has identified approximately 7,000 MW of capacity for such projects at some stage of the planning and development process; however, these projects did not appear to be cost effective. There may be some opportunities for this technology in the future, for example, improving the operations at existing sites, but any projects need to address the siting criteria discussed in SECTION 3.6 of this document.

HYDROGEN STORAGE

RECOMMENDATION 16

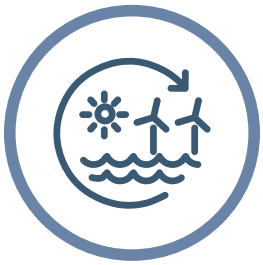
Utilities and the Council should continue to monitor green hydrogen technologies.

Renewable hydrogen can be stored, compressed for a transportation fuel, or put in a pipeline for industrial purposes. It is expensive. This technology requires low-cost electricity, water, storage facilities for the hydrogen, and energy generation or industrial use for the fuel.

Douglas County PUD is exploring a project to use surplus electricity from its hydroelectric dam to create hydrogen through electrolysis—separating hydrogen from oxygen in water using an electric current. Renewable hydrogen would be produced using a renewable resource with no carbon associated with production or consumption of the fuel. The utility is researching a 2-to-3-megawatt renewable hydrogen pilot project. In 2019, the Washington legislature authorized public utility districts to produce, distribute and sell renewable hydrogen.[92]

Electrolysis is not very efficient and therefore, may not have significant application to provide storage. Proton membrane technology is still in the early development stage. Monitoring these developments can inform future decisions on storage for renewable resources.

3.4 Energy Efficiency Resources



Energy efficiency programs reduce both peak demands and year-round energy needs. Energy efficiency has been proven as a reliable resource in the Northwest with costs that are less than half the cost of new gas-fired power plants. These programs save consumers money and reduce the emissions of pollutants that cause climate change. They are fish compatible.

Energy efficiency also reduces the region's seasonal storage needs because energy savings closely track energy demand. The "flexibility" of energy efficiency is extremely valuable. Energy efficiency programs have no adverse effects on fisheries or other tribal resources.

According to the Council, the region has saved 7,000 average megawatts since 1978 through energy efficiency programs, codes, and standards. That is enough electricity to serve more than 5 million homes. The U.S. Energy and Employment Report shows that over 100,000 people are employed in our region working with energy efficiency at utilities, the Northwest Energy Efficiency Alliance (NEEA), the Energy Trust of Oregon, state agencies, and at the many trade allies and contractors that work to implement programs and deliver efficiency services.[93]

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[92] SB 5588, Chapter 24, 2019 Laws, was signed into law on April 17, 2019.

[93] 2020 Report: https://www.usenergyjobs.org/.

These energy efficiency programs have saved northwest consumers over $70 billion dollars and those savings are growing at about $5 billion per year. The NPCC data shows that more than $8.5 billion has been spent by northwest utilities on energy efficiency programs—a significant portion of these funds were spent in the region, providing jobs and economic activity.

3.4.1. Secure All Cost-Effective Energy Efficiency.

RECOMMENDATION 17

The Council should increase the conservation targets in the 8th Power Plan to maintain at least the level of activity called for in the 7th Plan and work with BPA and utilities to try to exceed the targets.

In the draft 8th Power Plan, the Council recommends "that the region acquire between 750 and 1,000 average megawatts of energy efficiency by the end of 2027 and at least 2,400 average megawatts by the end of 2041.[94] These energy efficiency targets are significantly lower than the 7th Power Plan when the Council estimated that over 4,000 average megawatts of conservation could be acquired cost-effectively over the 20-year planning period.

One reason for the Council's decreased recommendation appears to be that solar and wind energy costs are lower than some of the energy efficiency. These lower renewable resources costs include the Council's assumption that this energy can be integrated using the regions' dams and reservoirs at little or no cost. This planning assumption is not accountable to the reality of dam operations on the Columbia River System.

It is also CRITFC's understanding that part of this reduced conservation potential is because LED lights are already in wide use and the Obama Administration adopted 49 new federal standards that are capturing some of the 7th Plan's targeted savings, so the baseline load forecast for 7th plan is lower. If this is the case, the Council should clearly communicate this change is the baseline and that new conservation measures are in addition to this baseline.

The CRITFC recommendation to maintain at least the level of activity for energy efficiency programs called for in the last plan are based on several factors:

1. We understand that the Council will be evaluating alternative river operations that we believe are likely to increase the costs of integrating solar and wind energy when compared to energy efficiency. Maintaining the program levels from the 7th Power Plan would avoid slowing energy efficiency efforts that the region may regret.
2. The Council's cost-effectiveness calculations should include the very high peak energy costs of transmission and distribution systems. CRITFC's analysis from 2013 showed the transmission and distribution costs of meeting the highest 15 percent of peak energy needs ranged from 79 cents to $1.19 per kilowatt-hour. Energy efficiency and other behind-the-meter actions avoid those high transmission and distribution costs. These

[94] Draft 2021 Power Plan, page 5–29.

avoided costs must be duly accounted for in cost-effectiveness determinations.

3. The Council notes that the energy conservation industry employees 100,000 people. Reducing these programs means downsizing this work force and reducing the number of companies providing these services when the region will likely need them in the future. Many industries are experience shortages of workers. Losing a trained work force could take years to recruit and retrain.

4. As the Council reconsiders its energy efficiency targets for the 8th Power Plan, it should assume a higher penetration rate. The 7th Power Plan assumed that only 85 percent of the cost-effective conservation will be achieved. If the region could achieve 100 percent of these savings, it would save consumers an additional $300 million per year.[95] If we assume these savings are phased in over the life of a 20-year power plan; the additional savings could total about $3 billion by 2036.

5. The Council, BPA, and utilities should include incentive programs for measures that are on the margin to stimulate new technologies. The Council and Northwest Energy Efficiency Alliance should identify promising measures and develop programs to bring down cost and increase the commercial availability. The region has had success with similar efforts where early investments reduced long-term costs.

   BPA and utilities can afford to pay the incremental costs of these marginal measures. The Northwest Power Act requires measures to be economically feasible for consumers, taking into account financial assistance from the Bonneville Power Administration and the region's utilities.

   It is important to note that BPA and utilities do not pay the full cost of the energy efficiency. Consumers usually pay a share of the costs of these programs. Building codes and appliance standards provide significant savings at no cost to utilities. A rough calculation of the costs of energy efficiency savings that were paid for by utilities is about $8 per megawatt hour[96]—a fraction of the costs of alternatives or the value of the electricity sold in the market over this period. The Council should conduct its own analysis of the utility paid costs in considering the costs and benefits of stimulating new technologies. During the first seven power plans energy efficiency was about half the cost of alternative generating resources.

6. There is a great deal of business and public interest in energy efficiency that did not exist in prior decades. Customers are asking for green certifications and business are routinely marketing products with zero-carbon footprints. Congress and the Biden Administration are considering infrastructure programs to address the climate crisis and increase funding for these programs.

7. Analysis indicates that there is likely additional energy efficiency available. We reviewed two papers that addressed this issue:

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[95] De-rating the energy efficiency that is achievable by 15 percent represents 600 average megawatts of low-cost power that were not included in the NPCC conservation targets for the Seventh Power Plan. A simple calculation of the value (marginal resource costs minus cost of conservation multiplied by 1000 average megawatts) shows that the value of this additional conservation is $300 million per year.

[96] The analysis assumes that the energy 7,200 average megawatts of savings when phased in over the past 38 years totaled savings of more than 1.2 billion megawatt hours, divided by utility spending of about $9 billion.

The first is a paper entitled: *Beyond Supply Curves*, by Fred Gordon and Lakin Garth of the Energy Trust of Oregon and Tom Eckman and Charles Grist formerly at the Northwest Power and Conservation Council. It discusses how new technologies, which are often impossible to forecast, have significantly increased the amount and reduced the cost of energy efficiency measures. Based on prior experience, the high efficiency windows in the 2005 Council Power Plan were 12 percent more efficient than the assumptions used in the Council's 1983 plan. The paper also shows how the cost of compact fluorescent lamps dropped from the $12 per bulb assumed in the 1991 plan to $3 assumed in the 2005 plan. It is likely that future innovations will continue this trend and they should be recognized in future uncertainties.

The second paper, by David Goldstein of the Natural Resources Defense Council, describes the methodologies that are "excessively conservative if the goal of policymakers is to meet aggressive climate change emission reduction goals." The paper documents the systematic biases that result in low potentials in energy efficiency. These include: 1) subjecting efficiency measures to a criterion of proof beyond a serious doubt; 2) assuming arbitrary realization factors less than 100 percent due to questions about social acceptance of energy efficiency; 3) implicit assumptions that a lack of research on the cost or feasibility of a measure means that is it excluded from a study; 4) a failure to consider system integration; 5) assumptions that once known efficiency measures are implemented, technological progress ceases and no further improvements are possible; and 6) reliance on projected costs of efficiency without looking at realized costs, which has always been lower whenever data has been available.

8. The Council projects that electrification of transportation could add 700 to 900 average megawatts of load by 2040. There appears to be significant potential for additional efficiency improvements in these vehicles (See **SECTION 3.3.3**. on Electric Vehicles).

In summary, the challenges for the region are to set realistic targets for energy efficiency and ensure the flexibility to achieve higher savings as they become available. CRITFC calls upon the region to do so.

After 40 years of experience, there are ample results in the Pacific Northwest to demonstrate that improving energy efficiency can reliably save energy. We also know that the Council's targets have been conservative. New technology has repeatedly made conservation more cost effective than estimated by the Council. Finally, the Northwest Power Act calls for energy conservation to be developed as a resource ahead of traditional resources.[97]

For all these reasons, the Council should address all the factors discussed above and increase the conservation targets to continue programs at the levels in the 7th Power Plan and work with BPA and utilities to try to exceed them.

[97] 16 U.S.C. § 839; 126 Cong.Rec. H9848 (Rep. Pritchard) ("[The Act] treats energy conservation as a resource, making it the top priority in meeting the region's energy needs. *NRIC and Yakama Nation v. Northwest Power Planning Council*, 35 F.3d 1371, 1378 (9th Cir. 1994).

3.4.2. Ensure that Utilities Achieve the Targets

RECOMMENDATION 18

The Council should monitor the implementation of energy efficiency programs to ensure that utilities meet the conservation targets.

The NPCC summary of achievements[98] shows the region ended up exceeding 6th Plan targets and is slightly ahead of 7th Plan goals—despite the impact of Covid-19 on programs. **TABLE 6** shows the region exceeded the NPCC's targets for all energy efficiency activities between 2005 and 2019.

Unfortunately, progress has slowed. The Council **FIGURE 13** shows total funding in 2021 was about $100 million per year less than in 2016 and annual savings declined from approximately 225 average megawatts in 2016 to a projected 145 average megawatts in 2021.[99]

The reductions in energy savings have been significant in the residential sector, with savings for 2016 through 2019 averaging about half the progress in 2015[100]. **FIGURE 14** from the NPCC shows the energy savings, by end use between 2010 and 2019.

FIGURE 15 shows that utilities are not meeting NPCC goals in the agricultural, industrial, and residential sector.

TABLE 6. NPCC Targets for All Energy Efficiency Activities Between 2005 and 2019

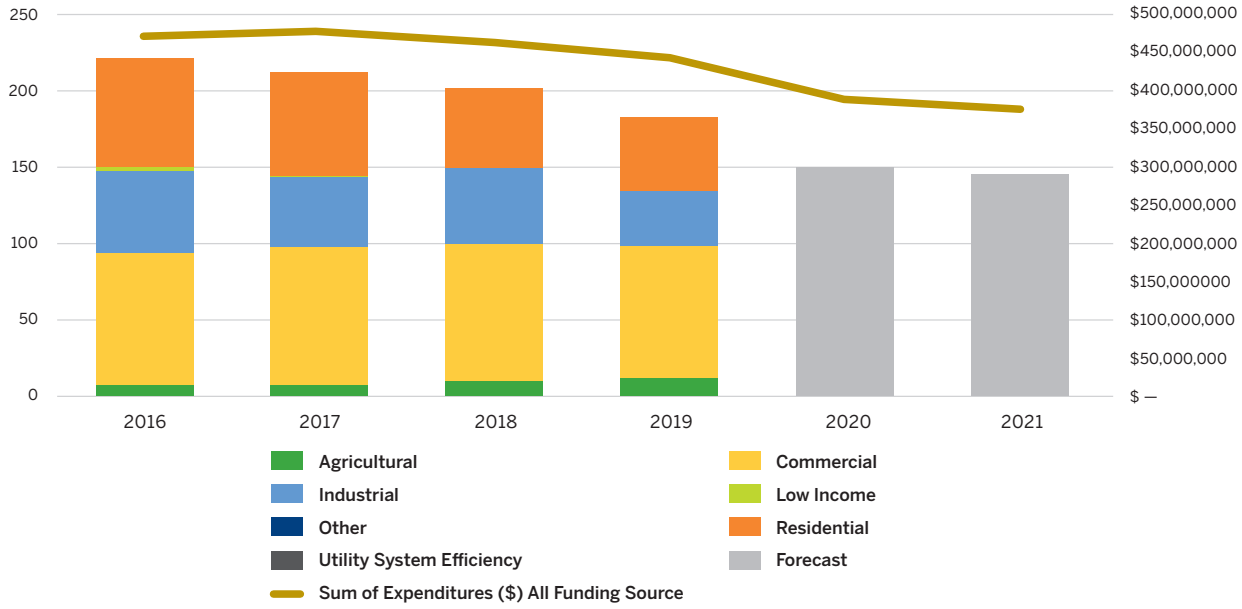
	Year	Cumulative Target (aMW)	Actual Achievements (aMW)	Actual Over/Under Target (aMW)	% Over/Under Target
5th Plan	2005	130	141	11	8%
	2006	265	293	28	11%
	2007	405	500	95	23%
	2008	550	735	185	34%
	2009	700	966	266	38%
	2010	900	1,223	323	36%
6th Plan	2011	1,120	1,503	383	34%
	2012	1,360	1,747	387	28%
	2013	1,620	2,009	389	24%
	2014	1,900	2,249	349	18%
	2015	2,190	2,492	302	14%
	2016	2,375	2,695	320	13%
7th Plan	2017	2,560	2,904	344	13%
	2018	2,790	3,133	343	12%
	2019	3,020	3,249	329	11%

[98] https://rtf.nwcouncil.org/about-rtf/conservation-achievements/2019.

[99] https://nwcouncil.app.box.com/v/2019RCPResults

[100] NPCC 2019 Regional Conservation Progress Report by the Regional Technical Forum.

FIGURE 13. Annual Program Savings (aMW) Compared to Annual Program Expenditures



Many utilities in the Northwest are national leaders in implementing energy efficiency programs. We applaud their efforts. Some utilities have not embraced this proven, low-cost resource. Failure to achieve these targets means more resources and transmission and distribution lines need to be built. These actions will add costs and present risks to upland resources like First Foods that the tribes are striving to protect. Failure to meet efficiency targets also puts more pressure on the hydroelectric system that has imposed economic resource transfers that have discriminated against the tribes' treaty secured commitments to their fishery resources.

The Council, BPA and PUCs should monitor future implementation to ensure that all utilities are meeting the targets. If the Council finds that some utilities are continuing to impose costs on other consumers, salmon, and other tribal resources, then the Council should impose a surcharge under the provisions of the Northwest Power Act.[101]

CRITFC would support a safe harbor provision to the surcharge requirements. For example, a utility could avoid the surcharge if it had: 1) well designed programs in place in all sectors; 2) offered funding to cover the cost to the consumer of the energy-efficiency improvements up to the costs of the next most expensive resource;[102] 3) had an effective public education program so all customers were aware of the programs; and 4) had committed sufficient funds to implement all requests for the energy efficiency programs.

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[101] Section 4(f)(2) of the Northwest Power Act authorizes the Council to recommend a surcharge of 10 to 50 percent for utilities that do not achieve the model conservation standards in Section 4(f)(1).

[102] The Northwest Power Act requires that the Council design the MCS to produce all power savings that are cost-effective for the region and economically feasible for consumers, taking into account financial assistance from the Bonneville Power Administration and the region's utilities.

FIGURE 14. Residential Sector Energy Savings By End Use

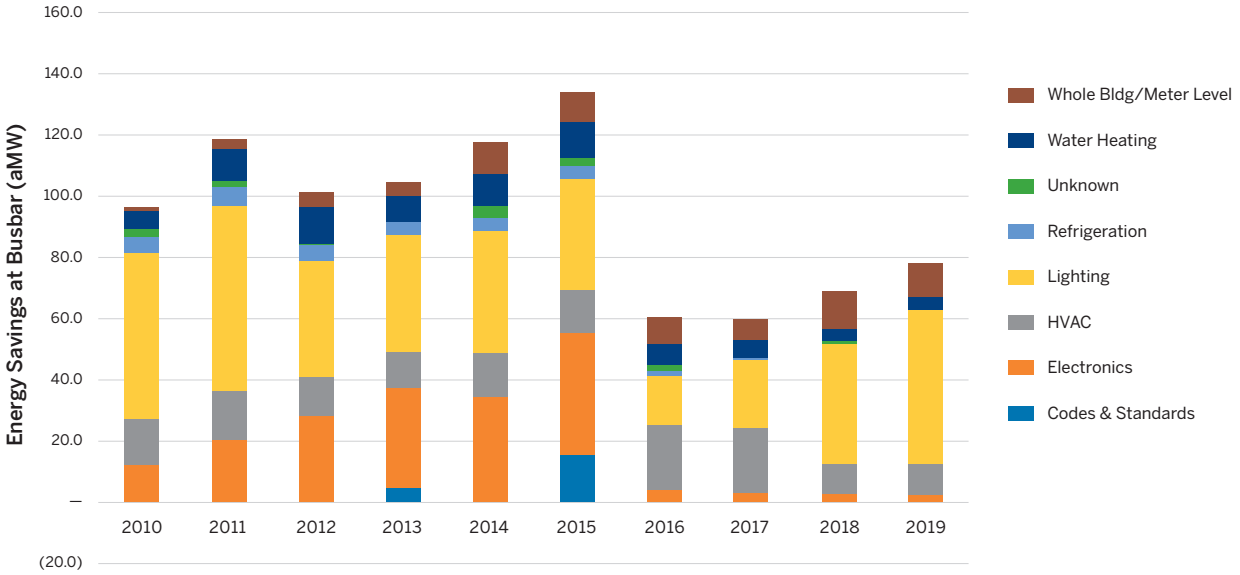
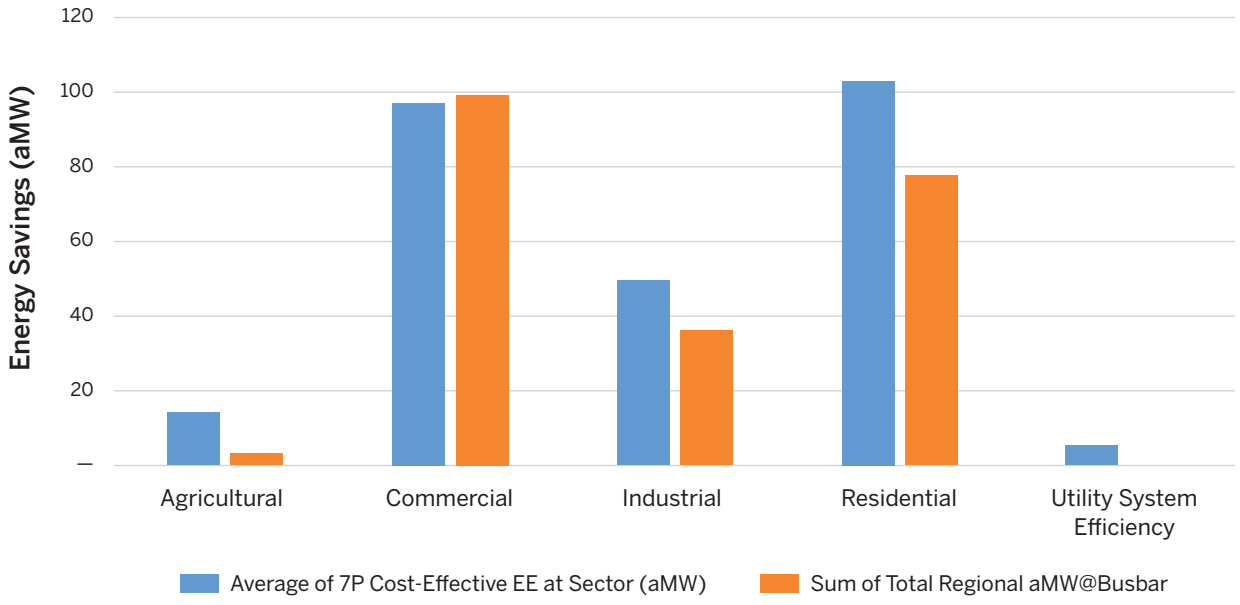


FIGURE 15. 7th Plan Cost-Effective Energy Efficiency vs. Utility System Achievements, By Sector



3.4.3. Expand Low-Income Weatherization Programs

RECOMMENDATION 19

All tribal homes and businesses should be fully weatherized by 2025 and all tribal homes and businesses should receive solar panels and battery systems that provide zero net energy by 2030.

Given the long history of damage by the electric power system to the Northwest tribes' resources, CRITFC recommends that energy efficiency and renewable resource programs implemented by private, public and federal power suppliers give priority to tribal communities. The interim target should be to weatherize all tribal homes and businesses by 2025. Furthermore, all willing tribal homes and businesses should receive solar panels with battery systems and energy efficiency improvements so that these energy efficiency and solar system resources will meet all the energy needs of the building.[103]

Tribal communities include many low-income people. Tribal poverty rates for Columbia River Treaty Tribes are still two to three times the national average. Per capita income is less than half the national average.[104] Data for CRITFC tribes are shown in **FIGURE 16** and **FIGURE 17**.[105]

The Clean Energy Transformation Act (CETA) in Washington requires utilities to ensure an equitable distribution of benefits from the transition to clean energy for all customers.[106] The act also requires utilities to make programs and funding available for energy assistance to low-income customers.

Oregon requires that the total generating capacity of community solar projects be made available for use by low-income residential customers.

RECOMMENDATION 20

Utilities should weatherize and achieve net zero energy for all low-income homes by 2035.

After forty years, too many low-income houses and multi-family buildings still have not been weatherized. People who can least afford it are exposed to higher bills. It is time to solve this problem. Achieving zero net energy will insulate people from higher future costs.

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[103] Many informal promises were made by federal officials during the 1930s that electricity would be made available to tribal people free of charge after the dams were built.

[104] The 1990–95 data (blue) were obtained from the 1999 Meyer Report, which presented information from the 1990 Special Tribal Run U.S. Census. The 2012-2016 data (orange) were obtained from the Center for Indian Country Development, which is a project of the Federal Reserve Bank of Minneapolis.

[105] YN is the Yakama Nation, CTUIR is the Confederated Tribes of the Umatilla Indian Reservation, NPT is the Nez Perce Tribe, CTWSRO is the Confederated Tribes of the Warm Springs Reservation of Oregon.

[106] Chapter 288, Laws of 2019.

FIGURE 16. Poverty Rate for Columbia River Treaty Tribes

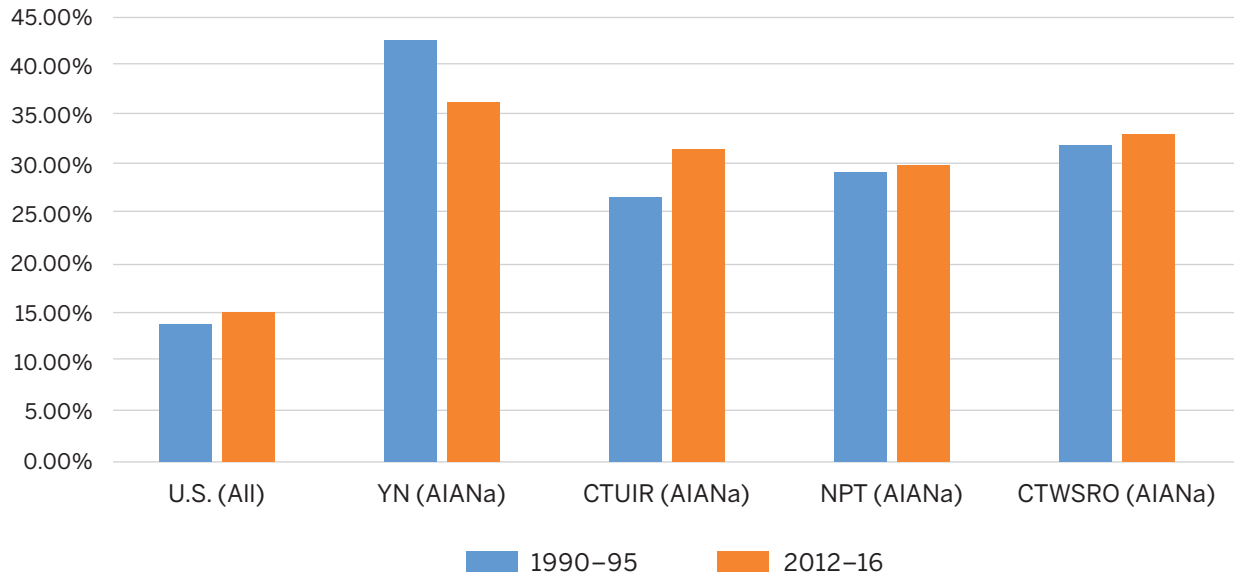
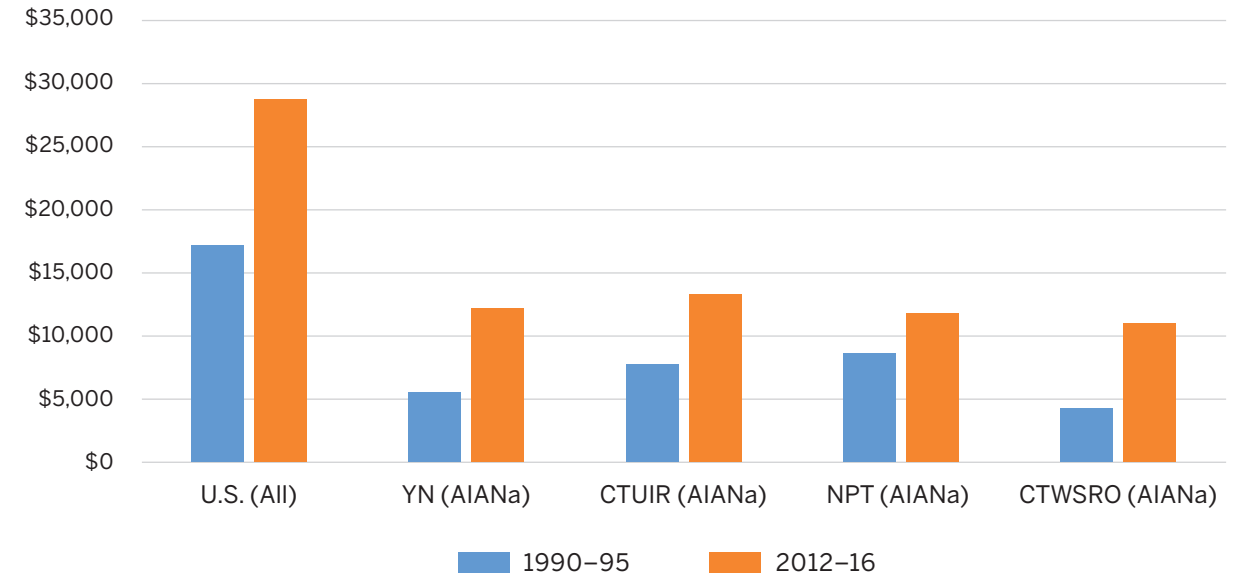


FIGURE 17. Per Capita Income for Columbia River Treaty Tribes



3.4.4. Energy Management Practices in Commercial Buildings and Industrial Facilities

RECOMMENDATION 21

Utilities, the Northwest Energy Efficiency Alliance, and other organizations should implement comprehensive programs to improve energy management practices in the commercial and industrial sectors.

Energy efficient commercial buildings and industrial facilities are a source of great potential savings, with the biggest gains in heating, ventilation, and air-conditioning (HVAC) and improved energy management in industrial plants.

Because HVAC systems and smart thermostats are complicated, they need continuing attention to remain efficient and tuned to the tasks for which they are designed. All new buildings should go through a building certification process to assure that they are operating as they were designed and to assure that the operation is efficient.

Most commercial buildings rely on programmable thermostats that are not always maintained. Many buildings are operated as though occupied continuously. Better scheduling can result in 30–40% savings in many of these buildings. With Smart Grid technologies and strategies that enable one to essentially dispatch loads behind customers' meters, these savings can now be more easily captured. We recommend a concerted regional effort to do so. In Washington state, there is a new building performance standard law that affects most commercial buildings over 50,000 square feet. It will require continuous assessment of operations and that buildings hit certain energy use targets.[107]

3.5 Renewable Resources

3.5.1. Review and Integrate Policies to Reduce Greenhouse Gases

RECOMMENDATION 22

Congress, state legislatures, the Council, and public utility commissions should review programs to reduce greenhouse gases to avoid unintended consequences.

Solar and wind development can significantly reduce greenhouse gas emissions. Lower costs, higher efficiencies, and current federal and state policies are driving an increase in these resources. The capital cost of renewable resources developed to meet state Resource Portfolio Standards (RPS) and/or clean energy standards is being recovered in rates, so when these

[107] https://www.commerce.wa.gov/growing-the-economy/energy/buildings/

resources produce power in excess of "native load need" they can be sold at very low, zero, and even negative costs.[108] As a result of the federal Production Tax Credit and Renewable Energy Credits, resource producers will pay others to take their electricity so they can get the credits.

As a result, the forecasts of future wholesale ***energy*** prices for many hours of the day and for nearly all months of the year across the WECC will continue to be low. These low prices depress the value of energy efficiency's ***energy*** (kwh) savings which in turn increases the cost of energy efficiency as a source of ***capacity*** savings.[109] Therefore, while these tax policies, cost-recovery practices and RPS requirements are intended to promote the development of non-greenhouse gas emitting generating technologies, they have the unintended effect of reducing the amount of energy efficiency that appears to be cost effective. Policy makers must recognize and account for this unintended consequence and its environmental consequences.

Even though some energy efficiency measures can reduce greenhouse gas emissions at a lower cost per ton than the cost of doing so with renewable resources, the existing incentives (tax credits, RECs) and electricity market structures make the energy efficiency measures appear more expensive. These policies may also not adequately address the high economic and environmental effects of transmission and distribution lines. Policies should address all these issues in the development of an integrated set of least-cost options for reducing greenhouse gas emissions, whether that be energy efficiency or renewables resources or most likely a combination of these resources. Unfortunately, under the current policy environment the least-cost mix of resources to reduce greenhouse gases is not likely to be developed.

These policies and standards can also have unintended and negative impacts on tribal communities and all consumers. Energy efficiency reduces consumer costs, provides energy and peak savings that are matched closely to energy needs, and provides local employment. Energy efficiency has other benefits that should be addressed in these policies, such as certainty, reliability, and insurance against heat dome and other extreme weather that can reduce some renewable resource production. Energy efficiency, along with other distributed energy resources such as batteries and demand response, can reduce the scale of renewable development needed to replace fossil fuel generation. Reducing the need for renewable resources helps avoid impacts to tribal resources associated with development of solar and wind farms and transmission lines to get their power to market. It also can reduce some large impacts to the operation of the dams and reservoirs that hurt fish and wildlife.

The NPCC and federal and state regulators and policy makers should recognize the economic and environmental value of energy efficiency and distributed energy resources in offsetting the amount of renewable resources needed so the lowest-cost carbon reduction resource development path is selected. Simply increasing RPS requirements may not produce the best outcome because it does not consider whether there are lower cost carbon reduction resource strategies and strategies that better protect tribal resources.

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[108] A producer would pay an entity to take the power so the producer can get the production tax credit.

[109] In the NPCC 7th Plan energy efficiency was selected as a lower cost source of capacity than demand response because a portion of the cost of energy efficiency was offset by its energy savings value.

RECOMMENDATION 23

The Council should analyze the integration of renewable resources under a range of scenarios for river operations.

As discussed above, CRITFC is concerned about the assumption that the intermittent renewable resources coming online will be integrated with the hydropower system using current fish requirements and the otherwise unconstrained flexibility of the hydroelectric dams and reservoirs. For example, the analyses undertaken by the NPCC assumed static fish constraints for the 20-year planning horizon of the Power Plan. At no time in the history of the Northwest Power Act have fish constraints remained static for a 20-year period. It is highly likely that fish constraints will be modified within this upcoming 20-year period.

The Council has for 40 years been a skilled practitioner of a risk-management approach to power planning. Kai Lee's paper *The Path Along the Ridge* outlined a simple rationale for rejecting simple projections of load growth and other key parameters in power planning: "There are no facts about the future but it is widely believed to be uncertain and risky." In its first power plan, the Council determined that, instead of making simple, deterministic assumptions about an uncertain future, the plan should identify a variety of scenarios and strategies that can work across the full spectrum of possibilities.

The assumption that river operations will be static over the coming 20 years is akin to assuming straight-line energy demand into the future: it's a convenient assumption but almost certainly mistaken. It simply ignores the prospect that climate change, and its implications for ocean conditions, water temperature, amount and timing of runoff and other factors, are likely to have on salmon populations.

Moreover, NPCC's draft 8th Power Plan describes unprecedented effects—conditions that simply have never been considered in prior fish and wildlife program amendment processes, ESA proceedings, or litigation. As the draft plan describes it, as renewable energy development increases dramatically, swings in river flows and reservoir levels are likely to be stark—much more dramatic than has been the case under current river operations. In light of this, existing fish protections will obviously need to be reconsidered. The starts and stops in river flows that the draft plan assumes are likely to have a much harsher effect on migrating fish than has been the case historically.

The assumption that river operations and fish protections are static is belied by the agreed-to 2022 spill and reservoir operations and the system operational requests in the Term Sheet for Stay of Preliminary Injunction Motion and Summary Judgement Schedule.[110] These interim protections in place through July 31, 2022, increase spill for juvenile fish passage, limit "zero flow" operations, and maintain reservoirs at minimum operating pools to benefit salmon migration. It is likely that additional fish protections will be necessary to respond to the challenges the fish face, and the Council should immediately consider a range of fish protections, from additional spill to restoration of the lower Snake River by breaching the four Lower Snake River dams.

[110] *NWF et al. v. NMFS* et al. (Case number 3:01-cv-00640-SI)

The Council's current approach ignores the application of the Clean Water Act to the Columbia River System and the ongoing work by the Environmental Protection Agency on water temperature and water quality. In comments on the draft Energy Vision, EPA wrote:

> *The US Environmental Protection Agency (EPA) appreciates the ability of the Columbia River Federal Power System to provide carbon free power for the Pacific Northwest. However, we are concerned about future regional river flow strategies to produce power and the impact of increasing water temperatures. On August 13, 2021, EPA reissued the Columbia and Lower Snake River Temperature TMDL. This TMDL was developed to provide information about the primary sources of temperature impairments in the Columbia River basin. The TMDL examines sources of temperature impairments on the Columbia River, from the Canadian border to the Pacific Ocean, and on the lower Snake River in Washington, from its confluence with the Clearwater River at the Idaho border to its confluence with the Columbia River.*
>
> *One of EPA's key findings is the impact of climate change on water temperature in the Columbia River. EPA determined that the warming trend due to climate change has significantly affected temperatures in the rivers since the 1960s, and these adverse thermal impacts continue to increase. A synthesis of available scientific evidence indicates that climate change has increased summer water temperatures in the Columbia and Snake Rivers by approximately 1.5°C since the 1960s. EPA's analysis also found that dam impoundments significantly contribute to warming of the Columbia and Snake Rivers in the summer and fall due to increased river surface area and increased time for water to travel through the reservoirs. These attributes of dam impoundments also magnify the rate of warming from climate change in the Columbia and Snake Rivers (see TMDL Appendix D). Actions to increase flow and provide quicker water travel time in a reservoir can decrease summer water temperature and cool the river. As the TMDL moves into the implementation phase, these types of dam and reservoir operations changes should be assessed to cool river temperatures during critical periods and locations to improve conditions for fisheries.*[111]

Putting in place an energy development strategy that assumes, and implicitly accepts, that energy development can ignore these effects will simply set the strategy up for failure. As fish stocks absorb the impacts of these unprecedented fluctuations, hydropower operations are likely to be thrown back into the ESA and litigation forums that the region has been trying to manage its way out of for 30 years.

The way to account for these effects in developing a sensible energy strategy is to analyze a range of river operations scenarios that respond to the challenges that fish are likely to face, and review energy options that make sense across the range. The Council, the progenitor of risk-based planning, is in the perfect position to bring these techniques to bear in this new era of unprecedented uncertainty.

CRITFC recommends that the Council consider a range of fish constraints in its analysis of the

[111] Comments by Mary Lou Soscia, Columbia River Coordinator, US Environmental Protection Agency, September 28, 2021.

region's energy future and make a fully informed decision in adopting Power Plan requirements. SECTION 3.1 and APPENDIX C describe near-term and longer-term changes in the configuration and operation of the hydroelectric dams that should be evaluated.

3.5.2. Wind Generation

RECOMMENDATION 24

Utilities and BPA should continue to pursue wind, and the associated efforts to integrate wind power, consistent with the tribal concerns and protections for fish, wildlife, and cultural resources.

The Northwest has been a leader in the adoption of wind power. Wind power is a low-cost source of power today, and it offers insurance against escalating prices in the future, because the "cost of fuel" is free. However, the intermittent production of wind power, and the difficulty in predicting when the wind will blow presents a problem with integrating wind into the system. Integration of wind is exacerbated under high-water, high-wind, and low-load scenarios. BPA has led a regional effort to better integrate wind into the system. We believe that wind integration will be improved by use of various storage mechanisms discussed previously in this Energy Vision report.

Siting wind projects can be controversial. The Washington Energy Facility Site Evaluation Council held eight days of adjudicative hearings and took public testimony on two separate days when considering the application for the Whistling Ridge Energy Development near Underwood Washington and adjacent to the Columbia River Gorge National Scenic Area. Ultimately the project was abandoned by the developer. Similar concerns are now facing a wind development proposed for the Horse Heaven Hills near Washington's Tri-Cities.[112] SECTION 3.6 recommends a planning process for siting renewable energy development in the Northwest.

3.5.3. Solar Generation

RECOMMENDATION 25

The region should expand its efforts to promote utility-scale solar energy.

Solar power comes with the same integration problems that affect wind, and it comes with the same benefits of cost certainty throughout the life of the system. The capital costs of solar power have decreased significantly and there are growing opportunities to develop solar and battery systems to assist in meeting energy needs.

And, as discussed below we recommend a process for siting industrial scale solar developments that may impact undisturbed lands that are valued by wildlife such as pygmy rabbits and sage grouse, both of which have been considered for listing under the Endangered Species Act. Pygmy rabbits are now listed under the ESA and a long history of sage grouse litigation continues concerning protective measures.[113]

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[112] "The thought of turning our beloved Horse Heaven Hills into a pin cushion for massive wind turbines breaks the hearts of most Tri-Citians." From the editorial board of the Tri-City Herald, https://www.tri-cityherald.com/opinion/editorials/article250063544.html

[113] https://biologicaldiversity.org/w/news/press-releases/lawsuit-aims-compel-fish-and-wildlife-service-protect-bi-state-sage-grouse-2020-09-29/; https://biologicaldiversity.org/w/news/press-releases/court-halts-drilling-on-630-square-miles-of-federal-oil-leases-in-key-sage-grouse-habitat-2021-06-10/

RECOMMENDATION 26

BPA and utilities should fund proof of concept projects for dual use solar.

The siting process discussed above and in SECTION 3.6 should also address solar development that is compatible with high-value farmland. The American Farmland Trust (AFT) provided thoughtful comments about focusing solar development on marginal lands—those that are least productive for agriculture *and* not critical for wildlife habitat. Agricultural lands that require groundwater depletions for their productivity are inherently marginal. The Council staff presented examples of innovative low-impact solar development, dual purpose projects that co-locate and integrate renewable energy with a complementary activity that gain from working together, and floating solar systems on agricultural reservoirs.[114]

AFT has proposed pilot projects to demonstrate dual use solar on agricultural land. AFT defines "dual use" as solar development that is designed with agriculture in mind. Early research has shown that well-designed dual use projects have the potential to enhance agricultural practices, such as extending the growing season, preventing evaporation, and providing shade for livestock. It can also provide passive revenue for farmers to support the commercial viability of their farming operation.

Research is underway to develop the best practices and design of dual use solar. To date, these projects have been too small for electric utility application. Funding several utility-scale pilot projects could provide a proof of concept for this approach to siting solar on agricultural land.

3.5.4. Distributed Solar Generation

RECOMMENDATION 27

States, local governments, and utilities should expand policies to promote on-site solar systems.

The costs of solar photovoltaic systems for homes and business have also decreased. These investments provide savings and certainty for the building owners. These systems have significant system benefits because they do not require expanded transmission and distribution lines and thus avoid the environmental impacts of those developments. Solar systems with batteries are designed to provide storage and backup power to improve reliability. Solar roof top and battery systems will be sited behind customers' meters. In this case, line losses and ancillary services to get the power to the load are miniscule. Also, the intermittency problem of solar power is diminished somewhat, because small photovoltaic systems will be spread over wide areas of the region. Passing clouds will affect only a small portion of the installations at any moment. Thus, predictability of solar will be enhanced.

The Council draft 8th Power Plan projects distributed solar systems will add about 1,000 megawatts of capacity and 200 average megawatts of energy by 2030. By 2045, the projection is about 5,000 megawatts of capacity and 750 average megawatts of energy. CRITFC believes these systems can provide even larger amounts of energy with appropriate incentives that recognize the full value of these systems.

[114] Considerations of Large-Scale Renewable Resource Deployment, Gillian Charles, June 2, 2021.

Utility and government programs can further reduce on-site solar costs by supporting cooperatives that can purchase photovoltaic panels at lower-cost bulk rates and providing technical assistance to homeowners, landlords, tribal governments, and others. Programs can also provide additional financial incentives.

These policies should consider Zero Net Energy standards similar to California for new and existing houses and businesses. The evaluation of the costs and benefits of these on-site solar systems should include the savings to the transmission and distribution system discussed in SECTION 3.10 and APPENDIX E.

RECOMMENDATION 28

The Council, Northwest legislatures, energy regulators, and utilities should consider adopting zero net energy building standards.

California has implemented a mandate for zero net energy (ZNE) buildings. These are energy-efficient building with solar rooftops and batteries where the annual consumed energy is less than or equal to the on-site renewable generated energy.[115] The California goals are:

- All new residential construction will be zero net energy (ZNE) by 2020.
- 50% of new major renovations of state buildings will be ZNE by 2025.
- All new commercial construction will be ZNE by 2030.
- 50% of commercial buildings will be retrofit to ZNE by 2030.

The 2020 Oregon Biennial Energy Report[116] states:

> *Oregon Executive Order 17-20[117] targets equivalent performance to the U.S. DOE Zero Energy Ready Home specifications in the residential building code by 2023 and includes a directive for new state agency construction to be designed to be able to operate as carbon-neutral buildings after 2022. Executive Order 20-04[118] continues the trend toward increased efficiency in new construction and net zero energy buildings by targeting a 60 percent reduction in new building annual site consumption of energy by 2030, excluding electricity used for transportation or appliances, from a 2006 code baseline. This advancement in efficiency makes net zero energy achievable for some residences and building types, when coupled with installation of renewables.*
>
> *Executive Order 17-20 also includes a requirement for solar-ready provisions in the building code to make future installations of onsite renewables more accessible for building owners, which was incorporated into the Oregon residential building code[119] for new construction in October 2020. As of 2019, the Oregon commercial energy code requires completion of the "2019 Oregon Zero Energy Ready Commercial Code*

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115 See California Public Utility Commission: https://www.cpuc.ca.gov/zne/.

116 See https://www.oregon.gov/energy/data-and-reports/pages/biennial-energy-report.aspx.

117 Office of the Governor, State of Oregon. (November 6, 2017). Executive Order 17-20. https://www.oregon.gov/gov/documents/executive_orders/eo_17-20.pdf.

118 Office of the Governor, State of Oregon. (March 10, 2020). Executive Order 20-04. https://www.oregon.gov/gov/Documents/executive_orders/eo_20-04.pdf.

119 Oregon Building Codes Division (October 1, 2020). 2017 ORSC Amendments Solar Readiness Requirements for New Residential Buildings. https://www.oregon.gov/bcd/laws-rules/Documents/20201001-17orsc-solar-amendments-tr.pdf.

Compliance Form" that, while not specifically requiring onsite or offsite renewables in the code, includes a requirement for an estimation of building energy consumption, renewables needed to achieve net zero energy, and the onsite renewable generation potential. This helps raise awareness of net zero energy buildings and what is needed to achieve that level of performance. Utility programs, energy policies, energy codes, voluntary performance standards, and interested building/homeowners all contribute to advancing net zero buildings.

Building and retrofitting homes and business to be very energy efficient and adding solar or wind energy with a battery system has many advantages. With the right incentives, it would reduce consumer costs, reduce peak demand and energy needs at all other times, and reduce the costs of expanding transmission and distribution power lines. These are fish and environment friendly measures. All these factors should be included in calculating the cost effectiveness of these programs.

Zero net energy homes and building also provide energy security to the region and to individuals. They provide insurance against droughts that limit electricity from the dams, wildfires that disrupt transmission lines, cold snaps and heat waves that drive up electricity demand, and other natural disasters that will become more common as the climate warms. These benefits should be recognized in reliability forecasts.

A major effort to build and retrofit low-income residences that was recommended above will likely reduce the costs of achieving this goal in all structures. For example, the Council called on BPA and utilities to pay the incremental costs of meeting efficient building codes in the 1980s. As a result, the costs of materials and installation were reduced significantly, and these payments were no longer needed.

RECOMMENDATION 29

State and local governments should adjust building codes to ensure that they can accommodate on-site batteries.

In some areas, building or fire codes could limit the size of an on-site battery. These codes should be revised.

3.5.5. Other Renewable Resources

RECOMMENDATION 30

The Council, BPA, and utilities should continue to monitor and support other promising renewable resources.

We focused on wind and solar above, but other renewable resources either at specific sites or with technological breakthroughs may be cost effective and have fewer environmental impacts. Offshore wind, geothermal energy, and biomass have been used successfully where the right conditions exist. And wave power, although in its infancy, may be cost effective in the not-too-distant future. The growing focus on the climate crisis and environmental protection may produce new innovations with lower impacts. Funding for research and pilot projects can help stimulate new technologies. Where these resources show promise, the promise should be explored, and implementation should be pursued when and where analyses show them to be ready for commercial production and can be integrated within the power grid.

3.6 Develop a Comprehensive Plan for Strategically Siting Renewable Resources and Transmission

RECOMMENDATION 31

CRITFC and its member tribes should work with state energy and siting agencies, federal agencies, Northwest Grid, the Northwest Power Pool, and others to develop a timely comprehensive plan for siting renewable resources and transmission lines that builds in efforts currently being developed in the states.

The recommendations for energy efficiency, demand response, clear price signals, and distributed generation can reduce the need for new resources and additional transmission lines. We recognize that meeting the goals to reduce greenhouse gases will likely require additional development of significant additional renewable resources and some transmission lines. Therefore, CRITFC recommends the region prepare a timely thoughtful plan for where renewable resources should be developed, and where they should not. The plan should provide expeditious siting with clear and uniform standards across all political subdivisions that sites resources near loads and within the grid to relieve congestion, and that protects fish, wildlife, and other environmental values and tribal resources.[120]

Strategically siting some electricity generation closer to loads, in combination with reducing peak energy demands, will eliminate some of the planned costs and impacts associated with expanding the transmission and distribution system. Utilities must develop interconnection standards[121] that allow for safe operation of local generators. Distributed generation can be deployed to eliminate the need for backup generation and transmission and distribution capacity.

Distributed generation resources include fuel cells, net-metered small renewable resources, and small wind farms. Owners of net-metered small renewable resources, including solar photovoltaic applications, can sell power back to the local utility at retail prices. Small wind farms of two to ten machines can be placed

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[120] CRITFC's member tribes have ample experience with the devastating impacts of carbon free resources, such as the Columbia River Basin's system of dams that deeply impacted the tribes. These impacts have been documented in extensive surveys. https://www.critfc.org/wp-content/uploads/2014/11/circum.pdf. Even contemporary projects like the $2 billion pumped storage project proposed near Goldendale WA pose impacts to tribal cultures and economies and can be expected to face stiff tribal opposition. Situated directly on a sacred tribal site, the proposed project directly impacts Yakama Nation cultural, archeological, ceremonial, monumental, burial petroglyph and ancestral use sites.

[121] FERC has a NOPR to make interconnection standards simple and uniform throughout the country. See Standardization of Small Generator Interconnection Agreements and Procedures Advance Notice of Proposed Rulemaking, Docket No. RM02-12-000, issued August 16, 2002.

strategically within the grid and not necessarily where wind is the greatest, but where the combination of strategic placement and the wind resource yields the highest benefit to the electricity system. This benefit would show up as income to the wind developers and savings in transmission and distribution construction costs.

Moving new renewables next to existing transmission is another siting strategy that could minimize the costs and impacts of adding new resources. For example, Montana wind is well positioned to serve westside load centers while minimizing impacts on river operations. In addition to having the highest capacity factors (40–50 percent), it generates primarily during the winter, so its generation pattern best fits PNW peak load shapes; and it can use over 1 GW of repurposed Coalstrip transmission rather than needing to build new, much more expensive transmission to serve westside loads. Because of these characteristics, Montana should help meet PNW winter capacity needs while also lessening river operation and upland impacts.

Strategic siting of new resources is just one piece of a comprehensive siting plan; siting of new resources will also need to consider—and avoid—adverse impacts to fish and wildlife and other environmental values and tribal resources. According to the Washington Department of Fish and Wildlife, 30 industrial solar projects are proposed for Washington with a footprint of 49,000 acres, or nearly 77 square miles. All but one of those projects would be in the Columbia Basin. The Oregon Department of Energy (ODOE) reports that the state Energy Facility Siting Council has approved seven projects and has seven more under review. The 14 projects cover 27,969 acres or 44 square miles. Local siting processes in Oregon would likely add to this total.

Facilities sited on shrub steppe compromise the function of sagebrush and grassland ecosystems and degrade habitat for deer, elk, greater sage grouse, ferruginous hawk, pygmy rabbit, and many other species. Developments also risk excluding tribal members from their traditional cultural foods and medicines, either through loss of the foods, loss of access to the foods, or both.

In the mid-1980s, over 70 small hydroelectric facilities were proposed by private developers to the Federal Energy Regulatory Commission for licensing and development in the Salmon River Basin of Idaho. The National Wildlife Federation and the Nez Perce Tribe objected to initial steps in this development proceeding without a comprehensive plan of review. *National Wildlife Federation v. Federal Energy Regulatory Commission, 801 F.2d 150, 1507 (9th Cir. 1986).* The Ninth Circuit Court of Appeals emphasized Congress' commitment in the Federal Power Act to coordinated study and comprehensive planning along an entire river system before hydroelectric projects are authorized. This particular conflict and other similar conflicts over siting small hydro development in the Columbia Basin led to the regional policy adopted by the Northwest Power and Conservation Council and Bonneville Power Administration establishing "protected areas" where hydro project development is discouraged.[122] The current incentives for wind and solar developments are creating

[122] For more information and for the formal Protected Areas provisions, see the 2014 Fish and Wildlife Program's Protected Area Strategy (Part Three, Section IV (A)(5)) and Appendix F to the Council's 2014 Columbia River Basin Fish and Wildlife Program, available at https://www.nwcouncil.org/sites/default/files/2014-12_1.pdf. A 2020 Addendum was added to the 2014 Fish and Wildlife Program, but the text of the 2014 Program—including the Protected Area strategy—remains in effect. See https://www.nwcouncil.org/sites/default/files/2020-9.pdf.

an analogous situation, where impacts of uncoordinated renewable resource development may permanently harm the Basin's water, fish, wildlife and cultural resources.

A siting plan like the one used in the 1980s for regional small hydro development, should be developed to guide renewable resource siting. The plan should take a programmatic approach considering reasonably foreseeable impacts associated with such development. All affected tribes should be included during the early phases of siting, planning, and permitting processes by both state and federal governments. The plan could assess renewable resource sites and prioritize their potential for development. Potential aesthetic, wildlife, and cultural resource impacts, all of which may bear upon site selection, and related issues, such as the location proximate to load or need for new transmission, could be examined. The following examples demonstrate how such siting plans have been developed and what a plan could address.

- In October 2012, the Department of the Interior completed such a plan for development of solar energy on public lands in six western states. The Programmatic Environmental Impact Statement (PEIS) for solar energy development provides a blueprint for utility-scale solar energy permitting in Arizona, California, Colorado, Nevada, New Mexico and Utah by establishing solar energy zones with access to existing or planned transmission, incentives for development within those zones, and a process through which to consider additional zones and solar projects.
- The Solar PEIS establishes an initial set of 17 Solar Energy Zones (SEZs), totaling about 285,000 acres of public lands, that will serve as priority areas for commercial-scale solar development, with the potential for additional zones through ongoing and future regional planning processes. If fully built out, projects in the designated areas could produce as much as 23,700 megawatts of solar energy, enough to power approximately 7 million American homes. The program also includes a framework for regional mitigation plans, and to protect key natural and cultural resources the program excludes approximately 79 million acres that would be inappropriate for solar development based on currently available information.
- In January of 2013, the Department of the Interior completed a plan for renewable resource development in Arizona. The Restoration Design Energy Project (RDEP) is an initiative to identify lands that may be suitable for the development of renewable energy. The RDEP Record of Decision and Approved Resource Management Plan Amendments establish 192,100 acres of renewable energy development areas on BLM land throughout Arizona. These areas are near transmission lines or designated corridors, close to population centers or industrial areas, and in areas where impacts on water usage would be moderate. These lands also have few known resource impacts or have been previously disturbed. One example is retired agriculture property. These areas are available for solar or wind energy development. In addition, the Plan establishes the Agua Caliente Solar Energy Zone on 2,550 acres in western Arizona.
- In 1986, the Northwest Power and Conservation Council adopted Protected Areas into the Columbia River Fish and Wildlife Program. These provisions protected 44,000 stream miles of habitat that was important for fish and wildlife. The provisions were recognized by the Federal Energy Regulatory Commission pursuant to its mandates under

the Northwest Power Act. Protected Areas had the effect of avoiding disputes and wasted resources on sites that had significant fish and wildlife impacts and focusing development where it was unlikely to have negative impacts.

- The Oregon Department of Energy (ODOE) is developing the Oregon Renewable Energy Siting Assessment (ORESA) online mapping and reporting tool to inform this type of work. An initial version expected in Winter 2021 and project completion is expected in Spring 2022. ODOE may build on the ORESA project through the 2022 Biennial Energy Report regarding resource planning considerations with land use impacts of renewables. ODOE is involving a diverse group of stakeholder hopes that an online mapping and reporting tool will support efforts to carve out priority locations.
- Washington State has several efforts to address the siting of renewable energy and related infrastructure. The Compatible Energy Siting Assessment (CESA) is a joint effort of the Washington State Department of Commerce and Washington State Energy Facility Site Evaluation Council which supports Washington clean energy goals by identifying renewable energy siting and development.[123] The CESA effort includes a prototype mapping tool.[124]The Washington Transmission Work Group was mandated by the Clean Energy Transformation Act (CETA) of 2019 to review the need for upgraded and new electricity transmission and distribution facilities and is expected to report its findings in a final report due by Dec. 31, 2022. Washington State University will begin an effort to launch a least-conflict solar siting plan in the Columbia Basin and central Washington.

The need for such comprehensive planning was highlighted in a separate concurring opinion in the Whistling Ridge wind development proceeding before the Washington Energy Facility Site Evaluation Council in 2011. *Whistling Ridge Energy Project, Washington EFSEC Order No. 868 (October 6, 2011)*. "Absent such a plan… economic considerations will be paramount and the broader public interest in protecting the environment could finish second. This is in no one's interest, least of all renewable resource developers" (James Luce, Chair).

The region would benefit from a comprehensive planning process that would guide renewable resource development and siting for wind, geothermal and solar technologies, and for transmission lines to favorable locations and outcomes for regional fish, tribal cultural resources, and energy needs. Common to each of the foregoing plans was the concept of developing criteria that would protect key resources by designating areas where development should be avoided as well as criteria that could guide development to areas where development could be incentivized.

Such criteria could stimulate innovations in renewable resource siting. For example, "low-impact" solar is designed to improve soil health, retain, water, nurture native species, and produce food. These projects preserve natural habitat, rather than leveling land and removing topsoil to use gravel or artificial grass.[125] The NPCC has also reported on dual purpose projects that integrate renewable projects such

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[123] See https://www.commerce.wa.gov/serving-communities/growth-management/growth-management-topics/military-base-land-use/

[124] See https://storymaps.arcgis.com/stories/b2984ef464db408c86a744d31ccbd0e0

[125] InSPIRE project stands for Innovative Site Preparation and Impact Reductions on the Environment. From NPCC June 2021 presentation.

as livestock grazing, beehives, and certain crops. A National Renewable Energy Laboratory study identified over 25,000 man-made reservoirs that could be covered with floating solar systems to reduce evaporation and algae growth and supply ten percent of U.S. power.[126] The criteria might also promote repowering existing sites to improve efficiency and output.

In the Columbia Basin context, the following criteria are offered as examples of criteria that could protect tribal interests on their ceded lands that comprise much of the interior Columbia Basin.

Summary of Siting Recommendations:

Areas to avoid in siting renewable energy resources and transmission development:

- Sites that would involve direct disturbance of tribal First Foods, including:
  - Water
  - Salmon and culturally significant fish species bearing watersheds (*e.g.,* Pacific Lamprey, suckers, white mountain trout, etc.)
  - Ungulate (big game) calving, and critical feeding grounds and travel corridors
  - Cultural food plants and medicines
  - Berry fields
- Sites with high potential for direct disturbance of tribal archaeological and cultural resources as defined by the tribes
- Sacred sites
- Areas of tribal cultural use (*e.g.*, cultural food gathering)
- Sites where birds of prey will be impacted
- Critical habitat areas (designated and proposed) for species under the Endangered Species Act of 1973 or under state sensitive species statutes.

Areas to incentivize for renewable resources development:

- Sites that already have transmission. For example, expanding wind production in Montana could use existing transmission lines that were used to transmit electricity from coal plants that are phasing out.
- Sites already disturbed by tilled agriculture (see the discussion of dual use solar project above).
- Sites where ecological and energy benefits are complementary, such as reducing irrigation demand by siting solar and wind development where ground water resources are depleted, and making complimentary arrangements to protect long-term agricultural interests
- Sites that do not require extensive new transmission resources
- Currently designated industrial zones
- Land areas outside the anadromous fish zone

The BLM Final Programmatic EIS for Solar Energy Development[127] had some similar criteria for solar development in the desert Southwest,[128] which applied to both action alternatives. Several of the criteria are highlighted in **TABLE 7**.

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[126] Floating Photovoltaic Systems: Assessing the Technical Potential of Photovoltaic Systems on Man-Made Water Bodies in the Continental United States, Spencer *et al,* Environmental Science and Technology, 2019, 53(3), pages 1680–1989.

[127] Final Programmatic Environmental Impact Statement for Solar Energy Development in Six Southwestern States, BLM and DOE 2012, available at https://solareis.anl.gov/documents/fpeis/index.cfm.

[128] *Id.* at Section ES2.4.2.2.

These and other criteria were developed to address the potentially affected interests in the desert Southwest, including Arizona, Nevada, New Mexico, Colorado and portions of California. Some of the criteria are likely to be suited to the Columbia Basin. An excerpt from the FPEIS can be found in APPENDIX F. Numerous maps were developed by the U.S. Bureau of Land Management for the EIS that described areas for potential development. **FIGURE 18** is an example shown for the State of Nevada.

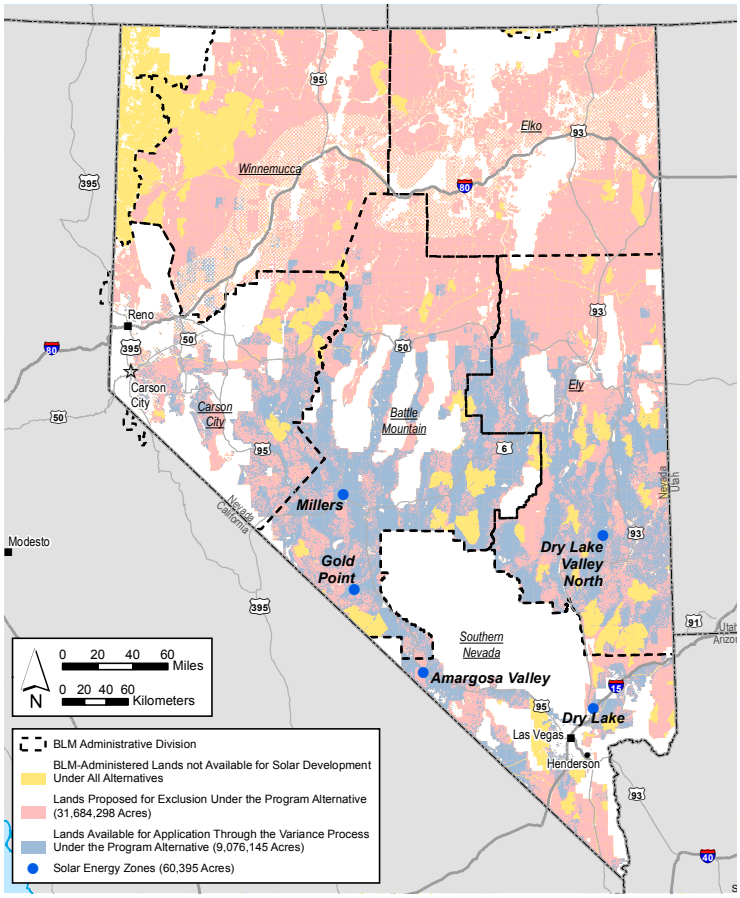
TABLE 7. Examples of Criteria Used to Determine Areas for Exclusion Under the BLM Solar Energy Development Program Alternative

1. Lands with slopes greater than 5% determined through geographical information system (GIS) analysis using digital elevation models.
2. Lands with solar insolation levels less than 6.5 kWh/m^2/day determined through National Renewable Energy Laboratory solar radiation GIS data
3. All Areas of Critical Environmental Concern (ACECs) identified in applicable land use plans (including Desert Wildlife Management Areas [DWMAs] in the California Desert District planning area).
4. All designated and proposed critical habitat areas for species protected under the Endangered Species Act of 1973 (as amended) as identified in respective recovery plans.
5. All areas for which an applicable land use plan establishes protection for lands with wilderness characteristics.

Further discussion of the analysis underpinning this map is set forth in APPENDIX F.[129]

CRITFC recommends the federal government, state siting councils and the tribes immediately undertake a collaborative process for developing such a siting plan to protect Columbia Basin fish, wildlife, and cultural resources. Access to state and federal incentives for resource development should be contingent upon compliance with the plan's siting criteria.

FIGURE 18. U.S. Bureau of Land Management Potential Solar Development in Nevada



Source: https://solareis.anl.gov/documents/fpeis/maps/alternatives/Final_Solar_PEIS_NV_map.pdf

[129] Also available at https://www.energy.gov/sites/default/files/EIS-0403-FEIS-Volume1-2012_0.pdf on pages 2–20 through 2–22.

3.7
Resource Adequacy

RECOMMENDATION 32

The Northwest Power Pool Resource Adequacy Program should address fish and wildlife protections.

The peak load reductions, energy efficiency, storage, and renewable resources recommendations above will all assist the region to provide adequate electricity supplies.

The Northwest Power Pool is updating its Resource Adequacy program. This effort is designed to address Pacific Northwest capacity shortfalls through 2030. If successful, the Northwest Power Pool Resource Adequacy Program will achieve electric system reliability while minimizing pressure on the existing hydroelectric system as the *de facto* fallback, with predictable adverse impacts on salmon, when the region is capacity short. The program description states: "the capacity program will not initially focus on longer time-horizon of fuel-related issues (*e.g.,* dry water years), though we understand those issues are important."

CRITFC has recommended that a principal feature of the Adequacy Program should focus on a planning reserve margin (PRM), or reliability buffer, to guard against unanticipated reliability events and protect the region's natural and cultural resources. While individual utility PRMs have typically centered around 15 percent, the Resource Adequacy program should increase this buffer to ensure reliability for both capacity needs and energy shortages in a low-water years. CRITFC notes that the California Independent System Operator (CAISO) requires utilities to purchase a resource adequacy product and is reportedly moving to a 20 percent reserve margin to help solve California's reliability problems.

In the near term, these reserves are likely to require having combustion turbines on standby. There may be opportunities to fuel these plants with biofuels that reduce their net carbon footprint. CRITFC recommends that the Power Pool and utilities prioritize such opportunities. Additional near-term reserves are likely to be fueled by natural gas. While CRITFC strongly supports the long-term elimination of all fossil fuels to address the climate crisis, in the near term, there may be circumstances where the choice is burning some natural gas or shutting down river operations and killing migrating salmon. This has happened in the past with devastating effects to tribal resources. Therefore, CRITFC supports rate treatment for the costs associated with maintaining, staffing, fuel contracts and fuel storage, and other costs for these resources.

These actions would likely address near-term capacity concerns and low-water energy concerns; however, there are high costs associated with maintaining generating resources that may only run a few times a year or a few weeks during a decade. Over the longer term, implementing CRITFC's recommendations on reducing peak loads, promoting energy efficiency, properly integrated renewable resources, and other dry-year strategies, provide a range of other longer-term actions to maintain resource adequacy at lower costs without damaging fish and wildlife and other tribal resources.

RECOMMENDATION 33

The California Public Utilities Commission and the California Independent System Operator should address reliability issues in California that could affect the Northwest.

Power disruptions in California can also affect the Pacific Northwest. The California Public Utilities Commission and Independent System Operator are working to address the problems that caused the blackouts in 2020. The system in California relied on *average* load forecasts rather than forecasts for critical hours of the day (for example, the peak hours between 4 pm and 10 pm that occur every day during July through September). The California forecasts also relied on *average* estimates for wind and solar output. However, hourly loads and resources vary greatly in California. As the sun sets, the energy from solar systems drops quickly, but the air conditioning electricity requirements continue—this creates a high risk of shortages around 7 pm when net demand reaches its peak. Given these known power system dynamics, the California Public Utilities Commission's reliability and planning targets were badly outdated.[130] They need to be revised. These revisions are likely to demonstrate a need for improved forecasts, more resources, including energy efficiency, better coordination with the Northwest, or a delay in retiring existing resources, to avoid future problems that could spill-over into the Columbia Basin.

3.8 Additional Actions to Address Emergencies

RECOMMENDATION 34

BPA and Congress should address repayments to the Treasury to avoid curtailment of fish and wildlife protections.

In the past, BPA has reduced fish and wildlife protections when low-water or higher costs threatened its ability to meet its annual payment to the U.S. Treasury.[131] CRITFC recommends that BPA increase its probability of repaying the Treasury on time and in full, thus reducing the chances that BPA would get into a position where it might have to choose between meeting fish obligations and deferring a payment to the Treasury. BPA's obligations to fish must come first. As an alternative, Congress could enact legislation that would provide the flexibility to refinance a payment to address extraordinary circumstances. Under no circumstances should fish protection be sacrificed to assure Treasury payments.

BPA has made some changes in its rate structure to increase revenue when financial reserves drop below certain thresholds—to begin replenishing financial reserves prior to needing to trigger the Cost Recovery Adjustment Clause. CRITFC continues to recommend that BPA expand the circumstances that could trigger the emergency provisions and increase the amount it could collect in these circumstances. Moreover, we were disappointed that BPA's stewardship obligations

[130] Randy Hardy, *Analysis of Three Agency Report on August 2020 California Power Outages*, October 15, 2020.

[131] BPA repays the costs of the federal dams and transmission system.

for fish and wildlife were not addressed on par with its power mission in its 2021 strategic plan.

BPA has reduced in real terms funding available for its fish and wildlife program. It has also made changes that reduce fish and wildlife operations. CRITFC will continue to work to address these concerns.

3.9 West Coast Energy Market

RECOMMENDATION 35

The Pacific Northwest utilities, states, and federal agencies should closely monitor West Coast energy market developments to ensure that they address impacts on Columbia Basin Fish and Wildlife and other tribal resources.

The growth of formalized markets has changed the way wholesale power is acquired. There are very few bilateral wholesale power purchase agreements as most transactions are now coordinated through market participation. Therefore, the design and incentives in these markets are important to overall power system operations.

California has an active Independent System Operator to coordinate electricity generation and distribution. Wide area market integration, through BPA participation in the Western Energy Imbalance Market (EIM) and ultimately an enhanced day-ahead market (EDFAM) can facilitate access to other sources of generation and flexibility when the hydrosystem is constrained. These constraints need to be priced into the hydro dispatch and reflected in marginal prices. BPA has decided to join the EIM; implementation is expected in March 2022. Further wide area coordination can take some pressure off the system.

It may be possible that closer coordination between regions can improve reliability and address resource adequacy problems. It will be important to work with California to ensure their operations do not adversely impact salmon migration and survival as discussed above.

3.10 Transmission and Distribution Costs and Reliability

RECOMMENDATION 36

BPA and utilities should invest in solutions that minimize transmission and distribution expansions.

As discussed above and in more detail in APPENDIX E, there are significant economic and environmental costs associated with the existing and new transmission and distribution lines.

CRITFC estimates that BPA and four Northwest investor-owned utilities spent approximately $8.8 billion on transmission between 2016 and 2020. Of this total, BPA spent $1.4 billion on transmission capital expenses. BPA is projecting another $2 billion between 2021 and 2025[132] for a ten-year total of $3.4 billion. The funding for expansion of BPA system represents more than half theses total costs. BPA spent $601 million between 2016 and 2020 and is projecting a transmission expansion program totaling $730 million over the next five years.

CRITFC was able to compile distribution and transmission costs from the past five years for four investor-owned utilities in the region that totaled $6.8 billion. The information for the investor-owned utilities did not have details on expansions.[133]

CRITFC could not find enough detail to determine how much of these costs were related to activities that could be reduced or delayed if additional energy efficiency, on-site solar, and peak-demand reduction programs described in this document had been implemented.

If utility spending on transmission and distribution over the next five years is similar to the recent past, the total BPA and investor-owned spending could total $8.8 billion. Spending by other utilities would add to this total. If additional energy efficiency, on-site solar, and peak-demand reduction programs described in this document could reduce the transmission and distribution capital costs by ten percent, it could save consumers approximately $880 million over the next five years. Even a five percent reduction in the construction of new transmission and distribution systems could save consumers about $100 million per year.

The large magnitude of these transmission and distribution costs and the significant potential for savings for consumers and the environment should convince regional energy decision makers to focus on the benefits of reducing these economic and environmental costs. The construction costs are averaged into utility rates, so consumers do not see the magnitude of the expense. The environmental costs often fall on tribal resources (such a First Foods and sacred sites), rural areas, and populations that are not represented in energy siting or ratemaking processes. Investor-owned utilities receive a rate of return on these investments. All these factors may create an incentive to expand these facilities rather than pursue activities that reduce the need for these expensive assets. Therefore, CRITFC recommends that all proposals for transmission and distribution expansions should evaluate the other alternatives described in this Energy Vision that could delay or eliminate the need for the project. BPA and utilities should pursue those alternatives when they reduce costs or cultural and environmental impacts.

BPA and utilities should also implement time-of-use transmission pricing that is based on the cost of adding new facilities. Some of BPA's customers are charged for the highest transmission use in a year; however, these marginal uses are priced at the average cost of the transmission system, not the full cost of meeting peak or the cost of expanding the system.

These efforts to reduce the costs and impacts of transmission and distribution lines will require an interstate approach that addresses the actions of federal and state agencies, utilities, utility regulators, and siting agencies.

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[132] BPA Historical & Future Capital Spend, page 8 of presentation on Integrated Program Review 2, March 2, 2021.

[133] See **APPENDIX E** for details on these costs.

RECOMMENDATION 37

BPA, utilities, and public utility commissions should develop a transparent system to report transmission and distribution costs.

CRITFC has tried to find information on past and future costs for the expansion of transmission and distribution systems. The BPA expansion cost information was readily accessible and is detailed in **APPENDIX E**. Past utility costs were available through Security and Exchange Commission filings, but they were convoluted and lacked detail. CRITFC could not find information on public system activities.

The Oregon PUC has directed Oregon investor-owned utilities to conduct Distribution System Planning, which is a holistic, transparent, and inclusive planning process focused on maximizing operational efficiencies and customer value on the distribution system. The localized and customer-side solutions identified through distribution system planning can help avoid unnecessary infrastructure investments, save utility customers money, and provide societal and resilience benefits to communities.[134] A system that clearly tracks past and projected future costs could be a model for other utility commissions to adopt.

RECOMMENDATION 38

BPA and utilities should address transmission reliability.

Climate change has caused a significant increase in the number of fires in the Western United States. In some cases, overloaded transmission lines have ignited fires. In other cases, fires have threatened transmission lines. These fires raise issue concerning transmission cost and reliability that involve both the east to west transmission lines across the Oregon and Washington and the California Intertie (AC and DC) along the Cascades.

FIGURE 19 superimposes 2021 wildfires over BPA's transmission system.

The fires in 2021 caused interrupted deliveries to California in July **(FIGURE 20)**.

Increased integration of the Pacific Northwest and California could address some of the issues identified in this Energy Vision. Utilities and system operators will need to address these transmission reliability issues. As discussed at page 41, the Infrastructure Investment and Jobs Act provides support for grid modernization including:

- $3 billion for Smart Grid investments.
- $10 billion in additional borrowing authority for BPA.
- $1 billion to upgrade transmission between Canada and the U.S. related to the Columbia River Treaty.
- A $2.5 billion revolving loan fund for new transmission lines or upgrades.

Fish protection measures need not be sacrificed to provide transmission stability. Rather transmission services need to be planned and developed in a way that enables salmon protection measures to be implemented at high levels of reliability.

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[134] OPUC Order, available at https://apps.puc.state.or.us/orders/2020ords/20-485.pdf.

FIGURE 19. 2021 Wildfires Superimposed Over BPA's Transmission System

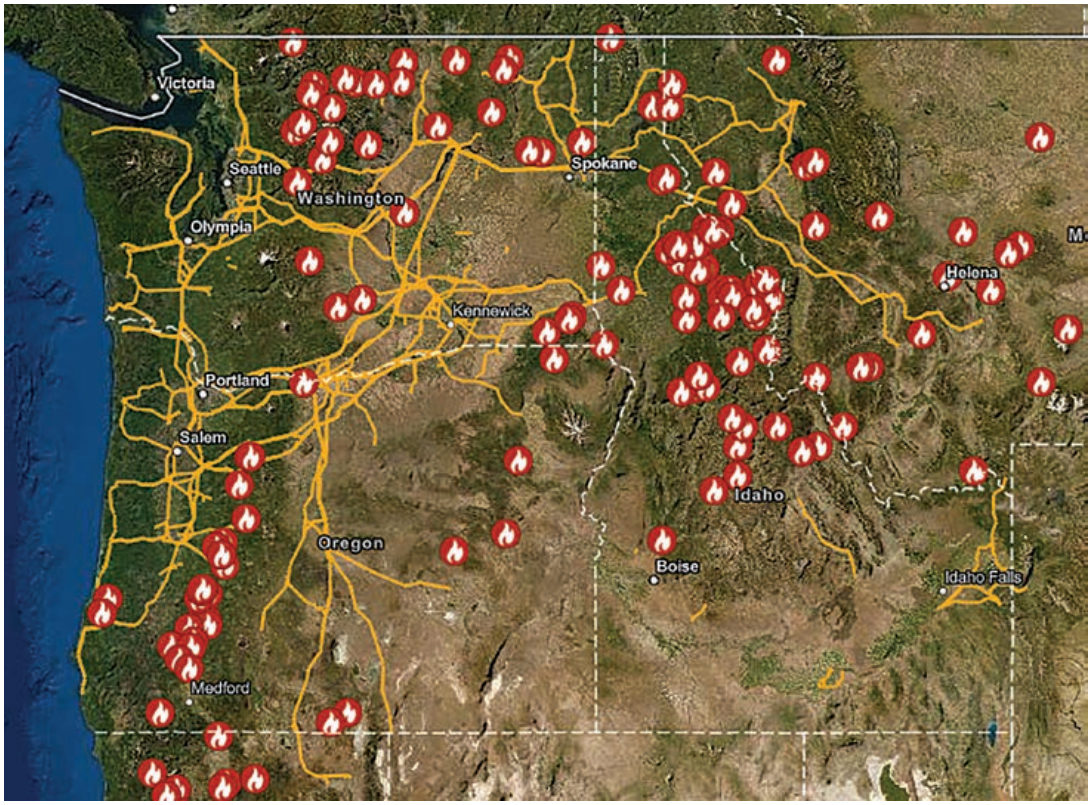
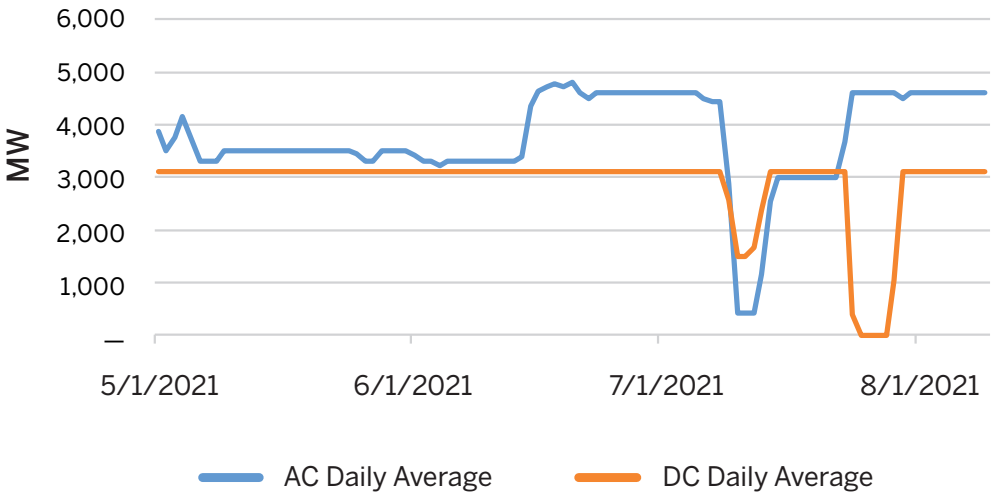
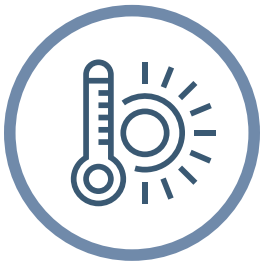


FIGURE 20. BPA AC/DC Intertie Capacity—Summer 2021



3.11
Reduce Reliance on Fossil Fuels



RECOMMENDATION 39

Federal, state, and local policy makers should develop programs to reduce the use of fossil fuels.

It is impossible to discuss energy without talking about carbon-based fossil fuels such as crude oil, coal, and natural gas. Their products and by-products include petroleum-based fuels (*e.g.,* butane, diesel, kerosene, liquefied natural gas, liquefied petroleum gas, propane, fuel oil), crude oil, natural gas, various types of coal, and methane. From extraction, to conveyance, to consumption, and by-product waste treatment, fossil fuels dominate global energy markets and drive climate change and hazardous waste management. The extraction, transport and use of fossil fuels are generally incompatible with Tribal Nations' ultimate obligations to protect sacred First Foods and precious water.

The fossil fuels life cycle includes points of extraction, conveyance and import or export project siting such as receiver terminals, refineries, and power plants, and finally consumption, usually through a combustion process. At each step to fossil fuel use, the planet and its resources are harmed. While fossil fuel extraction is not a dominating issue in the Columbia River Basin, the region is a target location for fossil fuel transport and export projects. The Basin also suffers from regional and global consumption effects, such as air deposition of mercury from coal plants in Asia.

These developments have placed undue burdens on the backs of the Region's salmon populations.

In the Columbia River Basin, fossil fuel projects include transport terminals, refineries (located on northern Puget Sound native lands), and gas and coal-fired generation plants. In the 1970s, there were proposals for pipelines from northern Puget Sound area to the Midwest. These proposals would have provided a few dozen jobs offloading supertankers and created significant risks to the environment and communities that depended on it.[135]

In 2005 there were proposals to import liquefied natural gas through ports along the Columbia River (these proposals were later reverted to developing export terminals when fracking in the United States became economical). Later coal companies eyed markets in Asia and rail lines that connected the Powder River Basin with the Pacific Northwest, and by 2012, crude oil companies were considering similar options, finding rail suitably cheaper than pipelines to export large quantities of Bakken crude and Canada oil sands (bitumen) crude. Bitumen's toxic by-product, petroleum coke, is also transported through the Columbia River Gorge.

[135] In 1977, Senator Warren Magnuson added an amendment to the Marine Mammals Protection Act to ban the construction of an oil superport inside Puget Sound that was designed to deliver crude oil to the Midwest.

Transport terminals usually include three separate components: the conveyance that serves the terminal, the terminal itself, and the marine vessels to export the product. These terminals are transitional facilities that cannot operate but for the other transport components. Typical conveyances include rail, barge, trucking, and pipeline. Of these options, rail is the component with the least amount of state, tribal, or federal regulatory oversight. In addition, many states and federal agencies are reluctant to comprehensively analyze the risks transport of fossil fuels poses to human health and the environment, leaving high consequence risks unmitigated. This poses an advantage to project proponents who, in the last decade, have rushed to propose dozens of fossil fuel-by-rail projects, particularly crude-by-rail and most recently, methane and liquefied natural gas by rail.

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Export projects do not provide abundant energy to regional markets, but rather burden local resources, increase risks of catastrophic harm, and provide no benefit for affected tribes. Starting in 2010, dozens of fossil fuel transport projects were proposed for the Pacific Northwest, specifically the states of Oregon and Washington, and the province of British Columbia. Regional tribes and First Nations were forced to spend time and resources analyzing and unifying in opposition to this onslaught. Most of the projects were not permitted, due in large part to tribes' coordination with allies in the environmental community, groups such as "Power Past Coal," "Stand Up to Oil," and "Power Past Gas." In the landscape of these victories, a new term was coined, "the thin green line" of the Pacific Northwest.

Besides providing the tribes and public with the only regulatory means to evaluate projects, the terminals themselves can be a problem. In more than one case, terminal projects were proposed for locations impacting sensitive cultural resources, areas that provide salmon spawning or rearing habitat and other aquatic resources or were situated such that they directly impeded tribal treaty fisheries. Most of the terminals lie near water bodies, such as the Columbia River, adding or expanding dock infrastructure that attracts predators—both avian and aquatic—that impact treaty fisheries. Finally, the terminals' operations that involve transfer and storage of fossil fuel products, and these terminals' proximity to water bodies, increases risks of spill and injury to the river.

The variety of conveyances that feed these terminals and refineries all pose unique risks depending on location and product. Fossil fuels are conveyed via pipeline, long-haul truck, rail car, barge, and marine vessels throughout the Columbia River Basin. Oil and natural gas pipelines create risks of explosions and are often highly destructive to natural areas when constructed and are notoriously leaky during operation. Natural gas pipelines have been proven to pollute the air with methane, volatile

organic compounds, and particulate matter. In British Columbia, a proposed pipeline would bring heavy oil sands crude over fragile habitat and to the Salish Sea for transfer to oil tankers. Marine vessels pose their own elevated spill risks and have been shown to impact Southern Resident orcas and tribal fishing.

Rail has been in the Columbia River Basin for a very long time, hauling materials and supporting the regional economy for over a century. In the Columbia River Gorge, the rail lines both sides of the river, the construction and operation of which continues to directly—and often negatively—affect the hydrology and flow of the river. Long trains delay tribal access to fishing sites and create hazards to tribal members trying to exercise their treaty fishing. Adding more rail traffic increases the danger.

The amount of coal hauled through the Columbia River Gorge has been that minimally necessary to serve local generation.[136] When excessively large-scale coal storage and transport projects were proposed in the Pacific Northwest that would have substantially increased the number of coal trains severalfold, the tribes stood against these projects. Even with the smaller number of coal trains, many tribal fishers complained of coal dust in the windy Gorge. Coal dust contains arsenic and polycyclic aromatic hydrocarbons (PAHs), a known carcinogen. High levels of both contaminants have been found in the soil around coal piles, and arsenic can leach into water. Airborne coal dust has been associated with bronchitis, emphysema, and asthma. Burlington Northern Railroad estimates that each coal car loses 500 pounds of dust each trip, with each 100-car train potentially losing 50,000 pounds. With the specter of more coal trains, then, the tribes were adamantly opposed to this additional burden.

Meanwhile, in the Bakken fields of the Dakotas, the United States found itself in possession of large depositions of domestic crude. Oil companies looked west to markets in Asia and considered rail as the simplest form of conveyance to get the product to market. To this point, rail tanker cars had not been tested for light crude such as that from the Bakken fields. In 2013, an oil train derailed in Lac-Megantic, Quebec and exploded, killing forty-seven people and there were continual derailments and explosions, spilling more oil into rivers, lakes, and marine waters than in the previous forty years. New and retrofitted tank cars were developed that decreased the severity of the derailments, but nonetheless, spills occurred on an annual basis. Along with greater risks of high consequence spill events, the increase in oil terminal proposals meant a sharp increase in rail traffic. Most oil trains are made up of more than 100–120 cars, stretching a mile and a half. For the Columbia River, this meant long and numerous oil trains travelling both sides of the river, impeding tribal fishers' access and creating potentially dangerous conditions.

In the past, natural gas has been peddled as a clean-burning fuel less impactful to the environment than coal and crude oil, and a potential "bridge" fuel to move from fossil fuels to renewables. Riding this message, in recent years, the U.S. has become a global leader in natural gas extraction, mostly through fracking processes. However, fracking is extremely water intensive and when methods do not meet industry standards can contaminate drinking water. When natural gas is produced or transported, methane can leak into the

[136] In 2020, the PGE Boardman Coal Plant shuttered permanently and was the only coal plant in Oregon. Currently the TransAlta Coal Plant in Centralia, Washington is operating at reduced capacity and is slated for permanent closure in 2025.

© Flickr/Sarah Craig/Faces of Fracking CC BY-NC-ND 2.0

atmosphere. Methane is a potent greenhouse gas, with 34-80 times the warming power of carbon dioxide on a pound-for-pound basis (IPCC 2014).

In Canada, oil sands bitumen extraction is the most polluted and polluting extraction process of any fossil fuel, creating toxic waste and hazardous by-products like petroleum coke. The oil sands are located on Indigenous Nations' territories and extraction has destroyed thousands of acres of natural homelands and habitat.[137]

Overall, new fossil fuel projects have no place within any plan to protect salmon or treaty resources. Mitigation is often unavailable or inadequate, and most projects pose risks of irreparable physical consequences to cultural and natural resources.

RECOMMENDATION 40

Federal and state governments should end all subsidies for fossil fuels.

U.S direct subsidies to the fossil fuel industry are estimated at $20 billion per year. When externalities such as health, environmental, and climate factors are included, it is estimated the United States subsidizes fossil fuels to the tune of $649 billion per year. Eliminating fossil fuel subsidies would save taxpayer dollars while simultaneously reducing greenhouse gas emissions.[138] The fossil fuel industry also receives large tax breaks. The Biden Administration's 2022 budget proposes to eliminate $121 billion in tax breaks. The Department of the Treasury states "these oil, gas, and coal tax preferences distort markets by encouraging more investment in the fossil fuel sector than would occur under a more neutral tax system."[139]

The International Energy Agency and the Organization for Economic Co-operation and Development, an intergovernmental body in Paris, estimate that 52 advanced and emerging economies—representing about 90% of global fossil-fuel supplies—gave subsidies worth an average of $555 billion each year from 2017 to 2019.[140]

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[137] See, generally, https://www.theguardian.com/commentisfree/2015/jun/23/canadas-tar-sands-oil-fields-sacred-lands, https://www.nationalgeographic.com/environment/article/alberta-canadas-tar-sands-is-growing-but-indigenous-people-fight-back, https://www.ienearth.org/what-are-the-tar-sands/ (First Nations' subsistence food sources have diminished where habitat and entire ecosystems have been fatally disrupted by oil sands projects).

[138] See: https://www.eesi.org/papers/view/fact-sheet-proposals-to-reduce-fossil-fuel-subsidies-2021.

[139] *General Explanations of the Administration's Fiscal Year 2022 Revenue Proposals,* Department of the Treasury, May 2021.

[140] The Journal Nature, https://www.nature.com/articles/d41586-021-02847-2.

3.12 Carbon Dioxide Sequestration

RECOMMENDATION 41

Utilities, tribes, farming, and non-governmental organizations should implement pilot projects to sequester carbon dioxide.

There is great potential to reduce greenhouse gas emissions and improve carbon sequestration by changing forest and agricultural practices. The Confederated Tribes of the Warm Springs Reservation have a forest management program to sequester carbon and sell carbon offsets to others. The Nez Perce Tribe has Carbon Offset strategy to market Carbon Sequestration Credits. The program reinvests revenue from the sale of carbon to acquire previously forested lands and then replicate the process with additional reforestation projects (planting trees on land that was not previously forested). This effort contributes to the tribe's goal of acquiring former tribal lands. Subsequent carbon offset projects have included restoration of forests heavily damaged by wildfire and reforestation where past forest regeneration practices failed. APPENDIX D provides details on these activities.

Other examples include regenerative agricultural practices such as cover cropping and transitioning to no-till farming that trap carbon in the soil. These techniques were researched by the American Farm Trust in its report, *Combatting Climate Change on US Cropland.* This report provided a literature review of these two practices and describes a mapping tool that allows users to visualize and quantify greenhouse gas emissions reductions resulting from cropland and grazing land conservation management practices.

The American Farm Trust has expressed interest in partnering with tribes and others on carbon sequestration projects.

3.13 Nuclear Power

RECOMMENDATION 42

Northwest utilities should not consider new nuclear power missions at the Hanford Nuclear Reservation without tribal consultation and consent. Evaluation of other sites for nuclear fission should consider the costs and compatibility with intermittent renewable resources and salmon protections.

Several organizations in the Northwest utility have been exploring the development of new nuclear fission power reactors.[141] For example, X-energy has submitted a proposal to the U.S. Department of Energy to install several reactors on 22 acres of the Hanford Nuclear Reservation. The Confederated Tribes of the Umatilla Reservation "does not support the deployment of Small Modular Nuclear Reactors (SMR or

[141] https://www.seattletimes.com/seattle-news/environment/this-next-generation-nuclear-power-plant-is-pitched-for-washington-state-can-it-change-the-world/.

SMNR) or any new/additive nuclear [fission] missions at the Hanford Site".[142]

X-energy claims that these smaller reactors can be used for base load or load following. The website says these reactors operate at very high temperatures; cycling modules on and off several times a day to fill in times when low-cost solar and wind energy is not available will likely require diverting the steam output to other uses. These plants are also expected to have high capital costs. If they operate intermittently to follow load, the cost per kilowatt hour is likely to be higher than the recommended actions described above.

Any evaluation of this technology must address the full costs of these reactors, including the integration issues. Any consideration of new nuclear fission plants should also address waste storage, uranium mining effects and safety issues that have plagued the nuclear industry for more than 60 years. Permanent waste storage solutions for commercial nuclear waste have not been built. More than a quarter million metric tons of highly radioactive waste still sits in temporary storage near nuclear power plants and weapons production sites.

3.14 Stop Cryptocurrency Production in the Northwest

RECOMMENDATION 43

Utilities and Public Utility Commissions should adopt policy to deny service for cryptocurrency mining in the Northwest.

The process of mining and using cryptocurrency is energy-intensive due to the computer used in the process. The electricity and carbon dioxide impacts are alarming and harm salmon. A recent analysis showed that the four leading cryptocurrencies (Bitcoin, Ethereum, Bitcoin Cash, and Litecoin) use 164 million megawatt hours a year worldwide.[143] That is more electricity than 185 countries use and equal to 20 percent of the annual energy consumption in the United States.[144] The analysis estimates that over 115 million tons of carbon dioxide are emitted in these operations.

While data is limited, there are indications that the low electricity costs in the Northwest have attracted large cryptocurrency operations that consume large amounts of electricity and add to peak loads. These operations add costs and kill salmon; they do not provide any benefits to the Northwest. In fact, many of these cryptocurrency operations are Ponzi schemes where large investors get their money back when others buy into the system.

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[142] August 6, 2021 letter from CTUIR Chair Kathryn Brigham.

[143] https://www.moneysupermarket.com/gas-and-electricity/features/crypto-energy-consumption/?__cf_chl_jschl_tk__=pmd_8RUkZBCTQNCIDsLJr_Ur1t4_7BY8EpY8scGHti.XnQM-1635441682-0-gqNtZGzNAqWjcnBszQg9.

[144] https://www.eia.gov/energyexplained/electricity/electricity-in-the-us.php.

Utilities and public utility commissions should adopt policies to deny service to these operations because they damage the environment and salmon populations and many are scams that will harm small investors. If necessary, state legislatures may need to enact legislation. If it is not possible to deny service, then service should be made interruptible and only available when surplus electricity from renewable resources is available.

3.15 Climate Change Effects

Across the Pacific Northwest, changing environmental dynamics including weather patterns and air temperatures, river flow timing, flow source (snowpack or rainfed) and magnitude, and wildfire prevalence are impacting river temperatures. As these trends continue into the future, changing conditions are expected to have even more pronounced influences on water temperature.

The Columbia and Snake River dams amplify these thermal risks by dramatically slowing the water, creating a large surface area intensifying solar irradiation, and creating a heat trap for both warm and cool water flowing into the system of mainstem reservoirs. These changes in river temperatures are expected to affect the health, behavior, and survival of cold-water fish at both the individual and population scale. Where increased river temperatures result in exposure to temperatures above the optimal range for Columbia River salmon, impacts can include increased heat stress and migration delays, among other direct and indirect effects. In downstream mainstem waters where large areas of contiguous cold water are absent, cold-water refuges may play an increasingly important role in mitigating the effects of exposure to temperatures that exceed fish thermal tolerance thresholds.[145]

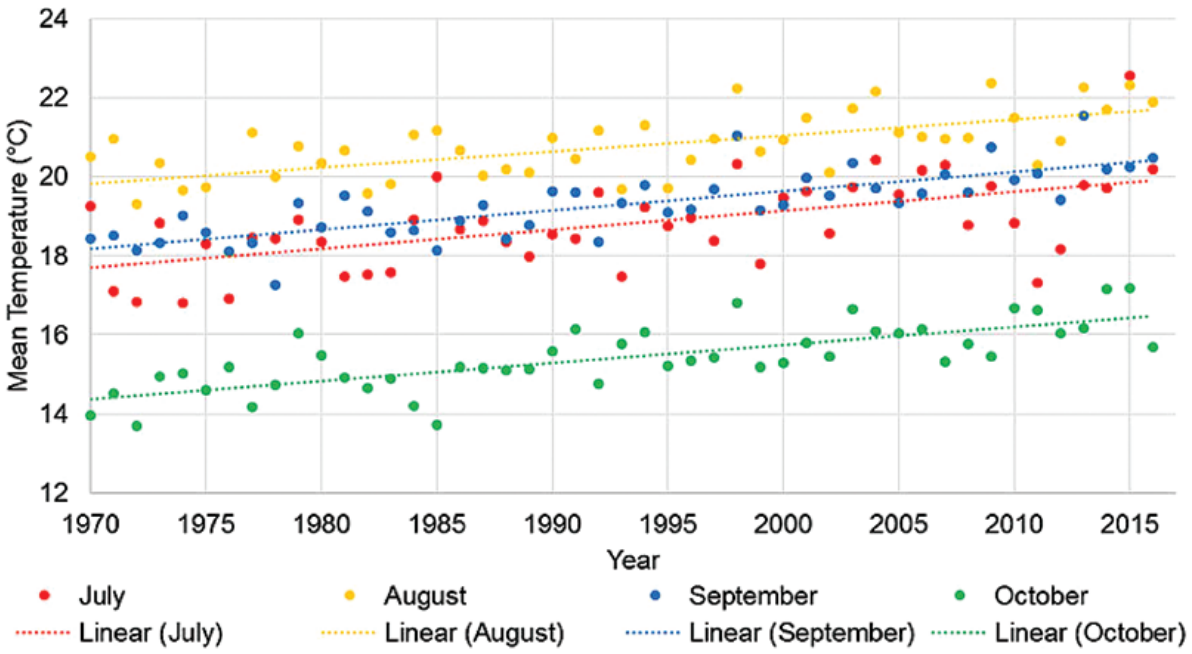
On May 18, 2020, EPA established the *Columbia and Lower Snake Rivers Temperature Total Maximum Daily Load (TMDL)* as required by Section 303(d) of the Clean Water Act and its implementing regulations (Title 40 of the Code of Federal Regulations, Section 130.7). Spanning almost 900 river miles, the TMDL examines sources of temperature impairments on the Columbia River from the Canadian border to the Pacific Ocean, and on the lower Snake River in Washington from its confluence with the Clearwater River at the Idaho border to its confluence with the Columbia River. The TMDL is required under the federal Clean Water Act because significant portions of the Columbia and lower Snake Rivers are identified by the states of Washington and Oregon as impaired due to temperatures that exceed the numeric criteria portion of the states' water quality standards at various locations and times of year.

EPA's TMDL report synthesized available records of river temperatures and estimated warming due to climate change that has occurred to date and warming that is projected to occur in the future (TMDL, Appendix G). EPA's reports evidence of a warming trend in river temperatures since 1960 that ranges from 0.2°C to 0.4°C per decade for a total water temperature increase to data of 1.5°C ±0.5°C.[146] As noted previously, lethal effects from

[145] https://www.epa.gov/system/files/documents/2021-08/tmdl-columbia-snake-temperature-appendix-g.pdf

[146] Available at https://www.epa.gov/columbiariver/tmdl-temperature-columbia-and-lower-snake-rivers.

FIGURE 21. Trend in Monthly Mean Temperatures at Bonneville Dam



thermal exposure for most salmonids have been found to range from 23°C to 27°C (McCullough, 1999, 2001).

In addition to the chronic effects of increasing baseline river temperatures, acute exceedances of thermal tolerance maxima occurred more frequently in recent years and are projected to be of increasing magnitude and frequency (Isaak et al. 2018). One recent example of extreme Columbia River basin temperatures occurred in 2015, when temperatures in early June reached in excess of 21°C weeks earlier than is typical and remained 2°C–4°C above monthly average temperatures for several weeks, contributing to a mass die-off of sockeye salmon in the Columbia and Snake Rivers (Isaak et al. 2018, NMFS 2016). Approximately 14% of the sockeye salmon that passed through the Bonneville Dam were detected upstream at McNary dam on the Columbia River, while on average 68% were detected the previous five years (NMFS 2016). In general, the first and last dates in each calendar year on which water temperatures exceed 20°C at Bonneville Dam are occurring earlier and later than they have historically (National Research Council 2004).[147]

The following climate change effects also need to be addressed alongside potential Columbia River System actions:

1. Projected changes to river flow and temperature under future climate change scenarios *(readily available in recent scientific literature and policy documents, supported by regional modeling efforts).*

[147] *Id.*

2. Potential adjustments to hydro regulation *(discussed in the RMJOCII report recently published by the action agencies).*
3. Considerations for Columbia River fish populations *(discussed in recent scientific literature with primary effects being higher winter flows, an earlier spring freshet, lower flows and higher water temperature during the summer, with these effects varying by subbasin).*
4. Synchronous effects on energy demand *(discussed in recent presentation by the NW Power and Conservation Council, with the primary effect being a projected increase in summer energy demand for air conditioning and a projected decrease in winter energy demand for heating).*

3.16 Conclusion

The Northwest is at a critical crossroads, facing challenges to the health of the planet and the future of salmon, other tribal foods and iconic fish and wildlife. These challenges are especially important to tribal resources that have sustained tribal people since time immemorial.

One path leads to affordable, carbon-free energy that harmonizes with the ecosystem and helps restore salmon. This future would prioritize energy efficiency, renewable resources, new storage technologies, reductions in peak loads, and other strategies that are compatible with the needs of fish and wildlife. These efforts would reduce the impacts of renewable resource projects and transmission lines on tribal resources and save consumers money.

The other path creates conflicts between renewable resources and tribal resources and results in higher costs for consumers.

Choosing the first path will require the courage to act, common-ground solutions, and a commitment of resources to accomplish the hard work ahead. It will also require the humility to periodically evaluate and adjust course based on new information and understanding.

CRITFC and its member tribes are committed to working with other regional interests to lead the region to a brighter and healthier future. Our people and the resources that sustain them depend on it.

Energy Vision Glossary

We have tried to minimize jargon and acronyms in the Energy Vision, but we have not always been successful. This glossary may help readers as they read the document.

Average Energy	Amount a resource can produce over an entire year. For example, a wind farm might have a total capacity to generate 100 MW, but the wind blows during only a third of the year, so the total average energy would be 33 aMW.
aMW	Average megawatts—for example, the amount of electricity generated or used on average over a year. For comparison, Seattle uses about 1,000 aMW during a year.
BPA	Bonneville Power Administration
Capacity	Amount a resource can generate at peak production
CRSO	Columbia River System Operations
CTUIR	Confederated Tribes of the Umatilla Indian Reservation
CTWSRO	Confederated Tribes of the Warm Springs Reservation of Oregon
Corps	U.S. Army Corps of Engineers
Council	Northwest Power and Conservation Council
Federal Action Agencies	Bonneville Power Administration, U.S. Army Corps of Engineers and U.S. Bureau of Reclamation
GW	Gigawatts—a thousand megawatts
kcfs	One thousand cubic feet per second of water flow
MW	Megawatt
NPCC	Northwest Power and Conservation Council
NPT	Nez Perce Tribe
Reclamation	U.S. Bureau of Reclamation
TMDL	Total maximum daily load. It is a regulatory term in the U.S. Clean Water Act, describing a plan for restoring impaired waters that identifies the maximum amount of a pollutant that a body of water can receive while still meeting water quality standards.
YN	Confederated Tribes and Bands of the Yakama Nation

Acknowledgements

CRITFC Staff

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Principal Authors

We also appreciate the work by **Ed Sheets** and **Margie Schaff** to draft major portions of this Energy Vision.

Sheets also assisted in the development of the 2013 Energy Vision and has worked on regional energy and environmental issues since 1975, including work on the Northwest Power Act with the late Senator Warren Magnuson, director of the Washington State Energy Office, and founding executive director of the Northwest Power and Conservation Council (see: www.edsheets.com).

Schaff has assisted numerous tribes on energy development and policy issues. She has worked for the Western Area Power Administration and for almost 30 years has operated her own law firm, currently Margaret Schaff & Associates, LLC.

Energy Experts

CRITFC also appreciates the consultants who provided invaluable advice and made significant contributions to this Energy Vision.

- **Tom Eckman** was the power division director at the Northwest Power and Conservation Council and worked for the Council for 34 years on energy efficiency and resources. He has also been instrumental in developing regional and national energy efficiency standards.
- **Tom Foley** was a principal author of the 2003 and 2013 Energy Visions. He worked as the energy resources manager at Northwest Power and Conservation Council and is a former board chair of the Energy Trust of Oregon.
- **Randy Hardy** was the CEO of BPA and Seattle City Light. He served as executive director of the Pacific Northwest Utilities Conference Committee and worked at the Federal Energy Administration. Hardy Energy provides advice to utilities, wind/renewable generators, and other organizations (see: www.hardyenergy.com).
- **Robert McCullough** founded McCullough Research in 1985 and has advised utilities and tribal governments on energy issues. He worked for Portland General Electric, including as director of special projects and vice president for bulk power marketing (see: www.mresearch.com).

Reviewers

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In our stories, the Celilo Falls are the remains of the dam built by the five Swallow Sisters to block salmon from returning upriver. Coyote tricked the sisters, destroyed the dam, and the resulting flood left the falls and the rocky, contorted riverbed downstream. As punishment for keeping salmon from the people, Coyote ordered swallows to fly up the river each spring to announce the return of salmon. To this day, the migration of swallows marks the spring salmon migration.

APPENDIX A:

Background

Populations of Columbia and Snake River salmon and steelhead are at very dangerous levels for their continued existence. Forty-two percent of Snake River wild-origin spring/summer Chinook populations have fewer than 50 fish. Current salmon and steelhead populations are at about 75% of the lowest goal recently set by a regional task force.

Vision for the Columbia River Basin Resources

CRITFC member tribes envision a future where the Columbia Basin electric power system supports abundant and sustainable fish and wildlife populations, protects tribal cultural resources, and provides reliable and affordable electricity.

The Yakama, Nez Perce, Umatilla, and Warm Springs tribes each secured, by treaty, rights to take fish that pass their usual and accustomed fishing places. Numerous federal court decisions have affirmed these rights.[148] For more information on the treaties please see APPENDIX A. The treaties did not only secure the right to take fish but assured the tribes that the fish would be there to harvest.[149]

The four tribes founded CRITFC in 1977 to protect the member tribes' treaty rights to take salmon; CRITFC's mission is "to ensure a unified voice in the overall management of the fishery resources, and as managers, to protect reserved treaty rights through the exercise of the inherent sovereign powers of the tribes."

For the tribes and CRITFC to accomplish their mission, salmon, steelhead, sturgeon, Pacific lamprey, and mussel populations need to be rebuilt. The dams on the Columbia and Snake rivers continue to be the main obstacle to anadromous and resident fish restoration. Climate change will compound the effects of the dams.

The people of the Yakama, Nez Perce, Umatilla, and Warm Springs tribes have always shared a common understanding—that their very existence depends on the respectful use of the Columbia River Basin's vast land and water resources. Indeed, their very souls and spirits were and are inextricably tied to the natural world and its myriad inhabitants.[150] Among those inhabitants, none were more important than the

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[148] *E.g. Sohappy v. Smith*, 302 F.Supp. 899 (D.Or. 1969), aff'd, *United States v. Oregon,* 529 F.2d 570 (9th Cir. 1976); *Washington v. Washington State Commercial Passenger Fishing Vessel Ass'n*, 443 U.S. 658 (1979); *United States v. Winans,* 198 U.S. 371 (1905); *Confederated Tribes of the Umatilla Indian Reservation v. Alexander,* 440 F.Supp. 553 (D.Or. 1977).

[149] https://www.critfc.org/wp-content/uploads/2021/11/Treaty-Rights-list.pdf.

[150] In our stories, the Celilo Falls are the remains of the dam built by the five Swallow Sisters to block salmon from returning upriver. Coyote tricked the sisters, destroyed the dam, and the resulting flood left the falls and the rocky, contorted riverbed downstream. As punishment for keeping salmon from the people, Coyote ordered swallows to fly up the river each spring to announce the return of salmon. To this day, the migration of swallows marks the spring salmon migration.

teeming millions of anadromous fish enriching the basin's rivers and streams.

Despite some differences in language and cultural practices, the people of these tribes shared the foundation of a regional economy based on salmon. To the extent the resource permits, tribal people continue to fish for ceremonial, subsistence, and commercial purposes employing—as they always have—a variety of technologies.

Today, perhaps even more than in the past, the Columbia River treaty tribes are brought together by the struggle to save the salmon and by shared spiritual traditions such as the first salmon feast.

A Tribal Energy Vision for the Columbia River Basin

CRITFC adopted the original Energy Vision in 2003. It called for a series of actions to avoid another energy crisis and lift some of the burden of the region's energy supply from the Columbia River. A decade later, we looked back on actions that were taken and proposed new actions in a 2013 update to the Energy Vision.

One of the most important aspects of restoring salmon and ensuring their resiliency to withstand energy and environmental catastrophes like that which occurred in 2001 is the continued investment of the region in fish and wildlife

protection, mitigation, and enhancement. In this regard, BPA is an unrivaled leader.[151] The 2003 Energy Vision did not address discrete fish mitigation measures. Rather it is a vision for a long-term regional energy system that places a lesser burden on the fish and wildlife that depend on the Columbia River and its tributaries, while protecting tribal First Foods and cultural resources found in upland areas.

The Columbia and Snake Rivers' dams are an integral part of the Northwest and West Coast power systems. Power generated from these rivers has been a cheap, dominant part of the power system, providing energy, capacity, ancillary services, system stability, and more. However, the low-dollar cost of hydropower does not fully reflect the huge economic, cultural, and environmental costs incurred by tribes and others.

These tribes based their living on resources of the rivers, including fish, wildlife, and water quality for thousands of years prior to the construction of the hydropower system. Before the first dam was built, salmon and steelhead numbered in the tens of millions of fish. The tribes' economies relied on those fish for their prosperity. Currently there are fewer than 1 million natural fish remaining in the Columbia River. The costs to tribes of development of the Northwest's hydropower system represent a classic case of "negative externalities." Because tribal non-market resources have not been "priced", they often have been treated in energy planning as if their cost were zero and their availability limitless. They are not. Treating them in such a way is economic malpractice. More importantly it does not recognize the trust and treaty obligations that the United States carries with regard to the tribes.

By careful energy planning and appropriate action, the region can use the Basin's river systems to meet the needs for fish, wildlife, and water quality while supplying reliable energy services.

New challenges and opportunities are being faced by energy planners that did not exist ten years ago. And our understanding of climate change has advanced significantly. State of the art climate models predict future changes in the annual cycle of Columbia River flows and regional temperatures. Addressing climate change causes and response is a very high priority for the tribes. Among other things, the recommendations for low-cost energy efficiency and renewable resources in this Energy Vision for the Columbia River Basin will reduce the need for power plants that emit greenhouse gases. The Vision's goals for greenhouse gas reductions are consonant with the goals set by California, Oregon, and Washington, but the Vision offers alternative means of implementation.

The 2003 *Energy Vision for the Columbia River*[152] described solutions to address the conflict between peak power production and Columbia Basin salmon. Against the backdrop of fish problems associated with serving peak loads, that plan identified less harmful and less expensive ways to provide electricity for peak loads. A win-win combination. The 2013 *Energy Vision for the Columbia River*[153] was built on the recommendations made in 2003. The 2022 *Energy Vision for the Columbia River Basin* builds on these predecessors.

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[151] In 2008, the Commission and three of its member tribes signed a ten-year Fish Accords Agreement with BPA guaranteeing funding for discrete actions. The Accords provide funding for a significant number of projects to rebuild fish and wildlife.

[152] https://www.critfc.org/blog/documents/tribal-energy-vision-for-the-columbia-river-2003/

[153] https://www.critfc.org/wp-content/uploads/2021/02/2013-Energy-Vision-Review-Draft-.pdf

"My strength is from the fish; my blood is from the fish, from the roots and berries. The fish and game are the essence of my life. I was not brought from a foreign country and did not come here. I was put here by the Creator."

— Chief Meninock, Yakama, 1915

APPENDIX B:

Resolutions, Affiliated Tribes of Northwest Indians, and National Congress of American Indians

2021 Virtual Mid-Year Convention

RESOLUTION #2021 – 23

"CALLING ON THE PRESIDENT OF THE UNITED STATES AND THE 117TH CONGRESS TO SEIZE THE ONCE-IN-A-LIFETIME CONGRESSIONAL OPPORTUNITY TO INVEST IN SALMON AND RIVER RESTORATION IN THE PACIFIC NORTHWEST, CHARTING A STRONGER, BETTER FUTURE FOR THE NORTHWEST, AND BRINGING LONG-IGNORED TRIBAL JUSTICE TO OUR PEOPLES AND HOMELANDS"

PREAMBLE

We, the members of the Affiliated Tribes of Northwest Indians of the United States, invoking the divine blessing of the Creator upon our efforts and purposes, in order to preserve for ourselves and our descendants rights secured under Indian Treaties, Executive Orders and benefits to which we are entitled under the laws and constitution of the United States and several states, to enlighten the public toward a better understanding of the Indian people, to preserve Indian cultural values, and otherwise promote the welfare of the Indian people, do hereby establish and submit the following resolution:

WHEREAS, the Affiliated Tribes of Northwest Indians (ATNI) are representatives of and advocates for national, regional, and specific tribal concerns; and

WHEREAS, ATNI is a regional organization comprised of American Indians/Alaska Natives and tribes in the states of Washington, Idaho, Oregon, Montana, Nevada, Northern California, and Alaska; and

WHEREAS, the health, safety, welfare, education, economic and employment opportunity, and preservation of cultural and natural resources are primary goals and objectives of ATNI; and

WHEREAS, the Tribes of ATNI are united by salmon; by the Northwest rivers that salmon, steelhead, lamprey, and native fish depend upon; and by the interconnectedness of salmon with their ecosystems – from the orca in the ocean and Puget Sound to the nutrients salmon supply to the furthest inland streams; and

WHEREAS, the United States used federal legislation and executive orders to take land from tribal peoples, and tribes ceded most of their land through treaties but reserved certain rights to protect their cultural way of life; and

WHEREAS, tribal cultures and lifeways are rooted in place and tied to their homelands, but tribes cannot just relocate to access traditional resources; and

WHEREAS, the modern Northwest with its massive irrigation, hydropower, and storage systems was built on the backs of tribal peoples from the 1930s on, through the use and destruction of the lands, rivers, and fisheries we have lived with for thousands of years; and

WHEREAS, the United States shares a unique relationship with the Tribes of ATNI, with the United States being bound to honor the obligations to tribes made in Treaties, Executive Orders, adjudicated through numerous federal court decisions and its trust responsibility to tribal sovereign nations; and

WHEREAS, the fate of our Tribes and the Northwest salmon are intertwined; and

WHEREAS, in the Columbia Basin, the Northwest Power Act and its promise of "equitable treatment" for energy and fish and wildlife did prevent the mid-Columbia fall chinook from being listed under the Endangered Species Act (ESA) but failed to prevent the subsequent listings of salmon and steelhead under the ESA; and

WHEREAS, U.S. District Court Judge Michael Simon in his 2016 ESA and National Environmental Policy Act (NEPA) ruling – rejecting the federal government's salmon plan for the Columbia River System dams for the fifth time – emphasized that the Federal Columbia River System remains a system literally crying out for a major overhaul, as Judge Marsh observed twenty years earlier; and

WHEREAS, the prior Administration's 2020 salmon plans in response to Judge Simon's ruling – the 2020 Columbia River System Environmental Impact Statement (EIS), Biological Opinion (BiOp), and Record of Decision (ROD) – were politicized with election-driven timelines, and used the prior Administration's weakened NEPA and ESA regulations to justify flawed conclusions and attempt to lock in inadequate dam operations for the next 15 years; and

WHEREAS, Columbia Basin Tribes expressed special concerns with the prior Administration's Columbia River System EIS with respect to its inadequate consideration of Tribal rights, interests, resources, trust lands; its failure to reveal environmental and social justice system impacts on Tribes; its failure to address fish restoration above dams that block fish passage; and its inadequate consideration of the impacts of climate warming; and

WHEREAS, the new Administration and the 117th Congress face a once-in-a-lifetime opportunity – a historical legacy moment – to secure congressional funding to invest in salmon recovery and river restoration throughout the Northwest; and

WHEREAS, Tribes throughout the Columbia Basin have supported Congressman Mike Simpson's initiative and his "Columbia Basin Initiative" legislative proposal for:

- Identifying this historic moment and opportunity;

- Engaging with Tribes directly and regularly;
- Emphasizing the very real and imminent salmon extinction crisis;
- Recognizing a singular, generational legislative moment, because of the current Administration and current leadership in the Senate and the House, and that this is a moment for action, not for more process;
- Offering a comprehensive framework that embraces actions that have been longstanding priorities for Tribes throughout the Basin: restoring the lower Snake River by breaching the four lower Snake River dams and optimizing spill to benefit salmon at the mainstem federal Columbia River Dams; restoring salmon behind blocked areas in the Upper Columbia and Upper Snake basins; and ensuring that Tribes and State co-managers become responsible for implementing salmon restoration;
- Offering a solution that invests in a stronger, better Northwest that goes beyond salmon, ensuring that communities impacted by river restoration are made whole – and in doing so offering additional opportunities for Tribes within other sectors – from infrastructure and technology development to energy production;
- Highlighting that an interest-based solution will involve legal certainty;
- Engaging in a bipartisan manner against the backdrop of these foundational elements;
- Speaking the truth that failure to act this critical historical moment will be looked back on as the tragedy of the extinction of Snake River salmon populations; and

WHEREAS, the status of Columbia Basin salmon and steelhead species is dire and getting worse, with many populations of Snake River spring Chinook salmon and steelhead on a steep slope to extinction; the point where populations become doomed to extinction is identified by biologists as the Quasi-Extinction Threshold (QET); and

- right now, 42% of the Snake Basin spring/summer Chinook populations are at or below the QET; that is, 50 natural origin spawners or less on the spawning grounds for four consecutive years; and
- 77% of the populations are predicted to drop below the QET level by 2025; and

WHEREAS, time may be even shorter as climate warming advances, and restoring the lower Snake (now a series of slow-moving, easily warmed lakes) to a naturally flowing river that connects fish to cold, high-altitude, near-pristine Salmon and Clearwater Basin habitat is exactly what is needed for the best possible ecological resilience to warming temperatures; and

WHEREAS, tribal initiatives to restore salmon behind dams that block fish passage in the Upper Columbia and Upper Snake River have been limited by availability of funding and assertions of inadequate authorizations; and

WHEREAS, on April 14-15, 2021, the Columbia River Tribes gathered and reached agreement on a set of "common ground" principles underlying their support for Congressman Simpson's Columbia Basin Initiative:

- The true wealth of our region begins with the health of our rivers, fish, and the ecosystem they support, which is our culture, history and future;
- Agriculture is an important part of our region's economy;
- Affordable and reliable power is important to regional families and businesses, tribal and non-tribal;
- Providing legal certainty for the vast majority of federal dams in the Columbia/Snake River basins is a necessary element of a lasting solution;
- A significant federal infrastructure investment in alternative energy and transportation provides a unique opportunity to restore salmon while keeping power affordable and maintaining agricultural commerce;
- A comprehensive legislative solution is preferable to all other avenues and is urgently needed;
- The time for action is now. The Columbia Basin cannot become another Klamath Basin crisis; and

WHEREAS, the Southern Resident orcas of Puget Sound, a being sacred to many Northwest Tribes, are starving to death because culverts and dams that block and impair Chinook salmon migrations are limiting the orcas' food source; and Governor Inslee's Orca Recovery Task Force recommended – in addition to other dam and culvert removals – reviewing the need to breach the four lower Snake River dams to help recover the struggling Puget Sound orcas, which resulted in the Lower Snake River Dams Stakeholder Engagement Report and informed Washington's statement of management goals and principles for the Columbia and Snake rivers:

- Protecting and restoring abundant, harvestable salmon and steelhead and other native fish species, including contributing to a reliable source of prey for southern resident orcas;
- Honoring tribal rights, including a future for salmon that supports tribes' cultural, spiritual, and economic needs;
- Providing for a clean, affordable, and reliable energy system that meets our clean energy and climate goals;

- Ensuring affordable and reliable transportation alternatives for wheat farmers in the Palouse and Tri-Cities areas

- Ensuring reliable irrigation supplies for eastern Washington farms; and

WHEREAS, implementation of federal court rulings upholding Treaty-reserved fishing rights and ordering the state of Washington to replace culverts that block fish passage require funding to implement, as do other Tribal habitat, hatchery, and salmon restoration efforts; and

WHEREAS, ATNI stands united in supporting investment in salmon and river restoration in the Northwest; now

THEREFORE BE IT RESOLVED, that ATNI calls on the President of the United States (POTUS) and the 117th Congress to ensure that funding is set aside now at this critical ecological juncture for salmon and orca, to implement the bold actions for salmon and river restoration identified in the framework of Congressman Simpson's Energy and Salmon legislative proposal, including restoring the lower Snake River by breaching the four lower Snake River dams; and

BE IT FURTHER RESOLVED that ATNI requests the POTUS and 117th Congress to ensure that the salmon restoration priorities of the Tribes of ATNI are prioritized and funded; and

BE IT FURTHER RESOLVED that ATNI calls for the timely convening of a Northwest Tribal Salmon and Orca Summit, at an ATNI location, with invitations to Presidential Administration Officials and to Northwest Congressional Delegation Members, to meet and take timely action with respect to the salmon and orca restoration priorities of the Tribes of ATNI; and

BE IT FURTHER RESOLVED, that ATNI requests the POTUS to prioritize working on the actions for salmon and river restoration identified as the framework of Congressman Simpson's Energy and Salmon legislative proposal, and withdraw any federal court defense of the prior Administration's flawed 2020 Columbia River System EIS, BiOp, and ROD as otherwise a defense of methods and conclusions inconsistent with the new Administration's environmental and tribal principles and priorities; and

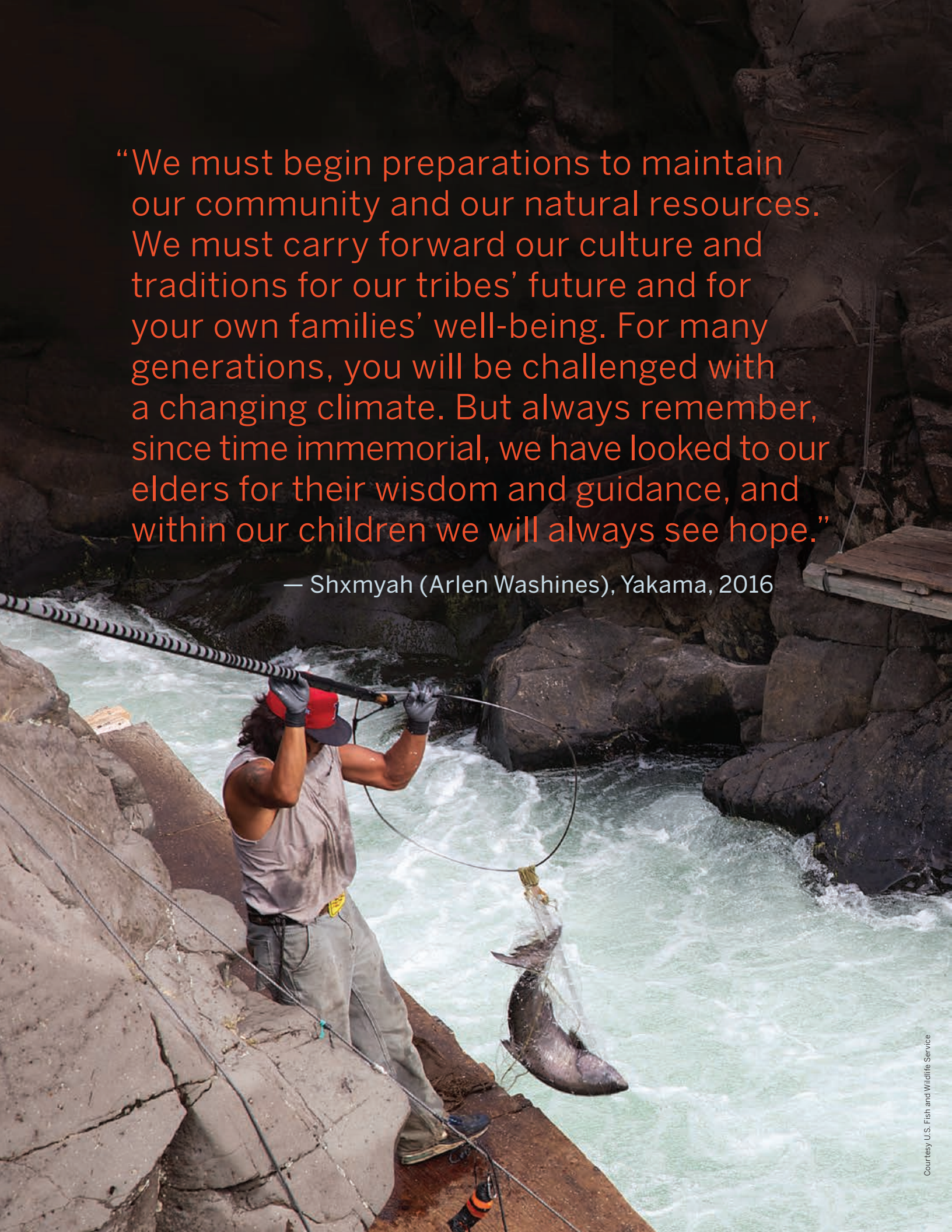
BE IT FINALLY RESOLVED, that this resolution be forwarded to the National Congress of American Indians.

CERTIFICATION

The foregoing resolution was adopted at the 2021 Virtual Mid-Year Convention of the Affiliated Tribes of Northwest Indians, Portland, Oregon, on May 24 – May 27, 2021, with a quorum present.

Leonard Forsman, President

Norma Jean Louie, Secretary



"We must begin preparations to maintain our community and our natural resources. We must carry forward our culture and traditions for our tribes' future and for your own families' well-being. For many generations, you will be challenged with a changing climate. But always remember, since time immemorial, we have looked to our elders for their wisdom and guidance, and within our children we will always see hope."

— Shxmyah (Arlen Washines), Yakama, 2016

Courtesy U.S. Fish and Wildlife Service

NATIONAL CONGRESS OF AMERICAN INDIANS

NCAI HEADQUARTERS
1516 P Street, N.W.
Washington, DC 20005
202.466.7767
202.466.7797 fax
www.ncai.org

The National Congress of American Indians
Resolution #AK-21-009

TITLE: Calling On The President and Congress to Invest in Salmon And River Restoration In The Pacific Northwest

WHEREAS, we, the members of the National Congress of American Indians of the United States, invoking the divine blessing of the Creator upon our efforts and purposes, in order to preserve for ourselves and our descendants the inherent sovereign rights of our Indian nations, rights secured under Indian treaties and agreements with the United States, and all other rights and benefits to which we are entitled under the laws and Constitution of the United States and the United Nations Declaration on the Rights of Indigenous Peoples, to enlighten the public toward a better understanding of the Indian people, to preserve Indian cultural values, and otherwise promote the health, safety and welfare of the Indian people, do hereby establish and submit the following resolution; and

WHEREAS, the National Congress of American Indians (NCAI) was established in 1944 and is the oldest and largest national organization of American Indian and Alaska Native tribal governments; and

WHEREAS, many of the Tribal Nations of NCAI are united by salmon; by the Northwest rivers that salmon, steelhead, lamprey, and other native fish depend upon; and by the interconnectedness of salmon with their ecosystems – from the orca in the ocean and Puget Sound, to the nutrients salmon supply to the furthest inland streams; and

WHEREAS, through legislation and executive orders, the United States took land from tribal peoples. Tribal Nations also ceded lands through treaties, but in so doing reserved certain rights to protect their cultural way of life; and

WHEREAS, Tribal cultures and lifeways are deeply rooted in place and tied to their homelands. As such Tribal Nations cannot simply relocate to access traditional resources or ceremonial places; and

WHEREAS, beginning in the 1930s, and through the use and destruction of the lands, rivers, and fisheries Tribal Nations have lived with for thousands of years, the modern Northwest is a maze of massive irrigation, hydropower, and storage systems built on the backs of Tribal peoples ; and

WHEREAS, the United States has a unique political relationship with Tribal Nations. Through this special relationship, the United States is bound to honor the obligations it has made in Treaties, Executive Orders, adjudicated through numerous federal court decisions, and its trust responsibility to sovereign Tribal Nations; and

WHEREAS, the fate of many Tribal Nations and the Northwest salmon are intertwined; and

WHEREAS, in the Columbia Basin, the Northwest Power Act and its promise of "equitable treatment" for energy and fish and wildlife did prevent the mid-Columbia fall chinook from being listed under the Endangered Species Act (ESA) but failed to prevent the subsequent listings of salmon and steelhead under the ESA; and

WHEREAS, U.S. District Court for Oregon in its 2016 ESA and National Environmental Policy Act (NEPA) ruling (*Nat'l Wildlife Fed'n v. Nat'l Marine Fisheries Serv.*, 186 F.Supp 3d. 861 (D. Or. 2106)) – rejecting the federal government's salmon plan for the Columbia River System dams for the fifth time emphasized that the Federal Columbia River System remains a system literally crying out for a major overhaul, as that Court observed twenty years earlier in the same case; and

WHEREAS, the prior Administration's 2020 salmon plans in response to Oregon District Court's 2016 ruling – the 2020 Columbia River System Environmental Impact Statement (EIS), Biological Opinion (BiOp), and Record of Decision (ROD) – were politicized with election-driven timelines, and used the prior Administration's weakened NEPA and ESA regulations to justify flawed conclusions and attempt to lock in inadequate dam operations for the next 15 years; and

WHEREAS, Columbia Basin Tribes expressed special concerns with the prior Administration's Columbia River System EIS with respect to its inadequate consideration of Tribal rights, interests, resources, trust lands; its failure to reveal environmental and social justice system impacts on Tribes; its failure to address fish restoration above dams that block fish passage; and its inadequate consideration of the impacts of climate warming; and

WHEREAS, Tribal Nations and Congress has a once-in-a-lifetime opportunity – a historical legacy moment – to secure funding to invest in salmon recovery and river restoration throughout the Northwest; and

WHEREAS, Tribal Nations throughout the Columbia Basin have supported legislative proposals that:

- Engage with Tribal Nations directly and regularly;
- Emphasize the very real and imminent salmon extinction crisis;
- Recognize a singular, generational legislative moment, because of the current Administration and current leadership in the Senate and the House, and that this is a moment for action, not for more process;
- Offer a comprehensive framework that embraces actions that have been longstanding priorities for Tribes throughout the Basin: restoring the lower Snake River by breaching the four lower Snake River dams and optimizing spill to benefit salmon at the mainstream federal Columbia River Dams; restoring salmon behind blocked areas in the Upper Columbia and Upper Snake basins; and ensuring that Tribes and State co-managers become responsible for implementing salmon restoration;

- Offer a solution that invests in a stronger, better Northwest that goes beyond salmon, ensuring that communities impacted by river restoration are made whole – and in doing so offering additional opportunities for Tribes within other sectors – from infrastructure and technology development to energy production;
- Highlights that an interest-based solution will involve legal certainty;
- Engages in a bipartisan manner against the backdrop of these foundational elements;
- Speaks the truth that failure to act this critical historical moment will be looked back on as the tragedy of the extinction of Snake River salmon populations; and

WHEREAS, the status of Columbia Basin salmon and steelhead species are dire and getting worse. Many populations of Snake River spring Chinook salmon and steelhead at the tipping point of extinction – identified by biologists as the Quasi-Extinction Threshold (QET);

- 42% of the Snake Basin spring/summer Chinook populations are at or below the QET; that is, 50 natural origin spawners or less on the spawning grounds for four consecutive years;
- 77% of the populations are predicted to drop below the QET level by 2025; and

WHEREAS, climatic warming shortens the time to act. Restoring the lower Snake (now a series of slow-moving, easily warmed lakes) to a naturally flowing river that connects fish to cold, high-altitude, near-pristine Salmon and Clearwater Basin habitat is the best possible solution for ecological resilience to warming temperatures; and

WHEREAS, the initiatives of Tribal Nations to restore salmon behind dams that block fish passage in the Upper Columbia and Upper Snake River have been limited by availability of funding and assertions of inadequate authorizations; and

WHEREAS, on April 14-15, 2021, the Columbia River Tribes gathered and reached agreement on a set of "common ground" principles underlying their support for Congressman Simpson's Columbia Basin Initiative:

- The true wealth of our region begins with the health of our rivers, fish, and the ecosystem they support, which is our culture, history and future;
- Agriculture is an important part of our region's economy;
- Affordable and reliable power is important to regional families and businesses, tribal and non-tribal;
- Providing legal certainty for the vast majority of federal dams in the Columbia/Snake River basins is a necessary element of a lasting solution;
- Providing legal certainty for the vast majority of federal dams in the Columbia/Snake River basins is a necessary element of a lasting solution;

- A significant federal infrastructure investment in alternative energy and transportation provides a unique opportunity to restore salmon while keeping power affordable and maintaining agricultural commerce;
- A comprehensive legislative solution is preferable to all other avenues and is urgently needed;
- The time for action is now. The Columbia Basin cannot become another Klamath Basin crisis; and

WHEREAS, the Southern Resident orcas of Puget Sound that are sacred to many Northwest Tribes, are starving to death because culverts and dams block and impair Chinook salmon migrations and limit the orcas' food source; and Governor of the State of Washington's Orca Recovery Task Force recommended – in addition to other dam and culvert removals – reviewing the need to breach the four lower Snake River dams to help recover the struggling Puget Sound orcas, which resulted in the Lower Snake River Dams Stakeholder Engagement Report and informed Washington States' statement of management goals and principles for the Columbia and Snake rivers:

- Protecting and restoring abundant, harvestable salmon and steelhead and other native fish species, including contributing to a reliable source of prey for southern resident orcas;
- Honoring Tribal rights, including a future for salmon that supports Tribal cultural, spiritual, ceremonial, subsistence, and economic needs;
- Providing for a clean, affordable, and reliable energy system that meets our clean energy and climate goals;
- Ensuring affordable and reliable transportation alternatives for wheat farmers in the Palouse and Tri-Cities areas;
- Ensuring reliable irrigation supplies for eastern Washington farms; and

WHEREAS, implementation of federal court rulings upholding Treaty-reserved fishing rights and ordering the state of Washington to replace culverts that block fish passage require funding to implement, as do Tribal habitat, hatchery, and salmon restoration efforts; and

WHEREAS, NCAI stands united in supporting investment in salmon and river restoration in the Northwest and throughout Indian Country.

NOW THEREFORE BE IT RESOLVED, that the National Congress of American Indians (NCAI) calls on the Executive Branch and Congress to ensure that funding is set aside now at this critical ecological juncture for salmon and orca, to implement the bold actions for salmon and river restoration identified in the framework of the Columbia Basin Initiative legislative proposal, including restoring the lower Snake River by breaching the four lower Snake River dams; and

BE IT FURTHER RESOLVED, that NCAI requests the Executive Branch and Congress ensure that Tribal species restoration actions are prioritized and fully funded; and

BE IT FURTHER RESOLVED, that NCAI calls for the timely convening of a Tribal Salmon and Orca Summit, at an NCAI location, with invitations to Executive Branch Officials and to Congressional Members, to meet and take timely action with respect to the salmon and orca restoration priorities of Tribal Nations; and

BE IT FURTHER RESOLVED, that NCAI requests the Executive Branch and Congress prioritize working on actions to protect salmon, and other culturally and economically important fish and wildlife, and river restoration actions, and withdraw any federal court defense of the prior Administration's 2020 Columbia River System EIS, BiOp, and ROD's and other environmental decisions that are inconsistent with Tribal environmental principles and priorities; and

BE IT FINALLY RESOLVED, that this resolution shall be the policy of NCAI until it is withdrawn or modified by subsequent resolution.

CERTIFICATION

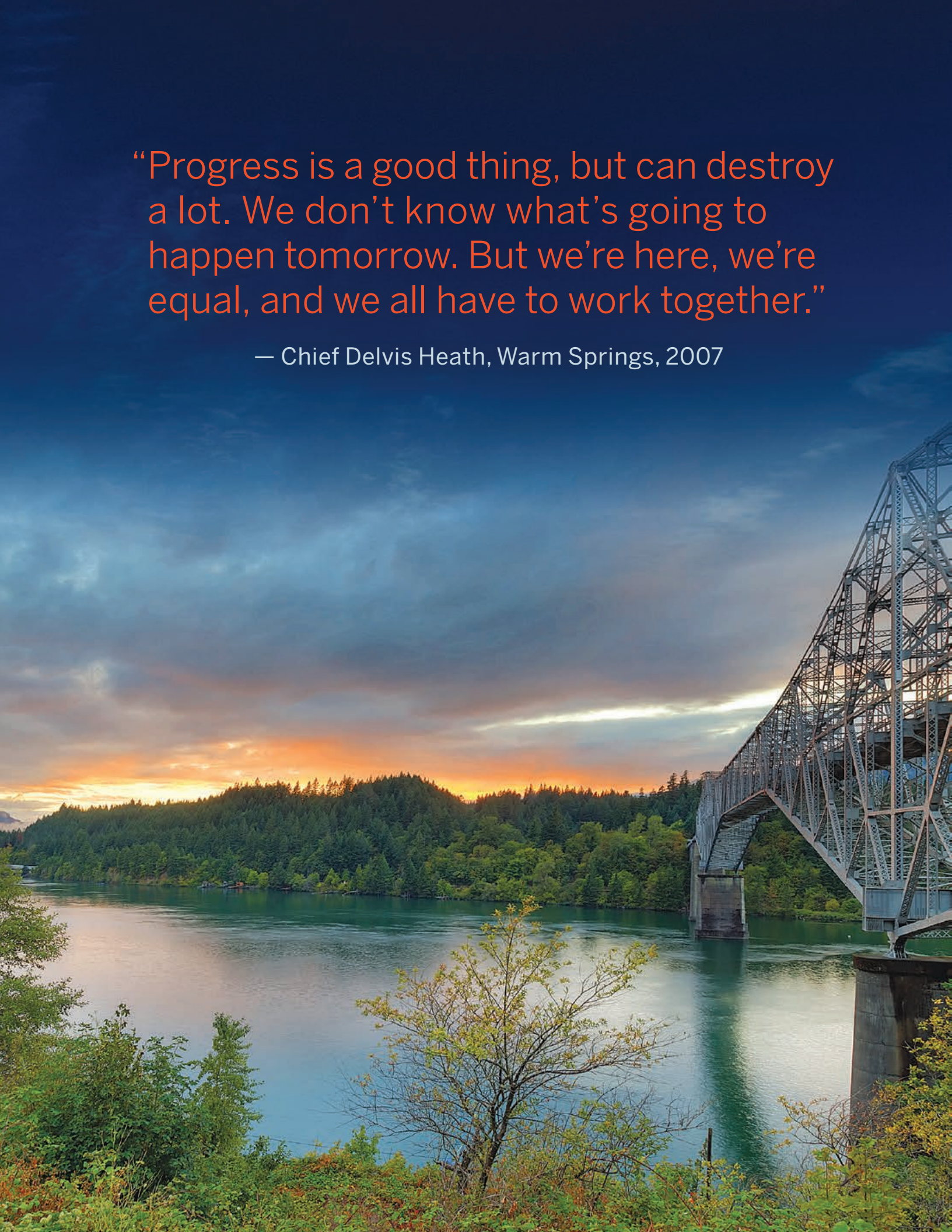
The foregoing resolution was adopted by the General Assembly at the 2021 Mid Year Conference of the National Congress of American Indians, held June 20, 2021 - June 24, 2021, with a quorum present.

Fawn Sharp, President

ATTEST:

Juana Majel Dixon

Juana Majel Dixon, Recording Secretary


"Progress is a good thing, but can destroy a lot. We don't know what's going to happen tomorrow. But we're here, we're equal, and we all have to work together."
— Chief Delvis Heath, Warm Springs, 2007

APPENDIX C:

Healthy and Harvestable Fish Population and Columbia River Hydroelectric System Configuration and Operations

Federal Fish and Wildlife Obligations Under the Northwest Power Act

When passing the Northwest Power Act in 1980, Congress acknowledged that the survival of the Basin's salmon is substantially dependent on the environmental conditions resulting from hydro system operations in the Columbia Basin.[154] The federal and non-federal hydro projects in the Basin have continually adapted their configuration and operations to improve the survival of affected fish and wildlife populations.

In the mid-1980s, the Northwest Power and Conservation Council made policy decisions on what share of the adult return fish losses were the responsibility of the hydroelectric system, concluding dams were responsible for reduced returns of five to eleven million of the fish, noting the impact estimate did "not take into account the accumulation of hydropower-related losses of salmon and steelhead year by years since hydropower development started. Such cumulative losses would be far greater than 5 to 11 million adult fish."[155] The Council also set an interim goal for the Fish and Wildlife Program of "doubling the runs...to a run size of about 5 million adult fish." The tribes viewed the Program's 1987 doubling goal as a compromise that would allow BPA to focus on an achievable interim goal and leave BPA's ultimate responsibility to a future decision process.

Some refinements to the Fish and Wildlife Program's goal have been made over the years, but no dramatic changes have been adopted that would reduce overall commitments. The most recent changes occurred in 2020 FWP Addendum with the adoption of Columbia Basin Partnership[156] (CBP) Phase II Report abundance goals as Biological Objectives/Targets. The CBP goals are population specific for 27 stocks of

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[154] 16 U.S.C. 839(6). It is generally accepted that the Basin's hydropower system has been "a major factor in the decline of some salmon and steelhead runs to a point of near extinction." 126 Cong.Rec. H10687 (1980) (letter from Comptroller General). The U.S. General Accounting Office ("GAO") described the impact of the hydropower system on anadromous fish in its September 4, 1979, report to Representative John D. Dingell, Chairman of the House Subcommittee on Energy and Power, as follows:

> Smolts surviving passage through the turbines of one dam enter the large, slow-moving reservoir of water formed by the next dam. The river no longer has the strong, swift current needed to carry the smolts rapidly downstream and out to sea. It now takes young fish more than twice as long to migrate downstream as it did before the dams were built. The slower the downstream migration, the more smolts are lost to predators. Others lose the desire to migrate and become permanent residents of the river, further reducing the breeding stock that finally reaches the ocean. It is the cumulative effect of hydro facilities which is so destructive. Each facility poses a separate and sometimes different set of problems for migrating smolts, and each contributes to a cumulative deterioration of the downstream migration. Depending on flows, juvenile losses from all causes average an estimated 15 to 20 percent at each main-stem dam and reservoir complex. Mortalities as high as 30 percent per project have been recorded under particularly adverse conditions.

[155] See 1987 Columbia River Basin Fish and Wildlife Program, page 39.

[156] NOAA Fisheries and its Marine Fisheries Advisory Committee (MAFAC) convened the Columbia Basin Partnership Task Force from 2017 through 2020 to bring together diverse representatives from across the Columbia Basin to establish a common vision and goals for salmon and steelhead.

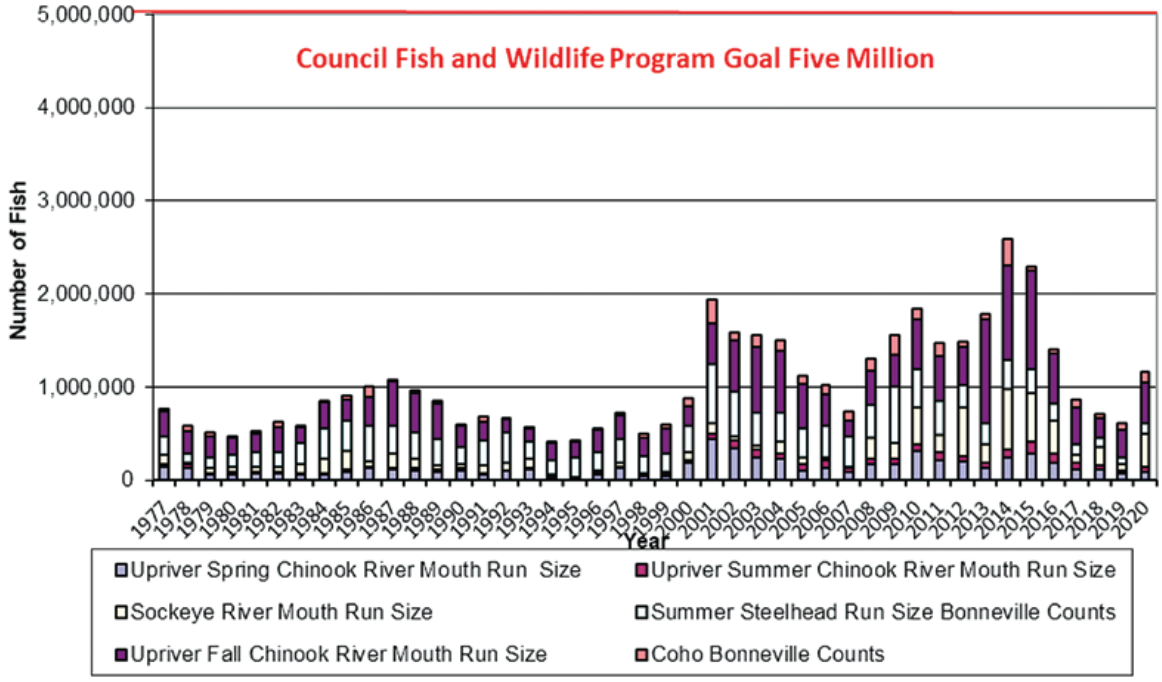
salmon and steelhead, with focus on natural origin fish. Low, medium, and high range goals are provided for specific populations and then adjusted and aggregated to larger spatial scales, including passage at Lower Granite and Bonneville dams.

While "Increas[ing] total adult salmon and steelhead runs of Columbia River origin to a 10-year rolling average of five million annually by 2025, in a manner that emphasizes increases in the abundance of the populations that originate above Bonneville Dam" remains as the FWP primary abundance goal (NPCC 2020), achieving run sizes at or above the CBP high range (healthy and harvestable) levels must be achieved with urgency.

The ultimate goal for the Federal government should be to address the requirements of the Endangered Species Act, the Northwest Power Act, and the Treaties, Executive Orders, and other commitments made to Indian tribes in the Columbia Basin. In the case of salmon and steelhead, the tribes seek to reach the dual goals of recovery and delisting of species listed under provisions of the ESA ***and*** the restoration of salmon populations to health and harvestable levels that support sustainable harvest sufficient to allow for a meaningful exercise of tribal fishing rights.

Reductions in salmon and steelhead abundance, productivity, and distribution was anticipated from the construction and operation of the CRS hydro-electric dams. Hatchery programs (*e.g.*, Lower Snake River Compensation Program, Mitchell Act and other actions) were established (congressionally authorized in many cases and others under the Northwest Power Act's Fish and Wildlife Program) to mitigate for direct and indirect the impacts hydro-electric dam construction and operations. In addition, FWP includes off-site mitigation to improve habitat, reduce predation, and supports adaptive management of dam operations. While these

FIGURE 22. Upriver Salmon and Steelhead Run Sizes



mitigation efforts have reduced overall impacts, they have failed overcome the impacts of the dams; actual adult salmon and steelhead returns remain well below the established goals.

FIGURE 22 shows the salmon and steelhead run sizes above Bonneville Dam from 1977 to 2017 compared to the Council Fish and Wildlife Program Interim goal of 5 million salmon and steelhead returning annually to the Columbia Basin. The Federal agencies responsible for implementing the Columbia Basin Fish and Wildlife Program (BPA, the Corps of Engineers, the Bureau of Reclamation, and the Federal Energy Regulatory Commission) are a long way from achieving the goals set in the Fish and Wildlife Program.

Current Biological Conditions

The Columbia Basin is home to one of the richest arrays of salmon and steelhead in the world, and this wealth of anadromous species holds great ecological, cultural, spiritual, and economic value. Salmon and steelhead are cornerstones in Columbia River Basin ecology and tribal culture, with historical returns estimated at 10–16 million fish, annually[157]; contemporary abundance of anadromous fish is only small fraction of their former run sizes (CBP Phase II, Thurow 2020). These resources are at risk, most stocks are currently listed under the Endangered Species Act (ESA) or have been extirpated.

- Twelve salmon and steelhead populations in the Columbia Basin are listed as either threatened or endangered under the Endangered Species Act.
- The total abundance of salmon and steelhead in the Columbia River is at or near the abundance when the first ESA listings were registered in the mid-1990s.

Various quantitative expressions describe the productivity of healthy salmon populations in tribal, state, and federal publications and regulatory documents. Once such metric—typically known as replacement—describes a growth rate of 1.0, where one adult in the parent generation produces one adult in the generation of offspring. Currently, many populations of salmon and steelhead in the Columbia Basin are below replacement, and their population growth rates need improvement just to reach this measure. Moreover, some positive degree of productivity or population growth rate sufficient to buffer the population against stochastic events, such as droughts and heat waves, is necessary for the health of the species. With relatively functional freshwater spawning and rearing habitat (productivity ~100 smolts per female), out-of-basin survival (smolt-to-adult return rates; SAR) of 2–6%, averaging 4% are needed to reach adult return goals. Recent Snake Basin spring/summer Chinook salmon SARs have been at or below 1% and freshwater productivity is often below 100 smolts per female. As a result, abundance of wild origin spring/summer adults in nearly half of the Snake River basin's populations are at or below a Quasi-Extinction Threshold of 50 wild-origin spawners.

To naturally persist, a population must be able to reproduce and survive at a certain rate to sustain itself. The survival of a species requires parents producing sufficient numbers of offspring to sustain the reproductive potential of the population as a whole. In addition to reproductive rates, the overall size of the population is important to its long-term health. A large salmon population may be able to persist through periods of low productivity. On the other hand, smaller populations are not as resilient. The combination of population size and productivity are used to define degrees of risk.

[157] https://www.nwcouncil.org/reports/columbia-river-history/salmonandsteelhead/

Other characteristics used to measure species viability include diversity and distribution.

Wide-swaths of Columbia basin habitat, once supporting anadromous salmon and steelhead, currently lacks salmon and steelhead production due to dams that blocked fish passage. Chief Joseph dam on the Columbia River[158], Dworshak Dam on the North Fork Clearwater River, Hells Canyon Dam on the Snake River, and Wallowa Lake Dam on the Wallow River preclude anadromous fish from reaching historically used spawning and rearing habitats. In addition to their lack of fish passage, operation of these dams alters fish habit in areas down-stream due to their impacts on water quality and quantity (timing and volume).

The remaining extant Upper Columbia and Snake River salmon and steelhead populations are in dire condition, with mid-Columbia stocks closer to medium range goals.

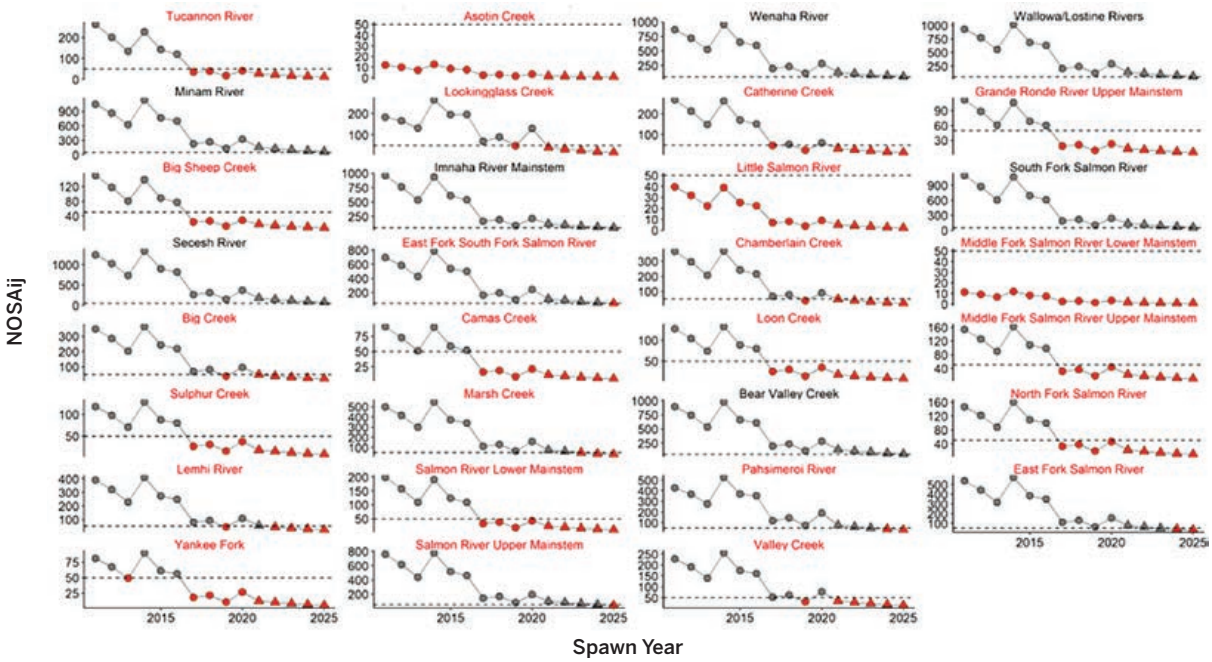
- Three stocks triggered NOAA's 2014 BiOp early warning and significant decline indicators: Upper Columbia Spring Chinook, Upper Columbia Steelhead, and Snake River Steelhead.
- NOAA's life cycle modelling of future climate scenarios for Snake River spring/summer Chinook salmon populations indicates that the median abundance of spring and summer-run Chinook salmon populations could further decline substantially in the next two to three decades, which would threaten to extirpate a large number of small populations.
- Spring/summer Chinook salmon in the Snake Basin are in trouble. Over the last four years, natural origin adult abundance in 44% of the ESA listed populations has been at or below the Quasi-Extinction Threshold (QET) of wild-origin 50 fish[159]. If adult salmon abundance continues to decline at a similar rate as the last 10-years (19% per year), nearly 80% of the populations may drop below 50 natural-origin spawners by 2025 and some populations will likely become extirpated in the near future (NPT 2021). **(FIGURE 23)**
- The number of adult steelhead returning to the Snake Basin dramatically dropped from a 40 year high of over 45,000 natural origin fish in 2015 to 15,000 or less estimated annually at Lower Granite Dam since 2017. Over the last four years, three (19%) of the Snake Basin steelhead populations have been at or below the Quasi-Extinction Threshold of 50 natural-origin fish. If adult steelhead abundance continues to decline at a similar rate as the last 10 years (18% per year), nearly half (44%) of the populations may drop below 50 natural-origin spawners by 2025; populations with B-run life history characteristics appear to be declining at a highest rate (NPT 2021). (**FIGURE 24**)
- Snake River sockeye salmon are fully dependent upon conservation hatchery (captive broodstock and supplementation) support.

[158] Chief Joseph and Hells Canyon dams are the first dams encountered by upstream migrating adults that lacking fish passage, subsequent upstream dams also lack passage and block access to historically used habitat.

[159] Quasi-Extinction is defined as 1) a population that is uncertain to persist; 2) there are not enough parents to successfully reproduce and perpetuate the population; and 3) the probability of recovery is low without substantial intervention.

FIGURE 23. Spring–Summer Chinook Salmon

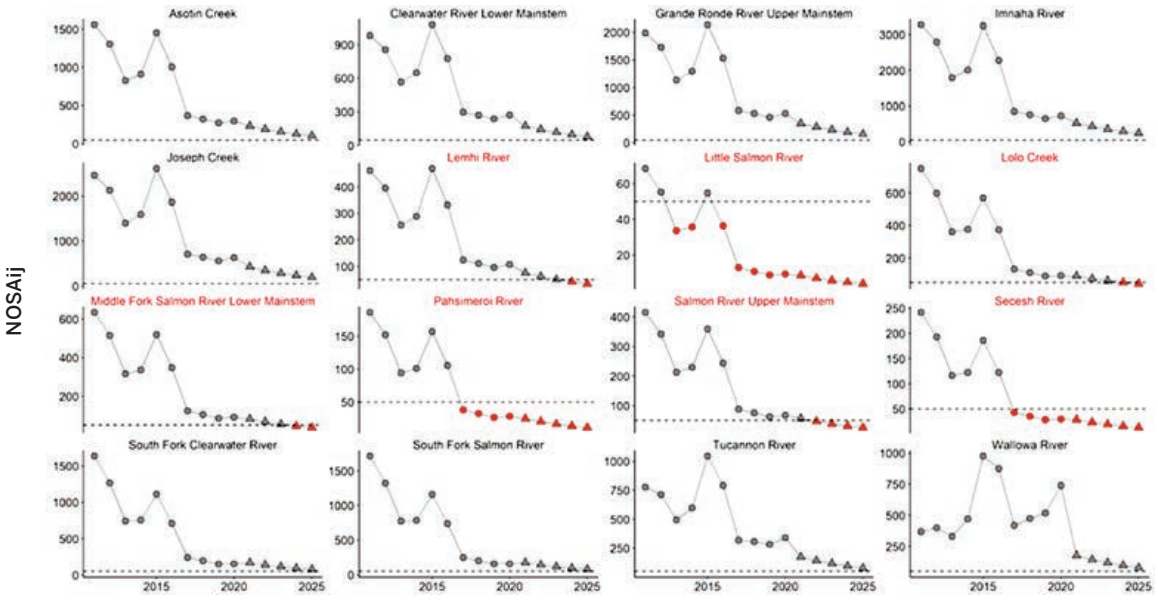
Future predictions of natural-origin spawner abundance (NOSAij) for Snake River Basin show 24 populations (77%) will start to drop below the quasi-extinction threshold (QET: dashed line; 50 spawners) within the next 5 years.



Source: Data through 2019 provided from Coordinated Assessments on 3/22/2021; 2020 data provided through personal communication with ODFW, IDFG and NPT.

FIGURE 24. Summer Steelhead

Future predictions of natural-origin spawner abundance (NOSAij) for Snake River Basin show 7 populations (44%) will start to drop below the quasi-extinction threshold (QET: dashed line; 50 spawners) within the next 5 years.



Source: Data through 2019 provided from Coordinated Assessments on 3/22/2021; 2020 data provided through personal communication with ODFW, IDFG and NPT.

Appendix C

- Snake River Fall Chinook salmon are limited to a single population that is actively supplemented. This population has rebounded from less than 100 natural origin returns in 1990 to a 10-year geometric mean now exceeding 9,000.
- Snake River coho salmon were extirpated from the Snake basin in 1986, but have been reintroduced, with returning adults now occurring from hatchery releases.
- Upper Columbia Spring Chinook have recently experienced the lowest abundance levels in their last 15 years. Their abundance and productivity remain well below the viable thresholds called for in the Upper Columbia Recovery Plan for all three populations (Methow, Entiat and Wenatchee) and these populations remain at high risk.[160]Upper Columbia steelhead experienced their lowest abundance level in the past ten years in 2018. Natural origin abundance and productivity remain well below viability thresholds for three out of the four populations (Okanagon, Methow, Entiat, and Wenatchee (improving)); however, the overall DPS status remains at high risk.[161]
- Mid-Columbia Steelhead started their precipitous declines in 2017 which have persisted through 2021. Yakima River MPG numbers declined to ~1,000 fish, numbers that haven't been observed since the time of ESA listing in 1999. There have been improvements in the viability ratings for some of the component populations of Mid-Columbia steelhead lower in the basin, but the DPS is not currently meeting the viability criteria described in the Middle Columbia River Steelhead Recovery Plan and the risk status has remained unchanged for the past three reviews.[162]
- Mid-Columbia spring chinook salmon, Mid-Columbia summer Chinook salmon, and Mid-Columbia fall Chinook salmon ESU status will be released shortly in the 2021 NOAA 5-year status assessment.

Warming River Water Temperatures

High summer water temperatures in the Columbia River System are known to have detrimental outcomes on fish survival and recovery. For example, in the summer of 2015, low flow conditions combined with lethally high temperatures in the Columbia and Snake River killed all but 1 percent of the Snake River sockeye salmon run. Lower river passage survival relative to temperature can be seen in **FIGURE 25** from a NOAA report on the 2015 sockeye passage season:[163]

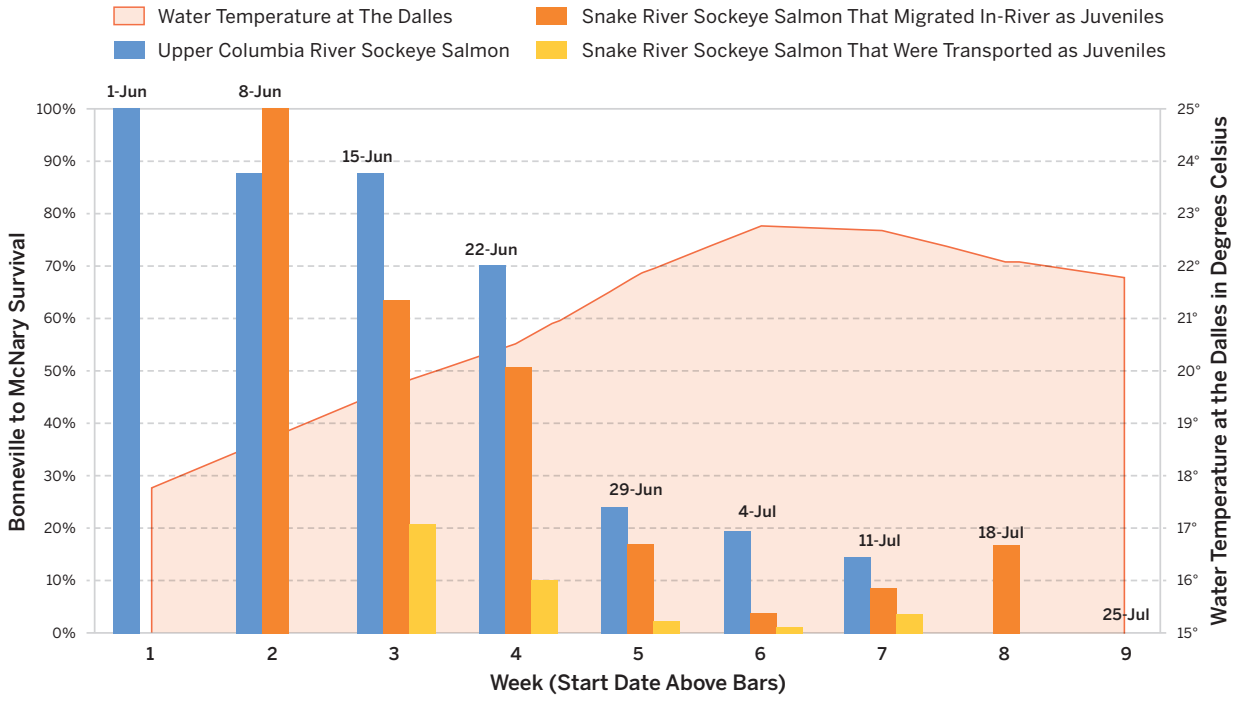
[160] NOAA Fisheries, 2016 5-Year Review: Summary & Evaluation of Upper Columbia River Steelhead Upper Columbia River Spring-run Chinook Salmon.

[161] *Id.*

[162] NOAA Fisheries, 2016 5–Year Review: Summary & Evaluation of Middle Columbia River Steelhead.

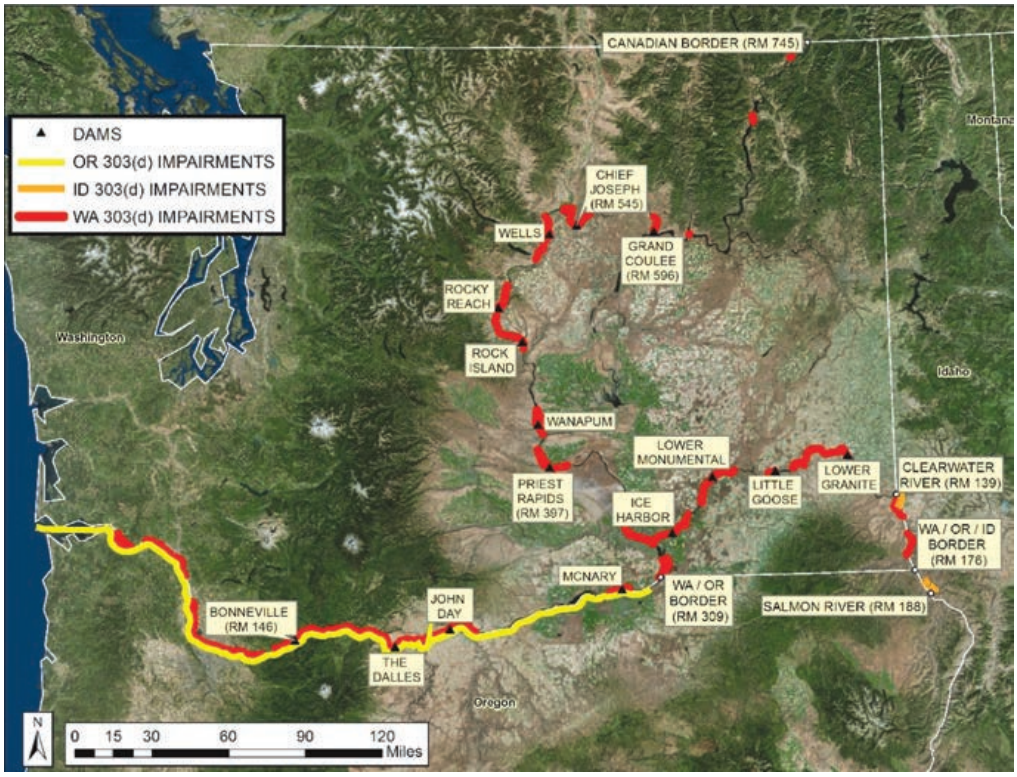
[163] NOAA Fisheries, 2015 Adult Sockeye Salmon Passage Report, Sept. 2016, available at https://archive.fisheries.noaa.gov/wcr/publications/hydropower/fcrps/2015_adult_sockeye_salmon_passage_report.pdf.

FIGURE 25. Weekly Adult Sockeye Survival Estimates from Bonneville to McNary Dam in 2015



Source: PITAGIS data and Columbia River DART

FIGURE 26. Map of Current Clean Water Act Impairments for Temperature in the Columbia and Lower Snake Rivers



Appendix C

Losses such as those experienced in 2015 will only be intensified by a warming climate. An analysis of temperature conditions in the Columbia and Lower Snake Rivers can be found in EPA's Total Maximum Daily Load (TMDL) for Temperature on the Columbia and Lower Snake Rivers (draft May 2020, final expected 2021). The geographic scope of the TMDL includes waters within the mainstem of the Columbia River from the Canadian border to the Pacific Ocean and within the mainstem of the Snake River in Washington from the confluence with the Clearwater River at the Idaho border to its confluence with the Columbia River. **FIGURE 26** shows current Clean Water Act impairments for temperature in the Columbia and Lower Snake Rivers.

The TMDL report is a detailed analysis of the sources of thermal impairment on the Columbia and Lower Snake rivers. The analysis points to the Federal Columbia River Power System as a primary source of thermal impairments. The TMDL makes clear that some significant changes to dam operations and alternative management of reservoir releases will be necessary to achieve temperature reductions and to limit the magnitude of impairments.

Columbia River Hydroelectric System Configuration and Operation

Multiple factors have contributed to these low returns, including especially construction and operation of hydro-electric dams. Protecting, restoring, and effectively managing these valuable species is one of the region's greatest responsibilities. Science on the status (abundance, productivity, and mortality factors) clearly shows a diversity of actions are needed, including breaching, to reach and maintain Snake basin fish populations at healthy and harvestable levels—especially in the light of climate change.

Given the imperiled condition of fish stocks impacted by Federal Columbia River Power System (FCRPS) dams and other important non-federal dams in the Basin, it is prudent to plan for variations in hydro configuration and operation going forward. The following subsections provide more detail on fish-related goals, fish population status, and hydro-project configuration and operational impacts to fish and wildlife. First and foremost, all hydro system operations for both flood control and power generation should consider how those operations may impact salmon survival and how they may be implemented to resemble a more normative river hydrograph.

Hydro-system configuration and operations must be compatible with and support achieving salmon and steelhead adult return goals in the near future, and in manner that is sustainable. Priority hydro-system actions should generally target high spill (non-powerhouse passage of juveniles), expanded spill periods (surface passage route option for all life stages and migration periods), reduced water travel times (elimination of zero flow periods and

minimum operation pool elevation), maintenance of functional habitats (no load shaping at Dworshak Dam), flow augmentation (cold water, stable flow periods, spring peak shaping), and juvenile transportation refinement (total dissolved gas management). These types of actions result in reduced powerhouse encounter rates (PITPH), accelerated fish travel times, and opportunity for year-round surface passage by all life-history behaviors (diversity).

Several actions could begin to rebuild habitat quantity and quality of the mainstem and tributaries: a) Reregulate flows to restore the spring high-water peak and revitalize the mosaic of habitats in alluvial riverine reaches; b) Reregulate flows to stabilize daily fluctuations in flow (caused by the practice of "power peaking" and lowering flows to store power from renewable resources) to allow food web development in shallow water habitats and reduce juvenile mortalities via stranding; c) Provide incentives for watershed planning that emphasize riparian and upland land use activities that support natural interactions between land and water, and insist on empirical evaluation of effectiveness of management practices; d) Couple seasonality of flow with spill rates over the dams that efficiently bypasses juveniles and adults around mainstem dams and behaviorally cue (rather than physically flush) the juveniles through the mainstem; and e) Restore mainstem habitats to more natural conditions which will reduce predation rates on migrating juvenile salmon.

First and foremost, all hydro system operations for both flood control and power generation should consider how those operations may impact salmon survival and how they may be implemented to resemble a more normative river hydrograph.

1. RUN OF RIVER DAM OPERATIONS

Spill Operations to Aid Juvenile and Adult Salmon Passage

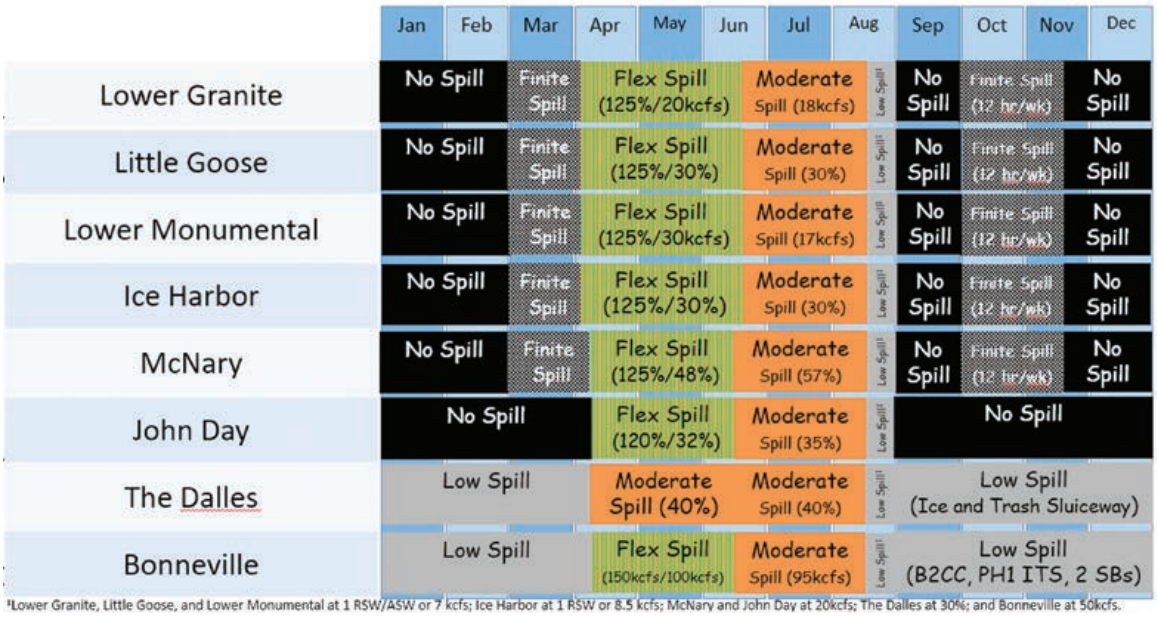
Specific spill operations with sizable interim benefits for fish and likely compatible with long-term healthy and harvestable fish returns are detailed in **TABLE 8** and **FIGURE 27**.

TABLE 8. High level summary of current and proposed spill operations at lower Columbia and Snake River projects, by season. See also **FIGURE 27** for project specific details.

Season	Current 2020 Biological Opinion	Interim Maximized Spill	Long-Term Breached Lower Snake
Winter (January to February)	No Spill	Low Spill	Low Spill
Early Spring (March)	Finite Spill (12 hours per week)	Low Spill	Low Spill
Spring (April to mid-June)	Flex Spill	High Spill	High Spill
Summer (mid-June to mid-August)	Moderate Spill	Moderate Spill	Moderate Spill
Late Summer (mid to late August)	Low Spill	Moderate Spill	Moderate Spill
Fall (September to December)	Finite Spill (12 hours per week)	Low Spill	Low Spill

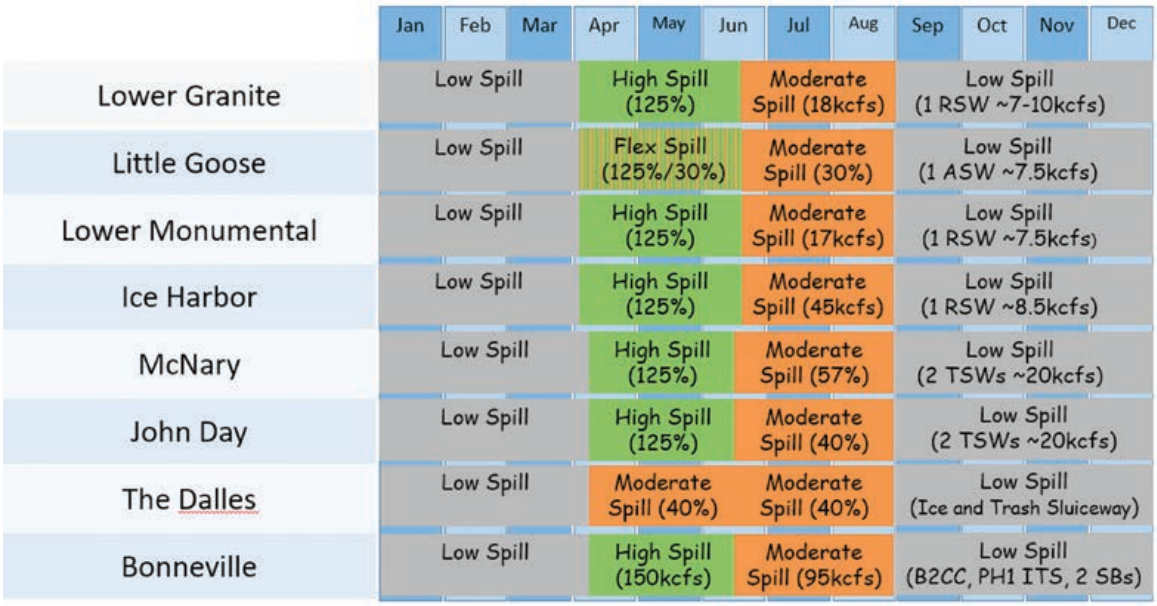
FIGURE 27. Current and Proposed Project Specific Spill Operations at Lower Columbia and Snake River Dams.

Panel (A): Current operations under the 2020 Columbia River System (CRS) Biological Opinion.



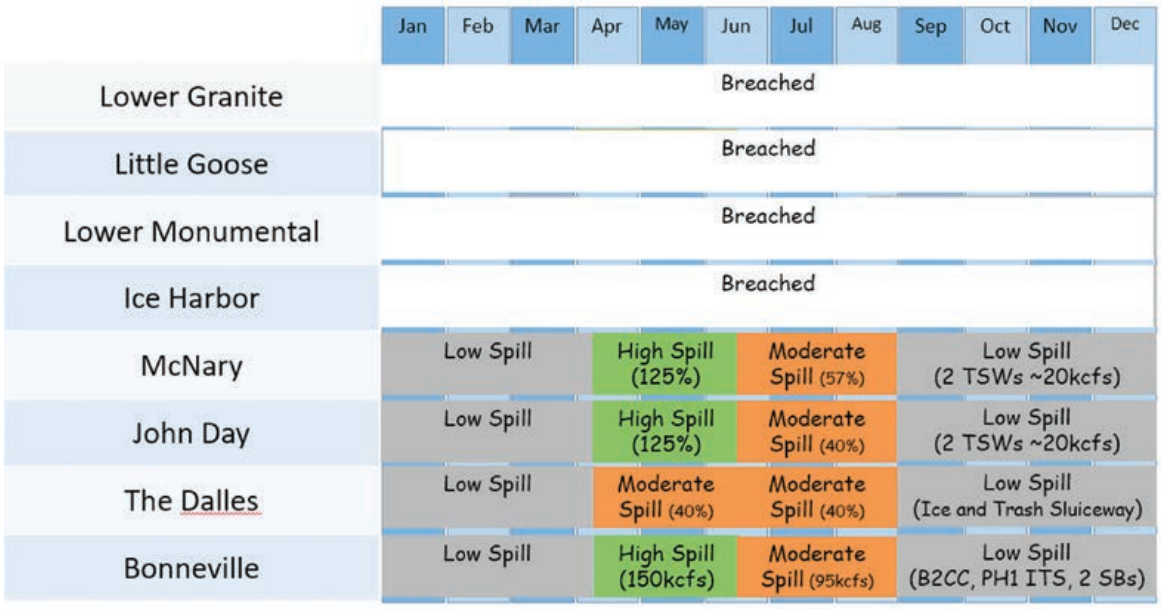
[1]Lower Granite, Little Goose, and Lower Monumental at 1 RSW/ASW or 7 kcfs; Ice Harbor at 1 RSW or 8.5 kcfs; McNary and John Day at 20kcfs; The Dalles at 30%; and Bonneville at 50kcfs.

Panel (B): Maximum spill operations proposed for interim operations under the Columbia River Initiative.



TSW = Temporary Spillway Weir **RSW** = Removable Spillway Weir
PH1 ITS = Ice and Trash Sluiceway. **B2CC** = Corner Collector **SB** = Traditional Spillbay

Panel (C): Lower Snake River breach and lower Columbia River max spill proposed for long-term operations under the Columbia River Initiative.



TSW = Temporary Spillway Weir **RSW** = Removable Spillway Weir
PH1 ITS = Ice and Trash Sluiceway. **B2CC** = Corner Collector **SB** = Traditional Spillbay

Operate at Minimum Operating Pool

Ensure that projects are operated at Minimum Operating Pool (MOP) throughout the migration season to reduce pool volumes and decrease water particle travel time which aids in decreasing migration time. A lower pool elevation creates more flow and more closely resembles a river environment. Existing reservoir (pool) levels are set to MOP in the Snake but not at all the Lower Columbia projects. All Lower Columbia Projects should be restricted to MOP. There are current limitations to MOP in both the Snake and Columbia rivers due to other designated purposes of the hydro system.

In the Snake River, the Federal Navigation Channel must maintain a required depth at all flows; therefore, an elevated pool above MOP is necessary because of sedimentation. Until the channel is dredged, or barges are required to lighten load requirements, MOP will not be implementable during periods of low flow. This risk shifting to salmon is unacceptable.

In the Lower Columbia, John Day (the largest reservoir) is operated to only MIP (minimum Irrigation Pool) several feet higher than MOP. This is due to irrigation withdrawals not being deep enough. If the irrigation withdrawal capabilities are extended, then MOP could be achieved. Other restrictions at John Day are higher pool elevations to aid in predation management. At higher pool elevations avian predators are unable to nest on Blalock Islands. However, dissuasion could be used in place of elevating the pool to achieve the same result, allowing a return to lower pool elevations.

Lower pool elevations would also help reduce sedimentation plumes that form at the mouths of the tributaries creating shallow water habitat and reducing cold water refugees that migrants can take advantage of.

Allow for Increased Total Dissolved Gas Waivers Year-Round

Historically, total dissolved gas (TDG) limit waivers, as set by the states of Washington and Oregon, have allowed spring and summer spill operations in aid of fish passage to exceed the statewide 110% TDG limit and reach up to 115% TDG in the forebay of each dam and 120% TDG in each tailrace. To support the Flex Spill Operations Agreement, the states removed the forebay TDG limit for spring 2019 operations, allowing operations to be curtailed only by the 120% TDG tailrace limit.[164] For 2020, the states raised the tailrace limits to 125% TDG for the spring passage season, allowing for even more spill at each dam.[165] These increases in TDG waivers should be enacted year-round and allowed for purposes other than fish passage to allow for more flexibility in water management and flood control operations. Current TDG waivers can hamstring operations and cause projects to be too cautious based on early seasonal forecast, leading to less water augmentation for the spring and summer time periods to the determent of juvenile outmigrants.

Reduce Power Peaking

Reduce power peaking at passage dams during emergence and migration periods to reduce stranding of fry and smolts. Power peaking can also cause temporary disturbance or oscillation in the water level that can confuse downstream and upstream migrants and increase travel time. This operation is currently implemented below Priest Rapids Dam with tremendous success for the Hanford Reach Fall chinook population.

Strictly Limit Periods Of Zero Flow

Periods of very low or zero flow are currently allowed and are not based on biological triggers, such as the number of fish present in the river. Zero flows should only be allowed when biological triggers have been met to ensure there is little to no risk to migrants. Constraints need to be integrated into the power operations to maintain minimum levels of flow when fish are present in the system.

2. RESERVOIR OPERATIONS AT STORAGE DAMS

Implement Modified Flood Control During Years With Lower Seasonal Snowpack

Modeling has shown that modified flood control is important during low snow years when flood control is not as much an issue, but spring/summer flows are at risk from diminished runoff. During years of high snowpack, there is generally sufficient water for spring/summer migrations, but a higher flood risk that must be controlled by releasing more water during the winter. Modifying flows in low flow years allows more water to be shifted into the spring and summer and supports juvenile migration with shorter downstream travel times. Recent increases in gas waivers allows for more water to be spilled without causing Total Dissolved Gas (TDG) concerns. This increased capability should be considered when setting flood control targets. Increased flows during spring migration coupled with increases in spill can help to reduce powerhouse encounters for migrating juveniles. Smolt to adult return rates (SAR's) are higher when the number of powerhouses that juveniles encounter is decreased.

[164] For a more detailed explanation, see the Corps of Engineers' Fish Operation Plan for 2019 at 2, available at http://pweb.crohms.org/tmt/documents/fpp/2019/final/FPP19_AppE.pdf.

[165] See http://pweb.crohms.org/tmt/documents/fpp/2020/final/FPP20_AppE_FOP.pdf for more details.

More In-Depth Measures, Such as Altered Flood Control, May Be Needed Across the System.

Altered Flood Control (AFC), where all rule-curves for key Federal storage dams (*e.g.*, GCL, HGH, LIB, DWR), BC dams (*e.g.*, MCD, DCD, ARD), and one FERC dam (BRN) across all water year classes should be considered. The effective AFC operation is controlled mainstem river flood pulsing. There have been some peer-reviewed published studies showing the ecological benefit of controlled flood pulsing. The result is a more natural or "normative" hydrograph that is more in tune with the salmon's life cycle and accommodates the coming changes to basin hydrology due to future climate change impacts. Such a change in lower Columbia River flood risk exceedance may slightly raise the risk while still providing reasonable flood control protection.

Flood Risk Assessment for the Lower Columbia River

The Corps of Engineers has yet to perform a badly needed flood risk assessment for the lower Columbia River; the last assessment was done in the 1970s. So, the question of what level of flood risk management should accommodate salmon restoration is unanswered. The Corps' trend in flood control operations since the 1980s is for an increasing diminished peaking hydrograph. Among other things, this reduces volumes of water needed for the Columbia River estuary plume. Any change to the Corps' flood risk management operations will need Corps buy-in and cooperation so that they are still meeting their congressional mandates. Various alternative flood control operations have been modeled with the Council's GENESYS Hydro-model that show the absolute/differential values of mainstem river flow and project/FCRPS generation relative to a fixed standard, in this case, the 2000 Biological Opinion FCRPS operations (Dittmer 2006). Those previous analysis can be made available upon request.

3. OTHER HYDRO-ACTIONS TO IMPROVE SALMONID SURVIVAL

Grand Coulee Drum Gate Repairs

Implement structural modifications at Grand Coulee to allow drum gate maintenance to occur regardless of flow year and reduce the required draft to perform the work.

This draft can have large impacts in early spring flows or put the region in the position to have to choose between spring and summer flows since it may preclude providing adequate flow during both time periods.

Dworshak Operations

Operate Dworshak Dam on the North Fork Clearwater River to better mimic the spring freshet. Current flood control drafts occur early in the winter when there is little information on what type of flow year will be realized. This can easily lead to excessive deep drafts that make it challenging to achieve refill, let alone provide spring flow augmentation.

Install Additional Turbines at Key Projects

Install additional turbines at projects such as Libby and Dworshak to allow for more flexibility in moving water and reduce the risk of over drafting due to project limitations. This would allow the operators more time before selecting target elevations. This would allow for more climatological data to be considered to ensure that optimum reservoir operations are realized.

Gregg M. Erickson / CC BY 3.0

4. IMPLEMENT CLIMATE MITIGATION MEASURERS

- Implement purchase agreements or utilize other means to reduce water withdrawals and leave more water in tributary rivers, especially in the late spring and summer months to aid both juvenile and adult migrants. More water left in the rivers will help to decrease travel time and buffer temperature increases. Additionally, under future climate scenario, flow for generation in the summer will be more valuable.
- Address thermal impacts associated with hydropower operations by implementation of a temperature reduction plan for the Columbia and Snake Rivers in accordance with the EPA temperature TMDL.
- Develop a long- and/or short-term sediment budget model throughout the Columbia River Basin with specific focus on the Cold-Water Refuges (CWR) along the river. Such a model can aid in hydroplaning of the river locations with objectives of optimizing salmon survival.

5. HYDRO OPERATIONS: MID-COLUMBIA

Juvenile survival through the hydro system is lower for yearling chinook and steelhead in the Mid-Columbia, relative to their Snake River counter parts (2020 CSS). Also, PITPH, which is the relative proportion of fish passing dams via their powerhouses, is higher for steelhead originating from the Entiat-Methow rivers than from elsewhere in the Basin. This is important because CSS modeling has demonstrated that each additional powerhouse encounter by wild steelhead groups from the Snake River, Entiat and Methow rivers, Yakima River and John Day Rivers may reduce SARs by 21%. Similarly, each additional day of water transit time could reduce SARs by 14%.

Improved ecosystem-based functions, like additional fish flows during the spring freshet can decrease transit times through the system while reducing the number of powerhouse encounters by out-migrating smolts. Columbia River Treaty negotiations are therefore critical to the recovery Mid-Columbia salmon and steelhead stocks.

Improvements in lifecycle models and increased PIT tag detection in the mid-Columbia can work hand in hand to identify and target problems at a given life stage or problems at a more specific location on the Columbia River. For example, adding a spillway PIT tag detection system at the Wanapum project in Grant County would provide two valuable purposes. First, it would provide new insights into the survival of out-migrating juvenile smolts from Rocky Reach Dam to Wanapum Dam and from Wanapum Dam to McNary Dam. Second, it would improve the detection probabilities of smolts throughout the Mid and Lower Columbia River. While improvements in PIT detection can provide a better window to juvenile survival in the

mainstem, improvements in life cycle models can provide additional clues to fish survival/mortality in the mainstem and tributaries.

6. FISH PASSAGE IMPROVEMENTS AND MAINTENANCE AT FEDERAL COLUMBIA AND SNAKE RIVER DAMS

The following description of needed routine fish passage improvements and maintenance was compiled by CRITFC staff to help better understand the budgetary needs and short comings for both the US Army Corps of Engineers (Corps or Corps of Engineers) Columbia River Fish Mitigation budget (CRFM) and the Corps Operational and Maintenance budget (O&M). The compiled costs anticipate implementation and expenditure over an 8-year time frame so projects can be both one-time cost as well as a reoccurring cost. The majority of the items in the budget are ones that the Corps of Engineers has highlighted at the regional System Configuration meetings (SCT) and include the unfunded items from the O&M budget that were presented at the Fish Passage Operations and Maintenance regional meetings. The other items and projects are identified in the Proposed Action from the Action Agencies as well the NOAA's recent Hydro Biological Opinion. Additional items are needs that have been identified by staff working with regional sovereigns and stake holders.

Fish ladder repairs and improvements

Fish ladders are necessary to pass adult salmon upstream past the hydroelectric dams on the Lower Columbia and Snake Rivers. The ladder technology at most of the dams is 50 to 80 years old and in need of repairs, some extensive, to keep the ladders in service. Diffusers and Auxiliary Water Supply systems (AWS) are key components to supplying water throughout the fish ladder. A ladder failure during the peak of salmon runs would be disastrous since most dams only have 1 or 2 ladders. If a ladder fails, there are no other adequate means for adult salmon to get past the dam and to reach their spawning gravels and a whole year class of salmon could be lost. The water supplied to the ladders for operation are provided either from fish turbines or pumps. Many of these pumps and turbines are aging and have failed. John Day and McNary dams for example are operating with less than the needed number of pumps. If one of the current pumps fails, the ladders would not be able to operate and would require most of the entrances to be closed. This would require any adult salmon trying to pass the dam to find only a small entrance across the entire dam with little or no attraction water.

Climate change will increase not just absolute river temperatures but the length of time the river is at temperatures that stress salmon and impacts their survival. To help combat this, cooling water structures are needed at several of the adult ladders to ensure adult salmon continue to migrate and thermal barriers are not created at the dams.

The total cost of ladder repairs and improvements identified by tribal, federal, and state technical experts is $160.4M to be implemented over 8 years.

Courtesy US Army Corps of Engineers

Spillway Repairs and Improvements

The spillways at the dams are critical passage routes for juvenile salmon as they migrate to the oceans. The spillways also provide an important means for moving water during high flow events to aid in flood control. Modifications to spillway have been ongoing for 20 years to improve the efficiency and safety of the route. However, at several of the projects, most notably Bonneville dam, erosion and safety concerns about the operation of the spillway have arisen starting in early 2000. At Bonneville dam, spill is limited to reduce the creation of hydraulic conditions to draw boulders into the stilling basin and cause additional erosion and damage that could take the spillway out of service. Modifications to the spillway such as notched spillway weirs that use less water could help reduce the cost of spill for salmon as outlined in the recent NOAA Biological Opinion where spill is now required during times of year where it previously was not provided.

The total cost of spillway repairs and improvements identified by tribal, federal, and state technical experts is $170.9M, to be implemented over 8 years.

Fish Screen and Juvenile Bypass System (JBS) Maintenance

The fish screens are part of Juvenile Bypass Systems (JBS) that provides juvenile salmon and lamprey an alternative passage route to that of turbines. The screens divert juveniles away from the turbines and then forces them up into a gate well where they are in turn passed through dewatering orifices and piped around the dam or to raceways where they are held for transportation. Current data indicates that while survival upon release is comparable to a spillway, there is reduction in long term fitness and thus lower survival for those that use many of the JBS systems on the Columbia and Snake rivers. It is important to note that there will be powerhouse operations during juvenile migration times and protection for migrants will be needed. While JBS's are not a perfect solution they provide a safer route than most turbines. The screens need annual maintenance and the current design for the extended screens were not intended for juvenile lamprey. Juvenile lamprey are found to get impinged on the extended screens and leads to mortality. Many of the JBS's are aging and need to be rebuilt and upgraded. Many of the JBS's were retrofitted to the dams and were built before there were guidelines and knowledge about what would be the best design for juvenile migrants that they would encounter.

The total cost of repairs and improvements to the Fish Screens and JBS's identified by tribal, federal, and state technical experts is $132.7M, to be implemented over 8 years.

Survival Studies (for Flex Spill Operations, Turbine Improvements and Monitoring)

Over the past 20 years project operations at the dams have changed as knowledge and litigation has progressed. Part of what drives these changes is knowledge gained through studies and monitoring. As new systems are put in place it is wise to study them to determine they are operating as intended and are providing the benefit that was expected since the science and knowledge for what is best for adult and juvenile salmon continues to improve. The flex spill operations that were implemented over the last three years are an example of operational changes that are quite different than what has been done previously. It is imperative that monitoring and evaluation studies are conducted to insure the planned benefits are being realized.

Most studies and monitoring are based on using information gained as juveniles pass the powerhouses at the dams. The flex spill program has the goal of reducing powerhouse passage and passing the majority of migrants through the spillway. The new spill program appears to be working with the majority of juvenile migrants going over the spillway, however there is not enough data being collected to get very accurate or precise reach survivals as well as other important information to help inform managers if this new spill program is producing benefits over past years operations. To aid in this, additional means to collect data need to be pursued and advanced. There has been success with new monitoring structures such as the Lower Granite Spillway Pit Tag detection system. However there have not been adequate funds to implement additional and other promising technology to help gather this critical information.

The total estimated cost of studies and improvements for monitoring identified by tribal, federal, and state technical experts is $50.5M.

Predator Management

The Corps has funded extensive avian predator management programs in the mainstem and estuary. These programs have been vital to improving survival of juvenile migrants. However, the Corps is proposing to reduce the level of effort aimed at predator management. At the same time, invasive fish species such as Northern pike, bass, and walleye, are increasing in numbers and consume large numbers of juvenile salmon and steelhead. For certain species such as steelhead, avian predation can make up over half to two thirds in some years of the total mortality of juvenile smolts as they travel from the Upper Columbia and Snake River to Bonneville dam.

The Corps needs to increase funding for predator management and coordinate their predator management programs through a central forum to ensure that funding is targeting the worst offenders and that we are not merely switching the consumers rather than reducing the consumption of juvenile migrating fish. We are proposing $3.2M for monitoring and predator management programs and $8M for implementing predator management in the Columbia River. We strongly encourage close coordination between the Corps predator management programs and those funded through BPA and the mid-Columbia PUDs.

The total cost of predator management and predator deterrence structures identified tribal, federal and state technical experts is $31.2M, to be implemented over 8 years.

Sediment Management and Cold-Water Refuges

Sediment management has been an overlooked problem since the construction of the dams. Some dredging has occurred to assist with inland navigation but the accumulated sediments at tributary deltas and other areas within the reservoirs due to low flow in the mainstem continues to have a negative impact on salmon survival. The Zone 6 and the lower Columbia tributary mouths provide critical sources of cold water for salmon holding while on their migration route (adults upstream and for the late season juvenile downstream migrants). The tributary mouths are currently shallow, slow moving, and provide ideal conditions for warm-water piscivorous fish and avian predators that benefit from the shallow sand bar habitats with no habitat complexity. The tribes are proposing to implement sustainable actions which can result in restoration and conversion of key fish habitat in potential cold-water areas. These actions would include dredging tributary river mouths and reconfiguring habitat to support native vegetation, provide refugia for resting fish, and improve connectivity between cold water areas and the main river.

It is estimated that $500K/year will be needed for hydrographic assessments and monitoring and approximately $12M/year is needed for restoring these river mouths and creating and maintaining important cold-water refuges.

The total cost of Sediment Management and Cold-Water Refugee as identified tribal, federal, and state technical experts is approximately $12M/year.

Courtesy United States Geological Survey / CC BY-SA 3.0.JPG

Estuary Restoration

All migrating fish in the Columbia River must pass through the estuary twice in their life cycle. It was not until the early 2000s that Corps recognized the importance of habitat restoration in the estuary and began funding work to restore important habitat to support food webs and water quality improvements. Considerable work has been funded through the Corps and BPA to restore priority areas, but significant work remains. Due to the damming of the Columbia River the active channel and sediment transport through the plume no longer provide the necessary diversity to support robust food webs and refuge from water quality and predators needed for the transitioning salmon.

The total cost for continued estuary studies and actions as identified tribal, federal, and state technical experts is $6.5M/year for the next 8 years.

Lamprey

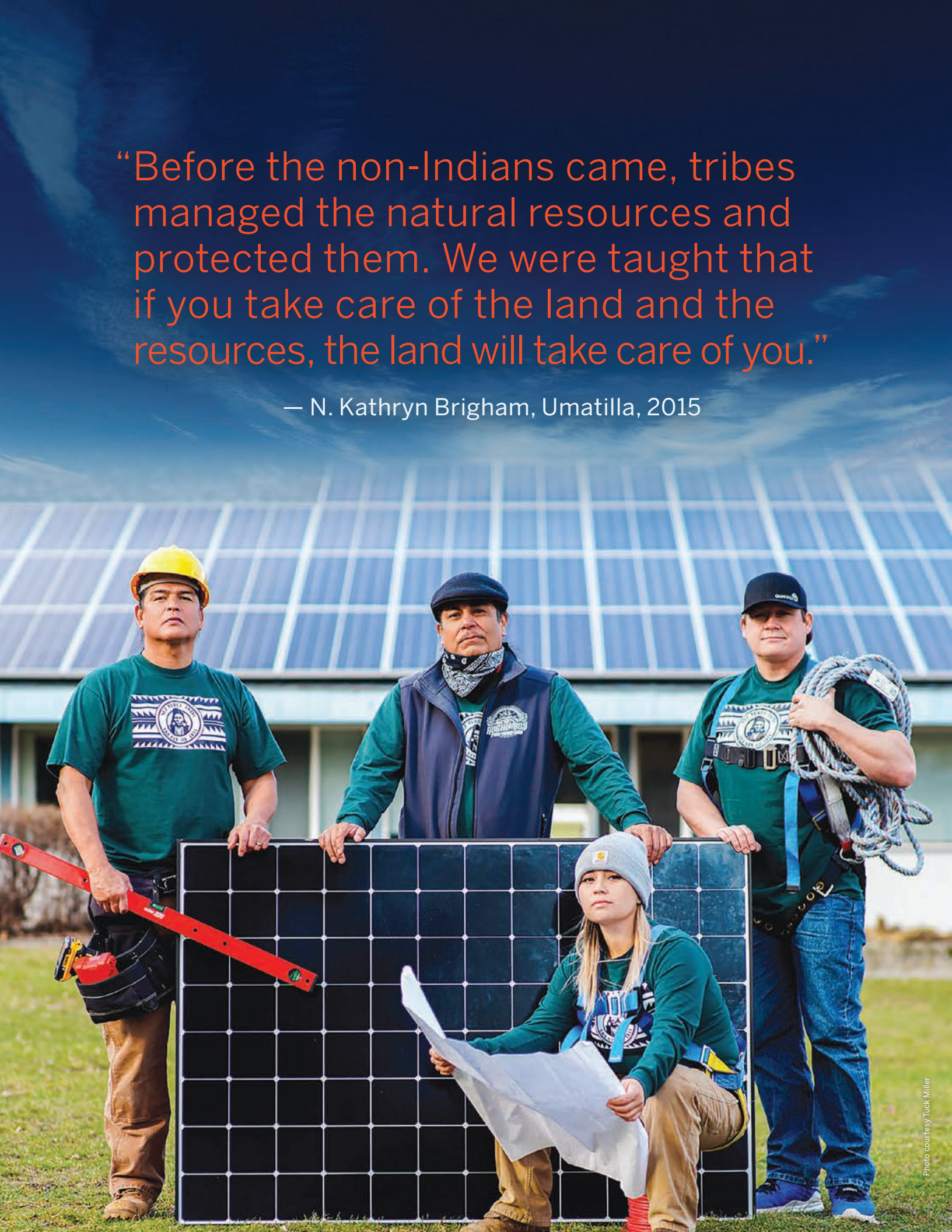
Pacific lamprey ("eels") hold great significance to the CRITFC member tribes for their subsistence, ceremonial, traditional, and medicinal purposes and ecological contributions. The goal of the CRITFC member tribes for Pacific lamprey restoration is to immediately halt the decline of Pacific lamprey and to restore lamprey throughout their range to self-sustaining numbers that support cultural, harvest, and ecological value. Pacific lamprey populations in the Columbia River Basin have declined drastically in the past half century due to a number of factors that include passage obstacles, entrainment, habitat degradation, poor water quality, contaminants, dredging, predation, poor ocean conditions, and climate change.

Blocked and delayed passage due to dams has severely impacted the ability for lamprey to reach their historic spawning habitat and has led to extirpation in the upper reaches of their range. Dams have altered the system for lamprey in all life stages and throughout their range. Ladders constructed for salmon are not suitable for lamprey due to differences in swimming style and ability. Lamprey use anguilliform swimming and use their sucking disc mouths to help propel them up surfaces. They are unable to maintain suction on 90-degree angles. Lamprey are not strong swimmers in comparison to salmon. As such, lamprey needs must be considered when constructing new passage or improving upon older structures at the dams.

Passage improvements for lamprey have been made at the mainstem dams, however more work is required. Roughly only ~ 50% of lamprey pass each consecutive dam during the upstream migration. Downstream passage is also problematic, lamprey are impinged on screens at the dams, inadvertently diverted and barged downstream with salmon, predated upon, endure poor water quality, and other threats.

The tribes and the Corps have developed an implementation plan to enact these actions to improve passage for Pacific lamprey. The cost of many of these improvements are significant and require multiple years of stable funding in order to be successful. Passage studies are required to monitor passage improvements and adjust or overhaul systems if the results of the studies suggest additional improvements are needed. A specialized miniaturized acoustic tag just for the small juvenile phase of lamprey has recently been developed for passage studies to understand the downstream migration (JLAT). These passage studies ideally would span multiple years and multiple dams, reservoirs, and tributaries. This is a significant cost that could take approximately 10 million to 20 million dollars to complete a robust study. Additionally, the JLAT tag needs to be commercialized to put it to work more easily.

The total cost for lamprey improvements and studies as identified tribal, federal, and state technical experts over the next 8 years is $165.1M.


"Before the non-Indians came, tribes managed the natural resources and protected them. We were taught that if you take care of the land and the resources, the land will take care of you."
— N. Kathryn Brigham, Umatilla, 2015
Photo courtesy Tuck Miller

APPENDIX D:

Energy Activities of CRITFC Member Tribes and Future Tribal Energy Leadership Opportunities

CRITFC developed a Tribal Energy Vision in 2003 and updated this vision in 2013. The four CRITFC member tribes have each applied the vision to their day-to-day government priorities. These tribal actions demonstrate their leadership in reducing damage to salmon and other fish and wildlife in the Columbia Basin, reducing emissions causing climate change and supporting a diverse and reliable energy resource mix that will lower energy costs and help recover abundant, harvestable salmon and other resident fish.

Energy Activities of CRITFC Member Tribes

Each of the four tribes has participated in studies and feasibilities of all possible energy solutions which could meet their goals, and which conform to the tribal culture. Feasibility studies and other similar actions have included reviews of energy efficiency options, wind energy generation potential (and any negative project impacts), solar generation projects, biomass project feasibility using local forestry resources, reservation hydropower generation and management, agricultural practices to save energy, natural gas projects and other potential projects.

All of the tribes have taken on some level of study or establishment of a tribal utility to give the tribe better ability to choose their own resources, control their power use, create jobs and provide essential, sustainable services to their reservations. Each of the tribes has invested in one or more personnel employed by the tribe to manage and operate the chosen energy projects.

Each tribe has had to consider the unique resources available on their reservation, and their unique political, cultural, and practical positions. These factors have included whether the tribe's reservation is in trust or has a checkerboarded land base (which impacts the tribe's jurisdiction over contiguous infrastructure), access to land with infrastructure for solar, whether a good wind resource is present in a place that does not have cultural impediments to development, whether there are existing hydro dams or hydro potential, and other similar factors. Each tribe has had to contend with different outside relationships with their various serving utilities, the ability to access outside commodities (such as natural gas), and their access to energy infrastructure.

Generally, the low cost of electricity in the region makes it financially more difficult for

renewable energy and new projects with new infrastructure demands to compete with existing markets. The hiring and training of local qualified personnel also presents a challenge unique to these rural communities.

Three of the four CRITFC tribes (Nez Perce, Umatilla and Yakama) have been officially "affected" by the Hanford nuclear waste site under the Nuclear Waste Policy Act of 1982. The U.S. Department of Energy Richland Operations Office is responsible for the cleanup at Hanford, which gives these three tribes a potentially different relationship with the U.S. Department of Energy and has other natural resource and partnership implications.

Each tribe has used available federal and other grants and technical assistance opportunities to assist in their energy planning, studies, projects, and decision-making efforts.

The following energy efforts are ongoing with the CRITFC Tribes.

Confederated Tribes of the Umatilla Indian Reservation[166]

General Information

There are over 3000 tribal members, about half of whom live on the reservation. The Umatilla Reservation totals 172,882 acres that flank the Blue Mountains of northeastern Oregon. Of that total, 90,315.54 are trust acres (52%) and in Individual Indian/Tribal ownership, including trust and fee. 48% is owned by non-Indians. The Umatilla Reservation's electricity is served by the Umatilla Electric Cooperative (in most of the residential and rural areas of the reservation) and by PacifiCorp (in the commercial and governmental area). Cascade Natural Gas also provides natural gas service on the reservation.

Energy Governance and Planning

CTUIR adopted an energy policy in 2009 to provide a long-term vision on the use of energy and the development of energy security and independence. Among the goals articulated in the energy policy are the desire to "Promote the development of clean and renewable energy sources...that build the CTUIR's energy independence..." and to "Develop strategies to

[166] The information regarding the energy activities at Umatilla was gathered from a review of public sources, and from an interview with Bruce Zimmerman, Tax Administrator for the tribe.

protect the CTUIR and its members from rising cost of energy through conservation…" The energy goals of the CTUIR are also succinctly summarized in the CTUIR Comprehensive Plan, where it states the desire of the CTUIR to "… actively pursue the reduction of greenhouse gases to sustainable levels by striving to conserve energy and developing energy independence for the sustainability of the Tribal community and its environment." The CTUIR Energy Policy further indicates that solar PV is among the most promoted energy technology, as long as development efforts are consistent with natural and cultural resource values.

Because of the major changes in energy technology, regional energy markets, tribal lessons-learned from past projects and a changed view of the "costs" of energy (including the financial costs, environmental costs, cultural costs, and other costs), CTUIR is updating its energy planning and tribal codes related to energy.

The tribes have designated staff focusing on energy issues. The tribe established an Energy and Environmental Sciences Program within its Department of Natural Resources (DNR). That department assists the tribe in meeting its energy and environmental goals. The tribal commercial functions are managed by the Department of Economic and Community Development (DECD), so a number of energy projects related to the tribal businesses are managed there. In addition, the tribal rights of way are managed at DECD in conjunction with the Land Management Department.

Various parts of the tribal code address energy related issues. CTUIR has adopted the Oregon Public Utility Commission's standards for net metering. The Land Use Development Code, which addresses zoning on the reservation, is going through an amendment process to clarify land related matters for residential and agricultural customers who want to take advantage of the existing utility net metering policies for small solar and wind. The code will also prohibit new wind unless it goes through a full tribal process and will limit other solar to 3 MW. These solar projects are proposed to be limited to industrially zoned lands. Any project larger than 3 MW must go through a more formal tribal approval process with various permits required.

Among CTUIR's business enterprises is Yaka Energy, a Section 17 corporation with an affiliated Nevada LLC. Yaka Energy is no longer operational. Yaka Energy focused on energy procurement and resale with a business objective to supply Fortune 500 companies, government agencies, investor-owned utilities and municipalities with energy commodities and energy marketing services. In addition to various energy marketing activities, a gas-fired powerplant was developed and fully permitted before the tribe decided not to move forward with the project in approximately 2006. With the decline in the economy and energy markets in 2009, this proved to be a good decision.

Outside Advocacy

The reservation's geographic location has led to it being a major transportation and utility corridor with numerous interstate energy and other facilities crossing tribal lands. The companies with facilities on tribal lands include the Union Pacific Railroad (which has crossed tribal lands since 1881) and Williams Companies (Williams Northwest has had gas pipelines on tribal lands since the 1950s and currently operates a 30-inch high-pressure gas pipeline). Various high-voltage electric powerlines also cross the reservation, and both Umatilla Electric Cooperative and PacifiCorp have distribution facilities on the Reservation. Cascade has gas distribution facilities. All these rights of

ways and service lines raise significant safety, environmental, natural resource, service, and financial issues for the tribe.

CTUIR has exercised their sovereignty through right of way negotiations to not only negotiate compensation for the use of their lands, but also to cover the costs of tribal services related to the rights of ways. Tribal services include law enforcement of trespass and illegal use of the lands, emergency response coordination with the energy and rail companies and tribal police, natural resources and ambulance services and administration of right of way uses. Third, the tribal right-of-way agreements govern all aspects of the right of way. The tribe now has numerous comprehensive right-of-way agreements.

These agreements have taken many years to develop and complete. In addition to compensation to the tribe for the use of tribal lands and resources, the provisions in the agreements include:

- A mandatory explicit consent to tribal jurisdiction and application of tribal law to the company's activities on reservation lands. If the company ever violates this agreement, the right-of-way is automatically void. In some instances when the tribe has presented this provision the company has left the table but then later has come back and accepted it. In one instance, a company refused to sign the agreement and moved the right of way off the reservation.
- Detailed list of facilities on the right-of-way with GIS coordinates which are incorporated into tribal GIS to pinpoint the location of every asset.
- Safety/emergency provisions. After one railroad right-of-way was negotiated and others were going through the process, a derailment incident occurred on the reservation. Within minutes, tribal police and emergency responders knew the exact location of the incident, the contents of every train car, the best route to access the site of the accident and had contact information for railroad officials. Because the emergency response worked so well between the tribe and Union Pacific, Union Pacific moved quickly to finalize all other pending agreements as beneficial not only to the tribe but to the railroad.
- Operational/environmental matters.
- A requirement for *annual* high-level meetings between the tribal leadership and the utility and company leadership, similar to a government-to-government meeting. Meeting locations alternate between the reservation and the company headquarters. They have been instrumental in developing good relationships.

Options Studied

Over the years the tribe has pursued many options for energy projects, such as the tabled gas marketing and generation project. As another example, the CTUIR Range, Agricultural and Forestry Department has considered a large-scale biomass project and ruled it out for the tribe's resources.

The Energy and Environmental Services Department is currently conducting explorations to determine the available geothermal resource. CTUIR is working with AltaRock Energy, Inc., HotRock Energy Research Organization, and the United States Geologic Survey (USGS). The project will determine whether a viable geothermal resource exists by studying the structural geology, rock outcrops, stratigraphy, and other signs of geothermal activity and will develop a conceptual model of the area and identify the best sites for future exploratory drilling.

Example Projects

- The **Tamástslikt Cultural Institute** is more than just a museum, it celebrates the traditions of Cayuse, Umatilla and Walla Walla Tribes and is the centerpiece of the Wildhorse resort and casino. In partnership with PacifiCorp, Cascade Natural Gas and the Energy Trust of Oregon, a study was conducted to identify energy efficiency and cost savings. The study led to the construction of a 40-meter 250 kW wind tower which supplements the tribal power needs, various energy efficiency activities, an efficient boiler, and covered solar parking structures.

- The tribes operate the **Kayak Public Transit System** which provides rural regional bus service southeastern Washington and northeastern Oregon with three fixed routes. Aside from providing a public transportation service, Kayak saves energy by providing a public alternative to single use automobiles.

- In 2018 the tribe installed the **Ántukš-Tińqapapt** or "sun trap" ground mounted 97 kW solar array. Over the anticipated 25-year lifespan (warranty) of the project, the tribes expect to save more than $450,000 in electrical utility bills and saving an almost 23-ton reduction in carbon dioxide emissions each year. The project also included LED lighting retrofit EEMs implemented across three tribal government buildings. The aptly named solar array supplies 100% of electric demand for three buildings—the Tribe's field station and the Kayak Public Transit Center bus barn and maintenance shop.
- Along with partners, CTUIR developed the **103MW Rattlesnake Wind Farm** west of Arlington, Oregon. Permitting began in 2002 and the project became operational in 2008. Permitting included a full Environmental Impact Statement. The wind farm spans 8,500 acres of ranchland that overlooks the banks of the Columbia River. The tribe sold the project to a developer and retains a financial interest in the project.

Appendix D

Courtesy Yellowhawk Tribal Health Center

- Yellowhawk Tribal Health Center is the first tribal building in the state to enroll in **Energy Trust of Oregon's "Path to Net Zero"** offering for buildings approaching net-zero energy use. Once certified Net Zero, this building will generate as much energy as it uses over the course of a year—a path the Eastern Oregon Tribe can be proud to walk. This building is 60 percent more energy efficient than a standard building of its type, and the estimated energy savings are 646,000 kilowatt hours per year. That translates to nearly $58,000 a year in savings, which will be invested back into the community. The building is accomplishing these savings through a variety of features, including solar panels, LED lighting, high-performance insulation and windows, and an efficient heating and cooling system that recovers heat and energy from the air.

- CTUIR maintains numerous connections with **Bonneville Power Administration (BPA),** including managing the land rights for BPA facilities on the reservation. For example, when CTUIR developed, built, and manage a light industrial and commercial business park known as the Coyote Business Park. The Business Park involved the replacement of power support structures of the high-voltage line that crosses the site. BPA replaced 10-12 wooden "H-frame" structures, each about 60 feet tall, with 7 to 9 steel poles and one lattice steel structure each about 110 feet tall on the portion of its Roundup-LaGrande transmission line that crosses the business park site.

Yakama Nation[167]

General Land/Energy Information

Roughly 10,000 people were enrolled members of the Yakama Nation in 2009 as descendants of the 14 tribes and bands of the Yakama Nation. The governance of the tribe is the responsibility of a 14-member tribal council, elected by a vote of the tribe's members. The reservation is 1.4 million acres in south-central Washington State. In 1963, most criminal and civil jurisdiction over tribal members was transferred from the tribe to the Washington state government under Public Law 280. The tribe started its own utility, and Yakama Power began service in 2006. Since its beginning Yakama Power has been actively pursuing utility expansion. While it has taken over much of the service to the reservation, Klickitat County Public Utility District and Pacific Power still provide electric service on some areas of the Yakama Reservation. The reservation is not served with natural gas.

Energy Governance and Planning and Outside Advocacy

The Yakama Tribal Council effectively delegated most of its internal energy functions to its tribal utility beginning with its Council Resolution GC-04-98 in 1998 to research the opportunity of a tribal utility. Yakama Power is governed by its Board of Directors, which consists of 7 tribal council members. The Nation received a relicensing settlement from Grant Public Utility District in 2007, which supported utility start-up expenses. Now, Yakama Power not only provides electric service to most of the reservation, it offers 20 GW internet, land line and cell phone service to the reservation and security services and cable television to some customers through fiber optic systems. All fiber is tribally owned and receives lease revenue from a local wireless provider. Yakama Power has a full requirements contract for power from Bonneville Power Administration but also develops its own renewable energy generation. Yakama Power advocates for tribal utility issues among federal, state, and local entities.

The Yakama Nation continues to actively pursue its Treaty Rights and otherwise advocate for its tribal sovereignty, including in energy related matters. For example, the Nation litigated Washington State's imposition of fuel taxes on tribal purchases. In 2019, the US Supreme Court[168] confirmed that citizens of the Yakama Nation are not required to pay a fuel tax to the state of Washington. A treaty signed with the United States in 1855 pre-empts the tax.

[167] The information regarding the energy activities at Yakama Nation was gathered from a review of public sources, and from interviews with Ray Wiseman, General Manager of Yakama Power.

[168] *Washington State Dept. Of Licensing v. Cougar Den, Inc.*, 586 U.S. ___ (2019); 139 S. Ct. 1000; 203 L.ED. 2d 301.

Options Studied

Yakama Power is responsible for developing all renewable energy it serves to customers. They are currently studying solar with an expectation of four ground-mount systems producing up to 1.25 MW. Their vision statement says, "The Yakama Nation will research and develop energy efficiency and renewable energy through a diverse portfolio of renewable energy projects and programs to become increasingly self-sufficient and energy independent, to reduce costs and enhance tribal economic opportunities and minimize impacts of climate change. The Yakama Nation will promote sustainable energy projects while preserving and enhancing the cultural, traditional and environmental resources and protecting the rights as outlined in the Treaty of 1855."

The Yakama Nation has studied its wind resource and has decided against supporting large scale wind energy on its traditional lands due to the presence of cultural significant sites on most high hill and mountain tops where wind farms want to be sited for the continuous winds there. Yakama Power is considering smaller scale wind generators for areas that do not present these cultural or other concerns.

The Yakama Nation has studied biomass energy. A 2010 study showed the cost of supply of wood fuel and transportation made the idea financially insecure with unknown future power market rates. The results showed that existing industries produce the cheapest supply of feedstock as a byproduct of their operations, while supplies harvested specifically for bioenergy were considerably more expensive. Fragmented land ownerships lead to the necessity of cooperation between owners and highlight the importance of a strong anchor supply close to the plant. Lastly, uncertainty in supply and cost parameters leads to larger ranges in available biomass, leading to reluctant investment in large plants.

Projects

Yakama Power's electric service to the Reservation is the most significant energy "project" undertaken by the Yakama Nation. Yakama Power's load has grown from about 3MW in 2006 to about 18MW in 2020. It started with the tribal campus, casino, and Yakama Forest Products with a condemnation of Pacific Power facilities.

In 2010, additional customers were added after the transfer of 43 miles of BIA distribution lines serving irrigation pumps. Yakama Power bought out some of Benton Rural Electric Association's lines in 2011 which brought the load to 5.5 MW. Yakama Power also began serving Wapato Irrigation Project in 2011 bring their load to 6.8 MW. In 2013, additional Pacific Power facilities were condemned in White Seam to allow the utility to serve the rodeo grounds, FEMA homes and Totus Housing Project for a total of 7.4 MW. A third Pacific Power condemnation was filed in 2015 which added the Wapato Industrial Park, Apas, mamchut, Wolfe Point and others.

In 2016 Yakama Power purchased the remainder of Benton Rural Electric Association's to bring the utility's load to 16.2 MW. A new bay was added in Pacific Power's Wapato substation to serve the new load. In 2018, Yakama Nation purchased the assets on Signal Peak road from Pacific Power bringing the load to over 17 MW. Yakama Power serves native and non-native customers.

In 2019, utility revenues were over $13 million. Their rates were lower than competing utilities on the reservation, with all-in residential rates of

Courtesy Yakama Power

$0.0726/kWh. Competing residential rates are almost $0.095/kWh (before taxes and fees).

One of Yakama Power's main missions is to provide employment for tribal members on the reservation. They developed a non-union Apprentice Training Program. Graduates from the program have included Yakama Power's electrical employees, plus 1 plumber and 2 HVAC professionals. Today, they employ 30 people, almost all Indians with all-Indian crews.

Their employees are some of the few all-Indian utility crews. Employees include 4 apprentice linemen, 7 journeyman linemen, 1 apprentice meterman, 1 journeyman electrician, 1 apprentice electrician, 2 fiber service splicers and 1 fiber implementation technician, as well as management and office staff. The utility has a full array of utility trucks and equipment with a large shop.

Utility facilities include 4 metering points where Bonneville power is delivered, 9 distribution substations, 590 miles of distribution line, and 95 miles of 24.5 kV sub-transmission. They anticipate the need for a 115 kV line to be initially operated at 34.5 kV.

Wapato Irrigation Project is a federal irrigation project originally built in 1868. It is maintained by BIA for seasonal irrigation; April through October, with 1,100 miles of canals to irrigate 176,00 acres on Yakama Reservation for tribal and non-tribal farmers and ranchers. While BIA still runs the irrigation project in coordination with the Yakama Nation Water Resources Program, the Yakama Nation received a transfer of Wapato's vintage electrical equipment from BIA in February 2008. The transfer included the transformers, generators, control systems, from Drops 2 & 3, and the 34.5 kV transmission line. The buildings at both drop sites are leased from BIA. The long-term plan is to revive all three generators in the irrigation project and add another three to generate about 8 megawatts. Yakama Power, along with Nation's Department of Natural Resources, the Tribal Council, US Department of Energy, the Wapato Irrigation Project (BIA) and Grant Public Utility District, began with an overhaul of the generator at pumphouse No. 2 (pictured below with local artist paintings on the turbine) near Harrah, which can now produce up to 2.5 megawatts, however transmission systems in the area limit the generation capability. Because Yakama

Courtesy U.S. Department of Energy

Power's contract with Bonneville permits only smaller added projects, power produced is sold to Grant County Public Utility District. Future plans include adding additional generation, including micro-hydro, to the project and expanding the Bonneville Power Administration substation and transmission facilities to accommodate the additional generation.

The Nation negotiated a settlement with Grant County Public Utility District related to the Priest Rapids Dam which impacted the Nation. Under the agreement, the Yakama Nation, through Yakama Power became a Priest Rapids Project power purchaser along with Grant PUD's 22 existing purchasers. Grant PUD markets the power on behalf of the Yakama Nation. Through 2009, the allocation was 20 average megawatts (aMW), 15 aMW from 2010 through 2015, and 10 aMW in 2016 through the remainder of the agreement. Like other power purchasers, the Yakama Nation pays project cost for power received. In recognition of the value of this power allocation, Grant PUD received rights to 75 percent of the renewable energy credits for the first 75 average megawatts of any renewable generation project developed by the tribe. Grant PUD will also receive the first opportunity to jointly develop new generation projects.

Confederated Tribes of the Warm Springs
Indian Reservation of Oregon

Confederated Tribes of Warm Springs[169]

General Land/Energy Information

The people of the Warm Springs reservation are Wascoes, Warm Springs Band (Tygh, Wyam, Tenino and Dock-Spus bands) and Paiutes who organized as a confederation in 1937 with a Constitution under the Indian Reorganization Act. In 1855, The Warm Springs and Wascoes (before the Paiutes moved there) signed the Treaty with the Tribes of Middle Oregon, which ceded 10 million acres to the United States. There are over 5000 tribal members today, most of whom reside on the 640,000 acre reservation in north central Oregon. The Tribal Council has 11 members, 8 elected positions (representing three districts: Agency, Simnasho and Seekseequa) along with three lifetime chieftain positions representing the three tribes of the Confederacy (Wasco, Warm Springs and Paiute).

The reservation natural resources include cultural resources, rangeland (ranching and wildlands), agriculture (the tribal farm grows grain hay, alfalfa hay and orchard grass; vegetable, flower, grass legume and grain seeds), forests, rivers and lakes, fish and wildlife and birdlife. The reservation is bordered by the Deschutes River (with Lake Stimtustus behind Pelton Dam and Lake Billy Chinook behind

[169] The information regarding the energy activities at Warm Springs was gathered from a review of public sources, and from interviews with Jim Manion, General Manager of Warm Springs Power and Water Enterprises.

Round Butte Dam), the Metolius River and Jefferson Creek. Crossing the reservation is the Warm Springs River and other creeks.

The tribal website states, "We ask, 'What impact will this have, both positively and negatively, seven generations from now?'" Natural resource considerations are paramount in all energy development options.

Energy Governance and Planning and Outside Advocacy

Warm Springs Water and Power has been delegated many of the energy functions for the Confederated Tribes of Warm Springs. However, the Tribe maintains an active Natural Resources Department and a Public Utility Branch who manages water, wastewater, solid waste and maintenance of over 90 tribal buildings. The tribe manages a Low-Income Energy Assistance Program that offers assistance with electrical bills or wood. The tribe also manages a Public Transit program through the Planning Department.

Jim Manion, General Manager of the Warm Springs Water and Power Enterprise participated as a member of the Indian County Energy and Infrastructure Working Group, operated by the United States Department of Energy to bring government and tribal leaders together to collaborate and gain insight into real-time tribal experiences representing obstacles and opportunities in energy and related infrastructure development and capacity building in Indian Country.

Options Studied

Warm Springs Water and Power has actively been pursing renewable energy for the past several years. They started with a resource inventory of reservation lands and compiled a list of potential resources. They assessed the two with the highest potential, wind and geothermal.

- Beginning in 2003, Warm Springs completed a wind energy inventory by installing met towers across the reservation. The study concluded that they do have a viable wind capacity factor sufficient to develop at the Mutton Mountain site. The environmental review identified birds of prey that could potentially be impacted, so the tribe has decided not to pursue a wind generation project at this time.
- The next was to look into geothermal, as the tribe has a known "warm spring" resource. Preliminary geothermal reconnaissance began in 1990. A Memorandum of Understanding was signed with a private company. While there was a promising resource in the southwest corner of the reservation, energy markets did not support the costs of the projects. Warm Springs Water and Power has conducted all necessary Geotech work along with subsurface work, drilling temperature gradient holes. The enterprise continues to explore funding options to drill a test production well to quantify the resource. Transmission access is a challenge for this resource as it is located in a remote and timbered landscape.
- Recently, Warm Springs Water and Power has started to advance the tribe's solar potential. They have identified a developer and are exploring access to the grid to build out a large-scale solar farm. We are considering a 100MW or larger commercial scale project if we can gain access to the grid. They recognize the need for new renewable resources over the next 5 years, and with the renewable energy standards on the west coast, they believe this could be a valuable resource to develop.

Example Projects

- **Warm Springs Power and Water Enterprises** is run by an Enterprise Board appointed by Council, and a General Manager. They manage the Tribes interest in the largest hydroelectric project within the State of Oregon as a co-manager with Portland General Electric (PGE) of the Pelton/Round Butte Hydroelectric Project located on the Deschutes River which borders the reservation. In 1955, the Tribes approved the building of the first powerhouse, the Pelton Dam and the second dam, the Reregulating Dam. The Tribes reserved the exclusive right to develop power generation at the Reregulating Dam if it was ever found to be economically feasible. In 1964, the Tribes approved construction of the third dam, the Round Butte Dam. It wasn't until 1979, when the energy market improved and federal law was passed allowing private developers to develop hydroelectric sites, the Tribes elected to exercise their option to construct a hydroelectric project at the reregulating dam.

The tribes entered the energy generation business in 1982, with the completion of this hydroelectric plant, which was the first tribal sovereign to receive a Federal Energy license. Warm Spring installed a 19.5 MW Bulb Kaplan turbine in the last of a series of dams on the Deschutes River. In 2001, the federal license for this hydroelectric complex ended. The Tribes & PGE entered into a Global Settlement Agreement to form a partnership to jointly own the Pelton/Round Butte Hydroelectric Project.

Today, the Tribes are a one-third partner in the project and have 100% ownership of the Reregulating Dam powerhouse, increasing the energy capacity to 170MW. By 2037, the tribes have an option to become the majority owner of the entire project. In 2021, the will be advancing the option to increase their ownership interest in the Pelton Project, taking the ownership interest to 49.9%. The partnership has proven beneficial to both Warm Springs and PGE, providing important revenue to the Tribes, and reintroducing salmon and steelhead above the project while providing carbon-free power to the grid that feeds Warm Springs and to the PGE grid.

- **Warm Springs Forest Products:** In 1970, three 3MW steam turbines were installed at Warm Springs Forest Products. In 2004, the tribe worked with state, federal and private firms to expand the biomass program to a 20MW cogeneration plant. In 2016, the tribe's forest products lumber mill shut down due to a reduced supply of logs, an aging plant and a changing economy.
- **Warm Springs Ventures** maintains a carbon offset venture that sells carbon offsets to major polluters. The tribal forest management plan for the 2,200 acres coincides with the practices called for by the carbon sequestration credit program.
- **Small-Scale Solar:** Sunlight Solar has completed two projects with the Confederated Tribes of Warm Springs. The first project was completed in 2010 on the Warm Springs Media Center building which houses the local radio station KWSO and newspaper SpilyayTymoo, the second is at the Warm Springs K-8 Elementary and includes a 213 solar panel, 58.565 kW system to power the school. Annually, the solar system is expected to save the school $4,000.

Nez Perce Tribe[170]

General Land/Energy Information:

The Nimiipuu people have always resided and subsisted on lands that included the present-day Nez Perce Reservation in north-central Idaho. Today, the Nez Perce Tribe is a federally recognized tribal nation with more than 3,500 citizens.

The current Reservation consists of 770,000 acres of which 124,000 are tribally owned. It was established by treaty with the United States government in 1868. Parts of five Idaho counties, Nez Perce, Lewis, Latah, Idaho and Clearwater Counties, are located within the reservation boundary. The cities of Lapwai and Kamiah serve as Tribal centers on the east and west ends of the Reservation. U.S. Highway 95 runs north and south through Idaho, and the reservation, and serves as a major interstate highway. Highway 12 runs east and west through Idaho's panhandle. Nez Perce Reservation lands consist of productive dry-land wheat farms that border on the Clearwater and Nez Perce National Forests. Beside arable hill tops and river bottoms, the reservation includes forested river canyons and steep, non-arable hillsides. The chief economic basis of this entire region is in agriculture and timber products.

[170] The information regarding the energy activities at the Nez Perce Tribe was gathered from a review of public sources, and from interviews with Stefanie Krantz, Climate Change Coordinator for the Nez Perce Tribe Water Resources Division.

The Reservation is currently served with electricity by Avista Utilities and by Clearwater Power Company. Natural gas service is provided in some places on the reservation by Avista. Although Idaho's electrical rates are among the lowest in the country, the Nez Perce Tribe's electrical bills are significant to the operating budget every year. Tribal programs are located in forty some buildings, in six counties, in two states. Ninety-five percent, or more, are heated electrically. The age of the Tribal office buildings located in Lapwai, Idaho vary from forty to over a hundred years old, and most have not been updated. The tribe has expressed concerns over the reliability of existing power systems and maintaining a reasonable cost of service.

Energy Governance and Planning and Outside Advocacy

The Nez Perce Tribal Executive Committee (NPTEC) has taken steps to provide specific energy leadership. They have established a Climate Change Subcommittee of the Council to address the ever-changing climate and natural resources, mitigation strategies, energy consumption, energy developments, environmental health, workforce development, and all efforts geared to going green, utilizing sustainable methodology, and having sustainable solutions for and on behalf of the Nez Perce Tribe. They have also created a full-time position of Climate Change Coordinator in the Water Resources Department of the Natural Resources Office. They are currently hiring a Climate Change & Energy Planner VISTA Member through AmeriCorps to assist in climate adaptation, policy, and resilience planning efforts.

The tribe has an active water utility run by a Water Utility Board. Their goal is to provide clean potable water for customers as well as maintain a reasonable rate structure that customers can afford. Water technicians operate and maintain the three water systems (North Lapwai, South Lapwai, and Kamiah) and the two sewer systems (Kamiah and North Lapwai) serving the Nez Perce Tribe. Water utility tasks include reading meters, water testing, repairs and planning future system upgrades.

In 2010, an Energy Committee was formed to guide the energy efficiency and energy development efforts for the Nez Perce Tribe. The committee consists of a diverse membership to ensure thorough planning. The members include a Grants Coordinator, Economic Development Planner, Environmental Planner, Construction Manager, and Energy Technician. The committee is recognized by the NPTEC and is invited to energy related discussions concerning the Tribe. The Energy Committee represents the government side of the Nez Perce Tribe, therefore it only works with not-for-profit projects.

The Energy Committee received a grant from Avista for a Strategic Energy Plan to ensure sustainable and environmentally responsible energy use. The goal of a strategic energy plan is to provide a roadmap to meet current and future energy needs in an economically, socially, and environmentally sustainable fashion. The steps taken in an energy plan depend on energy resource options, energy needs and forecasts, setting priorities and organizational structure. A consultant will be facilitating the final draft and facilitating tribal leadership, tribal programs and tribal community input through surveys and community meetings.

In an effort to prepare for changes to their homelands' ecology, the Nez Perce Tribe's Water Resources Division created a climate change adaptation plan for the Clearwater River Subbasin in 2011. The plan focuses on climate impacts to water and forestry resources, two areas of natural resource management that are both culturally and economically important to the Nez Perce Tribe. This plan will increase awareness of climate change issues in their

region and is also intended to aid the Tribe and regional organizations in integrating climate adaptation into existing and future management plans. Adaptation plan goals include:

- Creating partnerships to research local effects of climate change on water resources, forestry, and the economy.
- Including climate change adaptation assessment data, goals, and objectives into local and regional planning documents.
- Affecting a change in planning and zoning regulations along waterways and restoring the 100-year floodplain.
- Protecting and restoring water quality and quantity for human health and anadromous fish.
- Managing wildfire risk.
- Reducing and/or reinforcing infrastructure in landslide-prone areas.
- Developing ecologically connected networks of public and private lands to facilitate fish, wildlife and plant adaptation to climate change.

A 500kV Bonneville Power Administration ("BPA") transmission line crosses through the area and connects to the BPA Hatwai 500kV substation. A right of way was negotiated between the tribe and BPA in approximately 2013.

In 2014, the Nez Perce Tribe stopped energy companies from shipping "megaloads" of equipment and commodities through its reservation in Idaho from Alberta tar sands. After tribal protests, a federal judge halted further traffic, in part due to the state's failure to consult the tribe.

In 2019, The Nez Perce Tribe, Pacific Rivers and Idaho Rivers filed lawsuits against the Oregon Department of Environmental Quality to stop the relicensing of the Hells Canyon Complex of three dams along the Idaho-Oregon border operated by Idaho Power.

Options Studied

- In 2012, the Nez Perce Tribe Energy Committee selected TSS Consultants (TSS) to prepare a **Waste to Energy Feasibility Study** for projects on the Reservation. They studied utilizing sustainable and economically available waste sourced from the region

located within and tributary to the Nez Perce Reservation. The projects would have been scaled to meet electrical and thermal energy needs of select community buildings included in the communities of Lapwai, Orofino, Kamiah and Kooskia. An energy load assessment of targeted buildings as well as a site review/waste resource assessment was completed. Because the economy of the Tribe and surrounding region has been tied directly to forest products manufacturing, timber harvesting and agriculture, forest biomass was included in the resource assessment along with other potential feedstocks including agricultural by products, tree trimmings, and municipal solid waste.

- A **Tribal Utility Prefeasibility** was completed in 2013, the Tribe requested Technical Assistance from the US Department of Energy for a Tribal Utility Prefeasibility Study for selected areas of the reservation. Because the area included lands that were not held in trust, the study indicated that a tribal utility for the entire area could be difficult from a jurisdictional/regulatory point of view and that the area could be adjusted to include only tribal loads, or that the tribe could franchise current service to negotiate different service or rates.
- In 2019, a **Green Wastewater Study** feasibility study was conducted by the National Renewable Energy Laboratory to find if the tribe has options for greener wastewater treatment. NREL also identified some tribal housing as suitable for solar energy development.
- **Micro wind and microhydro:** As of August of 2020, the tribe is considering both small wind and micro hydro projects.

Example Projects

- The tribe operates a **Low Income Home Energy Assistance Program (LIHEAP)** through an annual grant from the US Department of Health and Human Services and other funds. The program provides heating assistance and crisis assistance. Qualifications for the heating program depend on income, fuel type and the percentage of income used for energy. The crisis program considers factors such as medical conditions, children and elderly residents. Applications are online.
- The Water Resources program operates an **Energy Efficiency Initiative**. See: http://nptwaterresources.org/energy-efficiency/
  - As part of the stimulus plan in 2009, the tribe received $97,000 for energy efficiency. The tribe also received $508,000 as part of a Native American Housing Block Grant for new construction, acquisition and rehabilitation including energy efficiency and conservation, and infrastructure development.
  - In 2011, utilizing $67,000 of the U.S. Department of Energy's Tribal Energy Program funding, energy-efficiency upgrades were installed in five Nez Perce Reservation buildings that house a large portion of the Nez Perce Tribe's governing entities. The upgrades included replacing lighting fixtures and windows as well as adding insulation and motion sensors. As a result of the upgrades, the Tribe's electrical energy consumption is estimated to be reduced by 30%, thereby reducing the cost to operate the Tribal physical plant and freeing up funds for other use. The upgrades will also provide a comfortable working environment for Tribal employees and are expected have a minimum annual energy cost savings of nearly $14,000.

In the first month after completion, a comparison between August 2011 and August 2012 (with an average temperature increase of one degree) electrical bills showed more than $1,200 in electrical cost savings to the Tribe. Based on this initial savings information, it appears that the project results may exceed the 30% savings goal that was initially set for the Tribe in these buildings.

- The tribe is currently planning a recycling education program.
- The tribe provides solar panels on schools and a "**Solar 4R Schools**" curriculum to support STEM classes in its school districts. Solar 4R Schools provided a renewable energy teacher training workshop to area teachers along with customized, durable science kits for four school districts valued at approximately $12,000. Teachers at each participating school will use these science kits alongside their multiple existing environmental stewardship and sustainability initiatives. Energy monitoring of their PV system and live solar energy data displayed at Solar4RSchools.org gives classrooms nationwide the ability to chart, graph and analyze the system's performance for educational purposes. The solar systems include a 4.48 kW solar array at the Lapwai School District and 4.48kW solar array at the Orofino School District.
- In February 2015 the Nez Perce Tribe completed a 10kW **Solar PV** demonstration system at the Tribal Hatchery Complex in Juliaetta, Idaho. It was funded by BPA and the Nez Perce Tribe. As a Renewable Facility, this project will function as an ongoing community education tool by teachers in four area school districts to supplement sustainability education for students throughout the Nez Perce region.

Photo credit Clean Energy Bright Futures

- **New Solar Initiative:** In September 2020, the tribe, with RevoluSun, a Hawaii company, is installing additional solar with battery backup, including one for the Pineewaus Community Center, one for the waste-water treatment plant in Lapwai. RevoluSun will providing training for tribal members in the installation. In the future a rooftop solar system is planned for the fisheries office and the clinic.
- **Carbon Sequestration Program:** The Nez Perce Tribe's Water Resources Division received a grant and technical support from the Model Forest Policy Program (MFPP) of the Climate Solutions University (CSU). In the mid to late 1990s, the Nez Perce Forestry & Fire Management Division began developing a Carbon Offset strategy to market Carbon Sequestration Credits. The tribe planned to reinvest revenue from the sale of carbon to acquire previously forested lands and then replicate the process with additional afforestation projects (planting trees on land that was not previously forested). This effort would also contribute to the tribe's goal of acquiring former tribal lands. Subsequent carbon offset projects have included wildfire rehabilitation (restoration of forests heavily damaged by wildfire) and forest development (reforestation where past forest regeneration practices failed). This first trial afforestation project became known as the "Tramway Project". The purpose of this initial project, about 400 acres in size, was to establish

marketable carbon offsets, develop an understanding of potential carbon markets, and cover the costs of project implementation and administration. Since the initial planting of the Tramway Agricultural Conversion / Afforestation Project, the Nez Perce have greatly expanded the program to include several other agricultural conversion projects as well as two additional types of projects, fire rehabilitation and forest development (defined earlier in the document). These projects are now separated into two different carbon offset portfolios, one portfolio containing only the afforestation (agricultural conversion) projects and the other portfolio containing the fire rehabilitation and forest development projects. It is this second portfolio (approximately 65.3% of the 3,375 total acres discussed earlier) that was committed to the CCX with the help of the NCOC. In July 2007, the Nez Perce Tribe signed a Contract with the NCOC and the CCX (for credits from 2003 –2010 on approximately 2,205 acres) and had the first actual sale in December 2007. The initial contract expired in December 31, 2010. Other projects are hoping to extend the carbon sequestration project, including a carbon cycle modeler which models the contribution of farmlands to carbon and a related sequestration through agricultural projects.

- The tribe has used the Volkswagen settlement funds to consider older tribal vehicles to plug-in hybrid **Electric Vehicles**. There are currently two charging stations on the reservation.

Tribal Energy Leadership Opportunities

The significant changes in the environment, the energy industry, energy economics and markets, energy technologies, public awareness and government policy are bringing astonishing opportunities for tribal energy actions. As shown above, tribes are frequently community and national policy leaders in employing ideas and technologies to solve environmental and natural resource problems. In particular, the existential environmental problem of climate change requires tribes to consider "energy" in many new ways. Environmental sustainability takes on broader and more critical meanings. As such, new approaches to meeting a challenge of environmental sustainability are needed. Some suggestions for tribes to additionally implement energy policy and technology to meet the goals set in this Energy Vision are set forth here.

First, the way in which tribes, as sovereigns, address, or can address energy issues is expanding. Tribes have long recognized that "energy" is not just about meeting electricity needs at a reasonable cost, more efficient hydroelectricity and replacing fossil fuels with renewable sources. Meeting an ambitious Energy Vision requires application of the principle of environmental/energy sustainability to all walks of life. In particular, tribes can consider "energy" in the following expanded ways.

- Water as an energy resource. In addition to major ongoing work related to watersheds and river operations, tribes may consider local water pumping, water quality, irrigation infrastructure and techniques and other local uses of water and water infrastructure. Permitted and unpermitted uses and of tribal water rights can also be considered.
- Housing as a tool for meeting the Energy Vision and for improving quality of life for

tribal members has often been overlooked. Housing on most Indian reservations is known to be substandard and not culturally appropriate. Poverty leads to not only energy inefficient homes but structurally unsound and even dangerous situations. The energy costs of poor housing, both in inefficient use of energy and unsustainable building products are very often much higher than in urban centers. Further, the problem of overcrowding has led to health issues. Poor financing options limit the flexibility for tribes to build higher quality or newer technology homes. Rethinking all aspects of housing (both existing reservation homes and new construction) is a major opportunity for cutting edge improvements.

- Just as housing can be a tool for meeting energy goals, all tribal buildings and infrastructure can be improved to better assist in meeting the Energy Vision. Just as every new building's financing includes its HVAC systems, the financing for every new building could include its own energy sources. An analysis of buying energy features up-front against the cost of purchasing power or other energy sources long term can be made common practice to assure both lower costs and self-sufficiency.
- Education is the strongest tool there is for long-term improvement in energy use and energy systems. Tribal schools and tribal meetings can both provide substantial energy education to their members, and to third parties. Application of creative ideas for meeting an Energy Vision through schools and other gatherings is an opportunity. (For example, "Energy Bingo" for tribal elders where the prizes are energy efficiency products with information about each one described during the calling of numbers.)
- It is likely that there will be new funding in the coming years for infrastructure. Energy planning when infrastructure is considered can be a game-changer for how infrastructure is used and how goals can be met. (For example, roads with bicycle lanes, easily accessible electric charging stations, carpool and transit opportunities, new technologies for water and sewer systems, etc.)
- All the tribes have members who are allottees and most reservations have allotments both within tribal lands and on traditional territories. For the most part, these allotments have been underutilized and not considered during tribal planning or during creation of federal policies. With sometimes half of "tribal lands" being subject to allotments, can new policies or programs be created to assure that these lands are part of the sustainability solution?
- All the CRITFC tribes have strong agricultural (including forestry) cultures. How can the Energy Vision be implemented through better, or improved agriculture and forestry practices, partnerships, or programs?

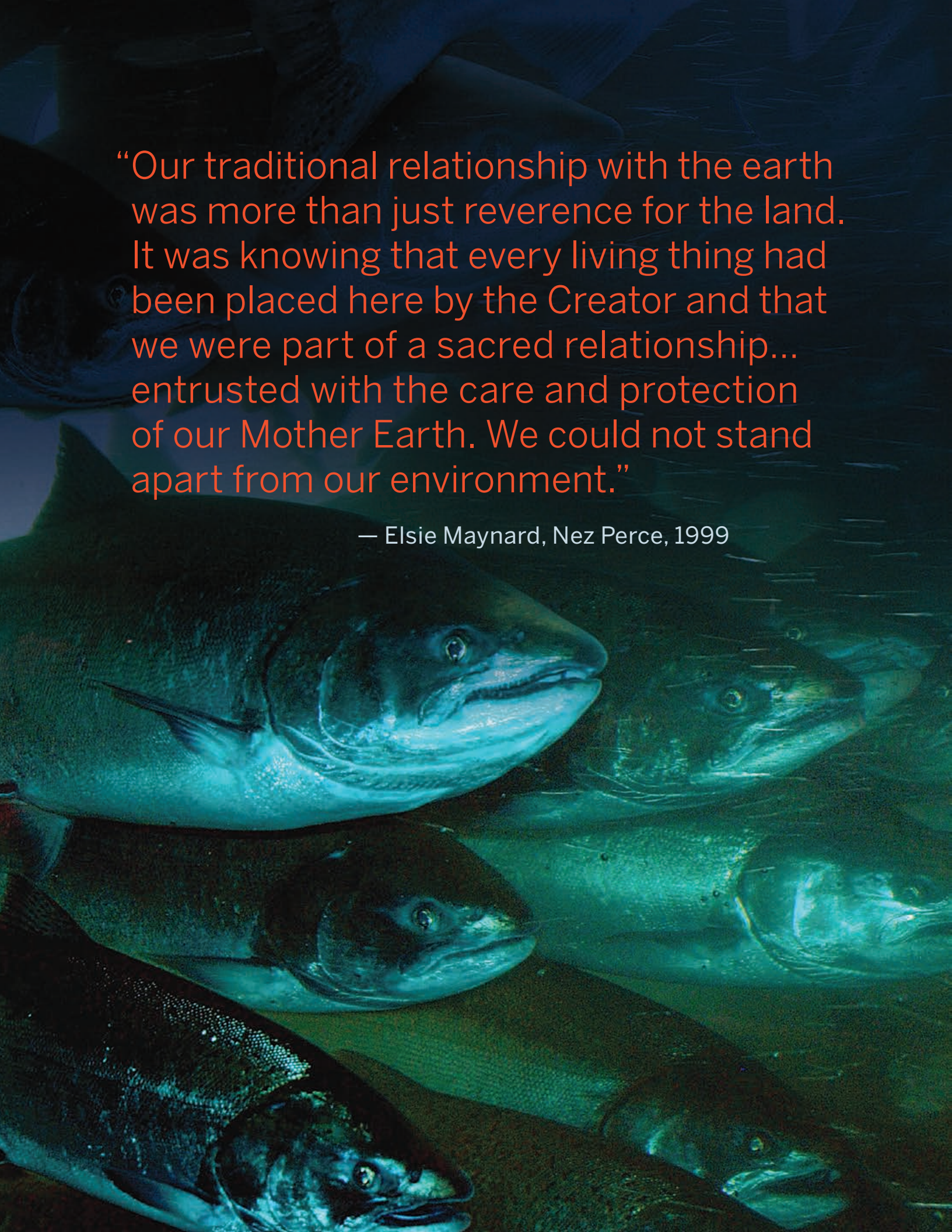
"Consideration of energy" here means that tribes (and CRITFC) can attack energy related problems with many tools:

- Tribes can legislate Tribal Energy Codes to create reservation goals, policies, procedures, funding and programs to assure that the Energy Vision is implemented within the reservation.
- Tribes can apply for and appropriately manage funding from federal, state, local and private sources to meet goals and to improve application of new and cutting-edge technologies.

- Tribes can use their political leverage and longstanding cultural wisdom to influence public opinion and government policy.
- Tribes can lead by example.
- Tribes can develop partnerships with private institutions, educational bodies, local governments, utility and energy industry players and others to further the Energy Vision and create buy-in by entities that may not otherwise be involved in improving the energy successes.
- Tribes can create local education programs for their own students and people and can work with outside educational entities to expand understanding of environmental/energy sustainability.
- Three of the four CRITFC Tribes were impacted by the Hanford nuclear site. Can the resulting responsibilities and relationships be leveraged to improve tribal energy options?
- Intertribal organizations have had a history of partnering with specific expert entities to attack specific goals important to the organization. If CRITFC or any of its tribes determine that an energy idea could be pursued, a pilot project can be developed which can benefit the community as a whole (local, regional, federal, international). It can be initiated through partnerships and likely funded by third parties.

Some particular cutting-edge technologies and new issues are up and coming for tribal consideration. These include:

- **Batteries:** The decreasing costs of batteries, the need for energy storage and new funding sources will likely create new opportunities for battery use in the next ten years.
- **Electric Vehicles and Vehicle Charging:** The development of new electric vehicle technologies, their purchase by government agencies, their decreasing costs and the need for new charging stations will transform tribal gas stations, truck fueling, and electrical infrastructure and generation. Tribes can be on the transforming edge of this revolution. Tribes could consider contributions to and investment in electric car technology programs, as well as charging infrastructure.
- **Microgrids:** With the fragility of the larger grid, utility policy changes being considered to permit more distributed generation, and the development of more sophisticated utility infrastructure meters and controls microgrids are under development for many critical needs facilities (military, hospital, government, etc.) Tribes are leaders in new microgrids, often because they can set policies for on-reservation loads that do not need to wait for state utility policy to be approved. Tribes also have funding sources which encourage new technology uses. In the next few years, most tribes will likely develop at least one microgrid.
- **Capacity:** With the transformation of energy markets to finer points of cost allocation and added renewable energy opportunities comes the need to balance energy generation with capacity reserves. "Resource Adequacy" is already a "new" additional significant cost for utilities in California and a new line item for costs of doing business. "RA" is being addressed in most energy markets and rate setting processes. Needed generation or storage resources specifically to meet capacity needs are under consideration by most utilities and government utility commissions. This change will impact the Energy Vision and maybe a point of consideration during next versions of the document.



"Our traditional relationship with the earth was more than just reverence for the land. It was knowing that every living thing had been placed here by the Creator and that we were part of a sacred relationship... entrusted with the care and protection of our Mother Earth. We could not stand apart from our environment."

— Elsie Maynard, Nez Perce, 1999

APPENDIX E:

Analysis of Meeting Peak Demands

E.1
Introduction

SECTION 3.1 above describes recommendations to reduce peak loads and includes recent information of the costs of expanding the region's transmission and distribution system. CRITFC is seeking additional information on those costs and the potential to defer or avoid some transmission and distribution costs by reducing peak loads, increasing energy efficiency, and promoting on-site solar and other distributed generation. CRITFC staff are interested in working with regional energy agencies and utilities to continue to update this important information.

SECTION E.1. provides new analysis of the high costs associated with building transmission and distribution lines. These high costs should be considered when evaluating the cost effectiveness of alternatives such as energy efficiency, on-site solar and other distributed generation options. CRITFC believes that a consideration of the full cost of generating or saving energy plus the cost to deliver it should lead to better resource decisions. It also provides updated information on peak loads for four investor-owned utilities in the region.

SECTION E.2 was developed for the 2013 Energy Vision to provide details on the high costs of meeting peak demands. CRITFC did not have sufficient resources to update this analysis with current costs; however, we believe that the general magnitude of the very high costs of meeting peak loads should be included in the analysis of efficiency measures compared to other options, including additional T&D.

APPENDIX C provides details on the recent changes in the operation of the dams to integrate renewable resources. Those issues are not addressed in this Appendix.

E.1.A. Background Discussion

Historically, regulated utilities have priced power at the average cost of delivering that power to consumers; they have not varied the cost much by time of day or season of the year. But power has more value when the demand for it is high and less when the demand for it is low. It also costs more to deliver power when demand is high because of additional, often higher-cost generators being called upon, higher line losses, and congestion in the transmission grid. Consumer electric rates that are the same throughout the day and throughout the year cause economic distortions of resources and have been overlooked for a long time because the price of power was very low. Our analysis shows that the costs of meeting peak loads is very high for consumers and for fish.

The value of the river system is distorted by this type of pricing strategy when hydropower operations on the river are designed to follow loads as they ramp up and down. These fluctuations in river flows kill millions of young salmon every year. Higher prices during peak energy use periods would dampen the peaks and reduce the stress on the hydroelectric system to follow them.

CRITFC continues to recommend a transition to time-of-use pricing of electricity. From an economic allocation of resources perspective, the ideal pricing strategy would be to price power at its full cost at all times, with costs fluctuating throughout the day. Full costs would cover the

cost of generating the power and the costs of the transmission, distribution, and support systems to deliver it. This pricing strategy would, over time, reduce costs and reduce the damage of river operations on fish and wildlife.

E.1.B. Current Use of the Hydropower System Hurts Salmon and Consumers

The day-to-day and seasonal operations of the hydroelectric system to meet peak electricity loads cause fluctuations in river levels that continue to kill salmon and other important fish species. The recommendations in this *Energy Vision for the Columbia River* are designed to reduce this problem while reducing costs for utility customers. As described in more detail below, the cost of delivering (transmission and distribution only) the highest 15 percent of peak energy to consumers ranges from 79 cents to $1.19 per kilowatt-hour—the average consumer pays about 8 cents per kilowatt-hour for delivered electricity, so these peak delivery costs are more than ten times higher than the total-average electricity costs. The cost of serving the highest peak loads range from 80 to 120 dollars per kilowatt-hour—a thousand times higher than average consumer costs. These high costs are melded into every consumer's electric bill. Reducing peak loads would also save an estimated $800 million per year in planned expansions of the transmission and distribution system.

Hydropower is used to serve peak loads because dams can react to demand by quickly putting more or less water through the turbines that generate electricity. Serving peak loads with hydropower kills millions of juvenile salmon every year. During certain times of the year, so much water is drawn down to generate electricity that salmon redds (gravel nests where salmon lay eggs) are uncovered or dewatered and their eggs die. Daily fluctuations change river water levels and juvenile fish that feed and live near the shore can be stranded and die when water levels are reduced. Migration of fish is interrupted when flows decrease at night because there is less demand for electricity and therefore less water moving through the reservoirs behind the dams. Fluctuations in reservoirs hurt resident fish by dewatering habitat and food supplies and reducing nutrients in the reservoirs.

Additionally, the water held behind storage dams for future power generation—for example, for summer peak loads to provide air conditioning—would, under natural conditions, be in the river aiding the swift and timely downstream migration of young salmon. Saving this water for summer energy production alters the natural (or normative) river conditions that aid juvenile salmon migration and would help in the restoration of fish to harvestable levels.

While changes in operations have lessened the frequency and severity of these occurrences, their effects are still significant.

E.1.C. Transmission and Distribution Lines Have High Economic and Environmental Costs

As discussed in SECTION 3 above, there are significant economic and environmental costs associated with the existing and new transmission and distribution lines.

CRITFC estimates that BPA and four investor-owned utilities spend approximately $8.2 billion on transmission between 2016 and 2020. Of this total, BPA spent $1.4 billion on transmission capital expenses between 2016 and 2020 and is projecting another $2 billion between 2021 and

2025[171] for a total of $3.4 billion for the ten years between 2016 and 2025. **(TABLE 9)**

The funding for expansion of BPA system represents about half theses total costs. BPA spend $601 million between 2016 and 2020 and is project is projecting a transmission expansion program that is budgeted at $730 million over the next five years.

CRITFC was able to compile distribution and transmission costs from the past five years for four investor-owned utilities in the region that totaled $6.8 billion. The information for the investor-owned utilities did not have details on expansions. CRITFC was not able to find similar information for municipal and public utility systems.

The information in **TABLE 10** was compiled from information that investor-owned utilities file with the Securities and Exchange Commission in what is referred to as their 10K filings[172]. It shows data for the value of each utility's transmission and distribution system in 2016 and 2020. The change column represents the increase in each system.

The information did not have enough detail to determine how much of these funds were spent on activities that could be reduced or delayed if additional energy efficiency, on-site solar, and peak-demand reduction programs described in this document had been implemented.

CRITFC found one data source that provided some additional detail for Portland General Electric Company. **TABLE 11** shows a breakdown by various distribution functions for 2016 through 2020 that total $1.5 billion[173]. For example, spending on distribution expansion or upgrades for capacity totaled $248 million between 2016 and 2020—about 17 percent of the total distribution spending. The expansions or upgrades for reliability and power quality totaled $372 million for the same period—about 25 percent of the total. Spending for new customer projects totaled $423 million—about

TABLE 9. BPA Transmission Expansion and Upgrade Costs (Millions $)

	2016	2017	2018	2019	2020	2021	2022	2023	2024	2025	Total
BPA Expansion	$202	$75	$105	$142	$77	$124	$145	$165	$150	$146	**$1,331**
BPA Total Transmission	$381	$276	$264	$281	$222	$283	$357	$377	$425	$565	**$3,431**

TABLE 10. Changes in Utility Plant for Transmission and Distribution Based on SEC 10K Filings (Millions $)

	Transmission			Distribution			Total Change
	2016	2020	Change	2016	2020	Change	
Avista	$683	$863	$181	$1,525	$1,979	$454	**$634**
PacifiCorp	$5,916	$7,654	$1,738	$6,414	$7,696	$1,282	**$3,020**
Portland General	$518	$970	$452	$3,351	$4,136	$785	**$1,237**
Puget Sound Energy	$1,308	$1,495	$187	$5,288	$7,029	$1,741	**$1,928**
TOTAL	**$8,424**	**$10,982**	**$2,558**	**$16,577**	**$20,839**	**$4,262**	**$6,820**

[171] BPA Historical & Future Capital Spend, page 8 of presentation on Integrated Program Review 2, March 2, 2021.

[172] The formats for the SEC 10K reports vary somewhat between utilities, the Utility Plant values are typically on pages 200–206.

[173] PGE distribution DRAFT_Baseline_requirements_version_0.xls Tab Baseline 4.1.e. https://portlandgeneral.com/about/who-we-are/resource-planning/distribution-system-planning

TABLE 11. Distribution Spending Dataset

	2016	2017	2018	2019	2020
Age-related replacements and asset renewal	$49,154,093	$84,237,345	$85,596,952	$87,070,673	$85,538,736
System expansion or upgrades for capacity	$32,435,392	$66,773,761	$81,983,583	$36,838,974	$30,067,022
System expansion or upgrades for reliability and power quality	$38,927,621	$51,202,075	$76,168,137	$121,503,276	$84,014,971
New customer projects	$50,409,001	$51,666,269	$60,052,182	$86,128,587	$174,938,843
Grid modernization projects	$8,935	$1,665,755	$2,672,200	$3,528,966	$4,922,836
Metering	$9,068,548	$7,480,460	$7,281,770	$11,915,666	$8,613,549
Preventive maintenance	$375,740	$4,494,525	$7,754,274	$4,870,319	$2,017,798
Grand Total	**$180,379,431**	**$267,520,189**	**$321,509,097**	**$351,856,462**	**$390,113,755**

28 percent of the total. Combining these three spending lines totaled more than a billion dollars for one utility over the past five years.

If utility spending on transmission and distribution over the next five years is similar to the recent past, the total BPA and four investor-owned utilities spending could total approximately $8.8 billion. Spending by other utilities would add to this total. If additional energy efficiency, on-site solar, and peak-demand reduction programs described in this document could reduce the transmission and distribution capital costs by ten percent, it could save consumers approximately $880 million over the next five years.

The magnitude of these transmission and distribution costs and the potential for savings for consumers and the environment should convince regional energy decision makers to focus on the benefits of reducing these economic and environmental costs. The construction costs are averaged into utility rates, so consumers do not see the magnitude of the expense. The environmental costs often fall on tribal resources (such a First Foods and sacred sites), rural areas, and populations that are not represented in energy siting or ratemaking processes. Investor-owned utilities receive a rate of return on these investments; this may create an incentive to expand these facilities rather than pursue activities that reduce the need to expand these expensive assets.

As the costs of solar and wind generation declines, more of these projects will be economic to site closer to load centers on the I-5 corridor. This would reduce transmission costs and impacts.

Transmission and distribution lines have significant environmental costs. Transmission lines often damage tribal cultural and sacred sites, First Foods, and fish and wildlife habitat. Transmission lines have been linked to wildfires in the West. Distribution lines affect local communities. These issues are discussed in more detail in SECTION 3, and APPENDICES F, G, and H.

BPA, utilities, utility regulatory, commissions, energy siting agencies, and the NPCC should consider these cost and other environmental, cultural, and tribal resources in evaluating the cost effectiveness of alternatives that reduce the need for these lines.

E.1.D. Some Utilities Have Made Progress on Peak Loads

McCollough Research has analyzed actual peak loads for PacifiCorp, PGE, Puget, and Avista. The analysis shows these utilities have experienced flat or declining winter peak loads. Summer peak loads have increased mildly.

FIGURE 28 is broken into summer **(FIGURE 29)** and winter **(FIGURE 30)**.

FIGURE 28. IOU Peak Loads By Month, 2011–2021

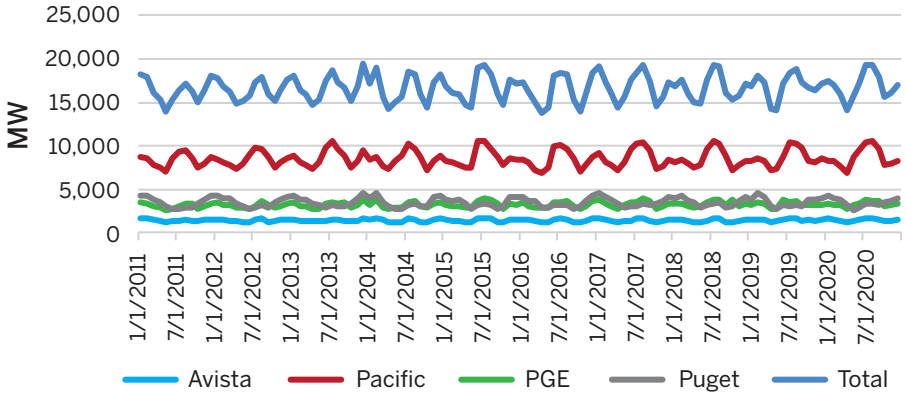


FIGURE 29. Summer Peaks By Month

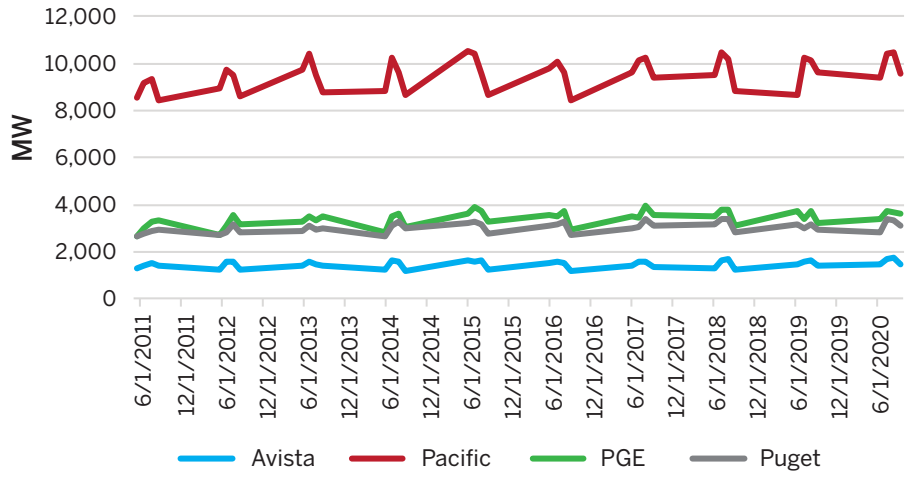
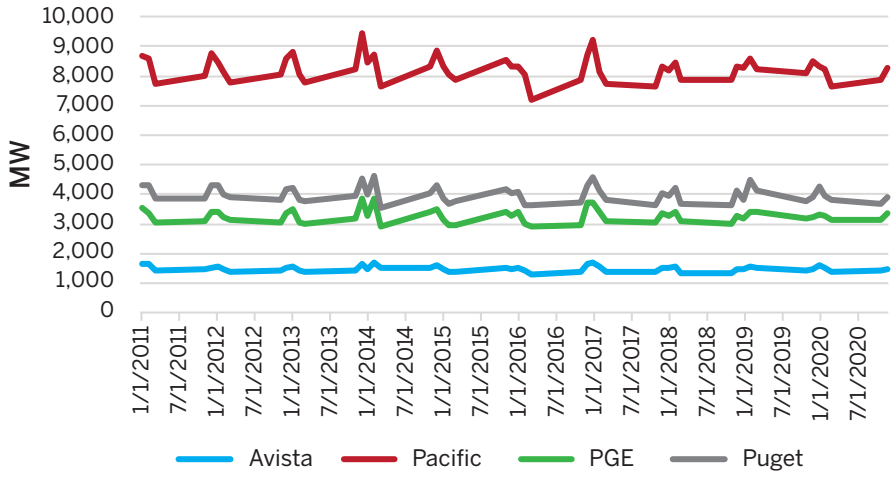


FIGURE 30. Winter Peaks By Month



E.2
The Costs of Serving Hourly and Seasonal Peak Loads

The hydroelectric system is used to serve peak loads because output from dams can be increased and decreased instantaneously by increasing or decreasing the amount of water going through the turbines.

In the Columbia River hydropower system, as is customary in most power systems, transmission and distribution lines were built to serve the highest peak load (the maximum amount of electric energy required during certain periods of time). Peak usage occurs infrequently and for short periods of time. Yet more than 25% of all capital in place, including generation capacity, transmission, and distribution is there to serve loads that occur about 6% of the time. **FIGURE 31** and **FIGURE 32** show the infrequent occurrence of the highest peak loads.

Proponents of using the hydropower system to follow peak loads argue that it is the lowest-cost option and that the fish killed in the process are an acceptable tradeoff. However, this argument ignores many of the costs to meet peak loads. For example, average-cost pricing of transmission and distribution systems obscures the true costs because all loads pay the same price for transmission and distribution, regardless of whether the transmission and distribution system is partially or fully loaded at time of use. Serving peak loads from any central station, distant plant (including hydropower) is expensive; it is far more expensive than other similarly reliable ways to meet peak loads.

FIGURE 31. Hourly Loads as a Percentage of Peak

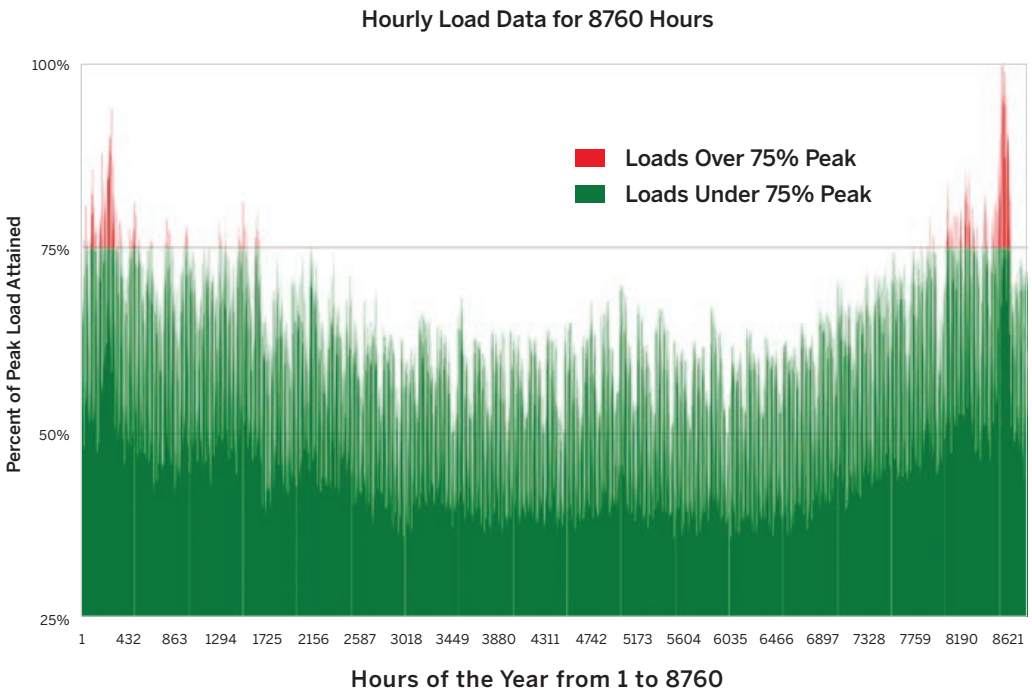
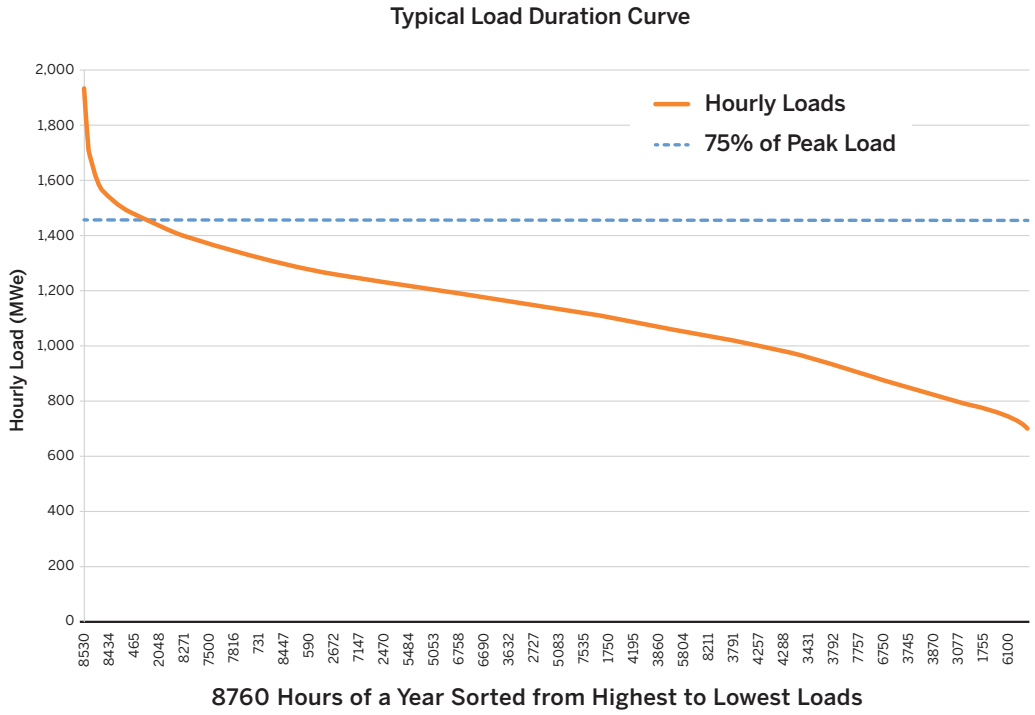


FIGURE 32. Hourly Load Duration Curve



Consider **FIGURE 32**, which contains a load duration curve for a typical northwest utility. The load duration curve is a simple structure that plots peak loads for each of the 8,760 hours in a year.[174] The loads, shown along the vertical axis, are sorted from highest to lowest-load hour; shown along the horizontal axis, the hour with the highest load is at the left of the horizontal axis and the hour with the lowest load is at the right of the horizontal axis. An arbitrary line has been drawn horizontally at 75% of the highest peak hourly load. To serve power needs in a conventional power system, a utility has to build or contract for transmission to serve its highest load, and it also must have an adequate distribution system to meet that peak load. An average rate for transmission in this region is $31 per kilowatt per year and the average distribution cost is $26 per kilowatt year.[175] That is, if a utility needs to transmit a kilowatt from a generator to load, it pays $31 per year, regardless of how many hours the kilowatt is transmitted. If transmitted for only one hour, the cost is $24 to $30 per kilowatt-hour!

Distribution costs are estimated to be three times transmission costs. Thus, the total cost of transmission and distribution can range from $80-$120 per kilowatt per year. Given this information, consider the line in **FIGURE 32** at 75% of peak load. Loads at this level and above occur about 600 hours per year. If the cost of transmission and distribution to simply deliver energy to that portion of load at 75% of peak is $80–$120; the per-kilowatt cost is

[174] For purposes of understanding, a sample load duration curve is derived in the Appendix.

[175] Northwest Power and Conservation Council memorandum *Updated Transmission and Distribution Deferral Value for the 2021 Power Plan,* March 5, 2019.

13 to 20 cents![176] The peak hour of the year (1 hour at 100% of peak—the extreme left edge of the graph) has a delivery cost of $80–$120 per kWh![177]

TABLE 12 shows the delivery costs per kWh for other loads that occur in the range of one to 600 hours per year. For example, loads at 85% of peak or higher, occur only 101 hours in a year, at a delivery cost of $.79 to $1.18 per kilowatt-hour.[178]

TABLE 12. Costs of Transmission and Distribution to Serve Infrequent Loads

Number of Hours	Percentage of Peak Yearly Load	Range of Transmission and Distribution Costs	
		$80/kWh	$120/kWh
1	100	$80.00	$120.00
21	95	$3.81	$5.71
43	90	$1.86	$2.79
101	85	$0.79	$1.19
209	80	$0.38	$0.57
600	75	$0.13	$0.20

The book value of transmission in the region is roughly $10 billion.[179] Thus, over $2.5 billion (25% of $10 billion) worth of transmission is being employed less than 6% of the time. Using the 3 to 1 ratio of distribution investments to transmission investments we used above, this means that over $7.5 billion worth of distribution is being used less than 6% of the time. Or, in sum, over $10 billion worth of capital invested in transmission and distribution sits idle for over 8100 hours per year.

Serving peak loads (*e.g.*, those above 75% of peak load) with any resource is extremely costly to the power system and serving peak with hydroelectric power is devastating to salmonids and the aquatic environment on which salmon and other species depend. Even without considering the huge costs imposed on fish and wildlife from raising and lowering river levels to serve peak loads, alternative means of serving these loads are cheaper than buying power and transmitting it from distant generators.

It is important to note that the current transmission and distribution costs are embedded costs—reductions in peak loads will not make them go away. However, reductions in peak loads may allow the current system to defer or eliminate future expansions. For example, BPA plans to spend $730 million to expand its transmission system over the next five years. These avoided costs should be considered in evaluating the cost effectiveness of energy efficiency, demand response, and other actions to reduce peak demand.

There are a number of benefits associated with controlling demand at peak. For the electrical system, lower demand on peaks translates into fewer capital resources that are needed to serve

[176] $80-$120 kW/year divided by 600 hours per year equals 13–20 cents.

[177] Some will argue that T&D costs are sunk (the capital cost has been made and cannot be recovered) and the variable cost of more throughput (*e.g.*, more power sold) is zero. There are two reasons why this is not the case. First, in the short term for non-transmission owning utilities, transmission costs are not sunk; they simply "rent" space on the lines. Second, in the long term, all T&D owners have planned expenditures at some time in the future. The planned expenditures have not been occurred, and delaying them, perhaps indefinitely, is worth a lot of money.

[178] Note that these costs do not include the cost of energy, which has been over $1,000 per megawatt hour on peak as recently ago as 2001. Costs have come down dramatically since then to a range of $30–$50 per megawatt hour

[179] The book value of BPA's transmission is about $5.5 billion (BPA Annual Reports), up from about $4.5 billion in 2001. Avista, Idaho Power Company, Montana Power Company, PacifiCorp, and Puget Energy Services combined had about $3.8 billion of book value in their transmission systems in 2001 (See FERC Form 1 data for 2000.) In 2003, we estimated that other utilities in the region not under FERC's jurisdiction make up another $.15 billion to get us to our estimate of $8.5 billion. Adding the additional $1 billion of BPA investment to the estimate used in the 2003 *Energy Vision* would total $9.5 billion. Other utilities have made investments also. Because the analysis here is only used to show the order of magnitude of transmission costs on partially filled lines, we have rounded up to $10 billion, to reflect other investments that have been made.

loads. The grid can serve the same total energy needs with fewer generating plants and a smaller investment in transmission and distribution lines over time if peaks are lowered. Line losses and ancillary services can be reduced with lower demand, as well.

Importantly, lower peak demands also help fish in the river. The river is ramped up and down to follow peak loads, and in so doing, smolts (juvenile fish) have been stranded on banks along the river, and redds (where salmon lay their eggs) have been dried out. Reducing peak loads will limit the number of hours in a year when the rivers have to be ramped up to meet peak demand, thereby, saving fish.

Looking forward, as we acquire the general ability to control loads, we can envision a time when loads can be shaped at all times to allow appropriate levels of spill and flow for fish migration through the river system. And, we should be able to get to this point at costs that are considerably less to the power system than in the past.

The Lawrence Berkeley National Laboratory has prepared a report entitled: *Grid-Interactive Efficient Buildings: An Introduction for State and Local Governments*[180] which describes grid-interactive efficient buildings, highlights trends, challenges, and opportunities for demand flexibility; provides an overview of valuation and performance assessments for demand flexibility; and outlines actions that state and local governments can take, in concert with utilities, regional grid operators, and building owners, to advance demand flexibility. This report also provides a sense of the potential for DERs coupled with controls to offset the need for conventional generation, transmission and distribution system solutions to meeting loads.

E.2.1 Capital Cost Savings Identified

Suppose future peak loads could be lowered, for example to 75% of current peak load[181]. These loads would not have to be eliminated overnight because the transmission system, albeit stressed, has and can continue to serve regional loads at today's levels. Peak loads could be reduced on the transmission system gradually by using the resource options described below. The peak load reduction could be designed to avoid planned transmission investment upgrades that are being driven by the need to serve growing peak loads. This schedule would allow the region to ensure that these actions are carefully planned and implemented correctly.[182]

With peaks at 75% of today's peaks, the capital earmarked for new transmission and distribution upgrades to serve peak load growth could be available to invest in alternative technologies to serve peak loads. The savings would be committed to load management, conservation, clean distributed generators to serve those loads, utility scale batteries, solar rooftop systems with batteries, and resources sited strategically within the transmission and distribution system. These energy plants and strategies would be used to serve peak loads and to serve off-peak loads whenever market prices exceeded the variable costs of operating the specific plants and implementing the load management strategies.

The magnitude of planned transmission and distribution investments that could be

[180] https://emp.lbl.gov/publications/grid-interactive-efficient-buildings

[181] In keeping with the theme of this report, this is not a prediction of what might happen soon, but rather a vision of what could be done with a regional focus.

[182] This is the goal of BPA as it revamps its transmission planning function, using the Round Table as an advisory group. The Round Table did not meet for several years, but reconvened in April 2011.

eliminated or delayed is significant. As previously mentioned, a rough estimate of the book value of transmission used to serve regional load is about $10 billion. Because the book value has been depreciated and was funded by low-cost government debt for the most part, the replacement cost of the transmission system would be much higher. In the 2003 *Energy Vision for the Columbia River* we assumed it would be $17 billion dollars. An inflation rate of 2% over the last 10 years would bring replacement value to about $20 billion.

Since the region's transmission system is now constrained during many hours, new investment will be needed to serve loads if load shapes do not change. The region would need to invest about 1% of the total value of the system per year to keep up with load growth.[183] Thus, about $200 million per year will have to be invested in transmission to serve peak load growth.[184]

Book value and replacement value of distribution systems in the region has been estimated at roughly three times that of transmission. Many of the actions we include in our plan will also save distribution investments. Distribution investments are also often very costly from a social perspective because they may entail digging up city streets. Large capital costs are incurred along with social costs and economic losses associated with time lost in traffic jams and other even greater displacements.[185] The savings from deferring investments would be great and would allow for even more generation to be built, if necessary. If the region were to do away with transmission investments to meet load growth, it could also do away with the corresponding investment in distribution systems. Thus, an additional $600 million savings per year (three times that of transmission) could be realized through forgone investment in distribution.

E.2.2 Energy Costs

Historically, energy costs have fluctuated widely. In 2001, not long before we published the initial draft of the Energy Vision, prices in the Northwest spiked to as high as $1,000 per megawatt hour ($10 per kilowatt hour). In the spring of 2001, futures for summer power were selling for 50 cents/kWh. Utilities and BPA were buying power at 20–50 cents per kilowatt hour and selling power to end users at less than 2.5 cents per kilowatt hour. That reality left BPA with an acute financial problem, which had implications for the protection of fish and wildlife.

The risk of fluctuating prices still exists from a range of catalysts, such as disruptions in power production or the transmission system. The 2013 *Energy Vision for the Columbia River* has been designed with the recognition that we cannot predict future price excursions, and that prices could spike again; however, the recommendations in this report should help constrain future price volatility.

[183] Based on an assumption of a 2% growth in peak loads. BPA had scheduled over $2 billion between 2002 and 2006. Only about $1 billion of that amount appears to have been spent.

[184] Of course, there will also be capital investment to maintain existing wires. This will be true for the distribution system also. That investment is separate from the investments to serve new load growth and generation interconnections addressed here.

[185] Reduced access to commercial ventures is an example.

E.2.3 Transmission and Distribution Costs

Transmission and distribution costs have several components.[186] One is the capital cost of the installations, and a second is the cost imposed by congestion on the grid. At many times of the day, season, and year, constraints exist on parts of the transmission and distribution system. Historically, BPA and other utilities have dispatched resources to move power around these constraints. The costs of doing this have been melded into average costs that in turn have been included in an average total power cost. The value of the resources used to get around transmission constraints is not transparent.

The end user has not paid the true cost of using either the transmission or distribution systems. As we noted previously, the cost of transmission and distribution to serve peak loads is enormous, but these costs are spread over all utility customers and all hours of the year. If the true costs of transmission capital and congestion were charged to end users, much of the crisis experienced in 2001 would have been averted because peak loads would have been lowered.[187] From an economic perspective, too much transmission is built to serve peak loads that are greater than they would have been if users paid the true price of the delivered peak power.

Today there are still calls for more transmission construction.[188] If one assumes that the trend toward deregulated markets continues, investors who build additional transmission will be at risk. Higher prices for energy and delivery at peak would drive users to look for other innovative ways to serve their peak loads, including shifting those loads to off-peak times when the prices of energy and delivery are lower. The advent of Smart Grid technologies and strategies that will enable devices behind customers' meters to compete with generation and transmission will exacerbate this movement. If this occurs, which we think it will, much of that new investment could easily be stranded.

The Lawrence Berkeley National Laboratory has also prepared a report entitled: *Determining Utility System Value of Demand Flexibility from Grid-Interactive Efficient Buildings.*[189] This report describes how current methods and practices that establish value to the electric utility system of investments in energy efficiency and other distributed energy resources (DERs) including demand response measures that reduce generation costs, and/or reduce delivery (transmission and distribution) costs can be enhanced to more accurately determine the value of grid services they provide. It contains seven recommendations for improving the methods used by utilities (and others) to determine the "avoided cost" of grid services so that DERs are fairly valued compared to conventional generation, transmission and distribution alternatives.

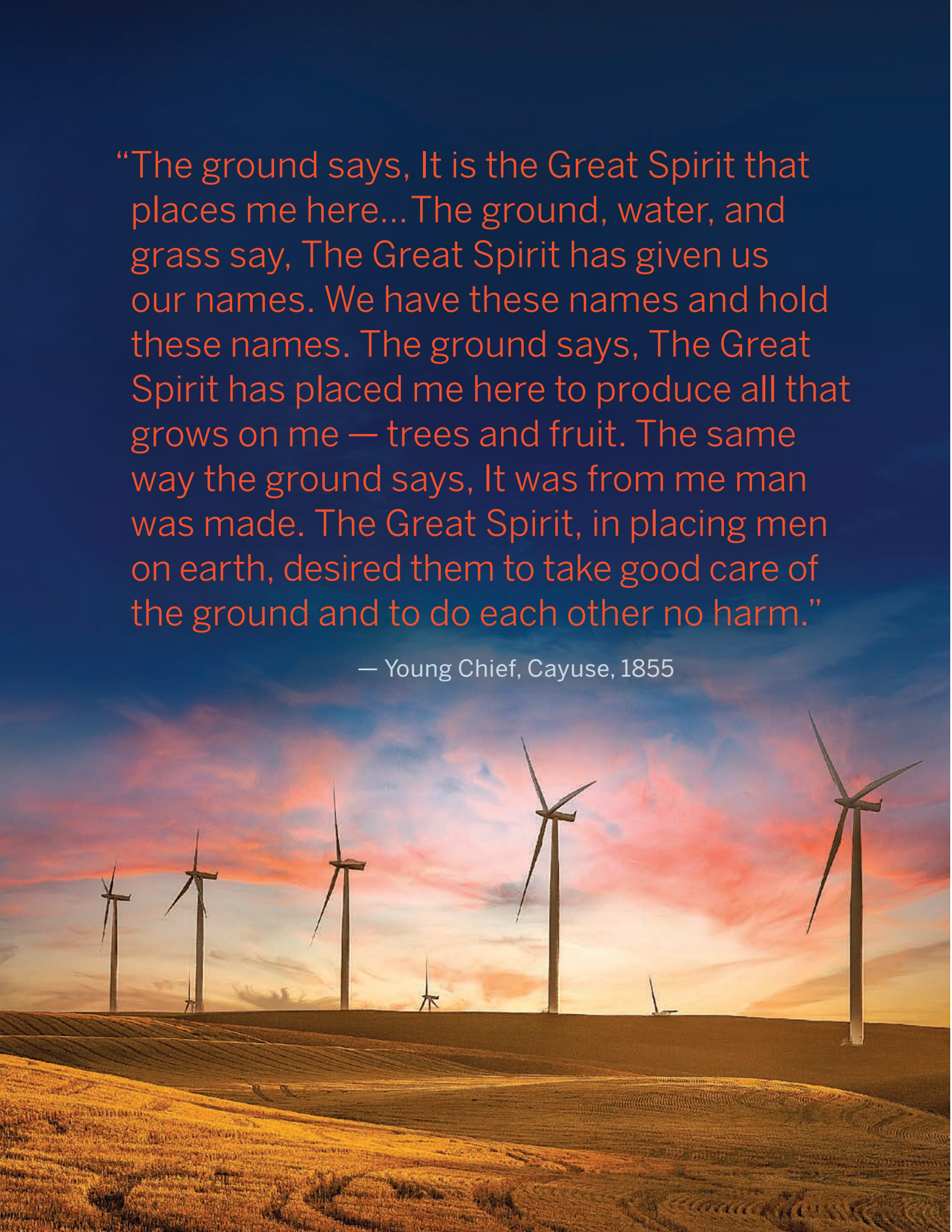
---

[186] Here we ignore line losses associated with T&D.

[187] Prices shot up because during peak loads generation was not always available to meet loads. This had the effect not only of increasing prices, but also led to rolling brown outs in parts of the West.

[188] BPA's book value of transmission was $5.5B in 2013 versus $4.5 in 2001.

[189] https://emp.lbl.gov/publications/determining-utility-system-value.



"The ground says, It is the Great Spirit that places me here... The ground, water, and grass say, The Great Spirit has given us our names. We have these names and hold these names. The ground says, The Great Spirit has placed me here to produce all that grows on me — trees and fruit. The same way the ground says, It was from me man was made. The Great Spirit, in placing men on earth, desired them to take good care of the ground and to do each other no harm."

— Young Chief, Cayuse, 1855

APPENDIX F:

Sample Criteria for Siting Renewable Resources

Introduction

SECTION 3.4 of the Energy Vision identifies criteria to address tribal resources in the Pacific Northwest. This appendix provides examples of other criteria that were identified by the Department of the Interior for the southwest

In October 2012, the Department of the Interior completed such a plan for development of solar energy on public lands in six western states. The Programmatic Environmental Impact Statement (PEIS) for solar energy development provides a blueprint for utility-scale solar energy permitting in Arizona, California, Colorado, Nevada, New Mexico and Utah by establishing solar energy zones with access to existing or planned transmission, incentives for development within those zones, and a process through which to consider additional zones and solar projects.

The Solar PEIS establishes an initial set of 17 Solar Energy Zones (SEZs), totaling about 285,000 acres of public lands, that will serve as priority areas for commercial-scale solar development, with the potential for additional zones through ongoing and future regional planning processes. If fully built out, projects in the designated areas could produce as much as 23,700 megawatts of solar energy, enough to power approximately 7 million American homes. The program also includes a framework for regional mitigation plans, and to protect key natural and cultural resources the program excludes approximately 79 million acres that would be inappropriate for solar development based on currently available information.

In January of 2013, the Department of the Interior completed a plan for renewable resource development in Arizona. The Restoration Design Energy Project (RDEP) is an initiative to identify lands that may be suitable for the development of renewable energy. The RDEP Record of Decision and Approved Resource Management Plan Amendments establish 192,100 acres of renewable energy development areas on BLM land throughout Arizona. These areas are near transmission lines or designated corridors, close to population centers or industrial areas, and in areas where impacts on water usage would be moderate. These lands also have few known resource impacts or have been previously disturbed, such as retired agriculture properties. These areas are available for solar or wind energy development. In addition, the Plan establishes the Agua Caliente Solar Energy Zone on 2,550 acres in western Arizona.

Sample Criteria for Siting Renewable Resources

The BLM PEIS for solar development had some similar criteria for solar development in the desert SW. These criteria (listed on the following pages) were developed to address the potentially affected interests in the desert Southwest. Some of them may be suited to the Columbia Basin.

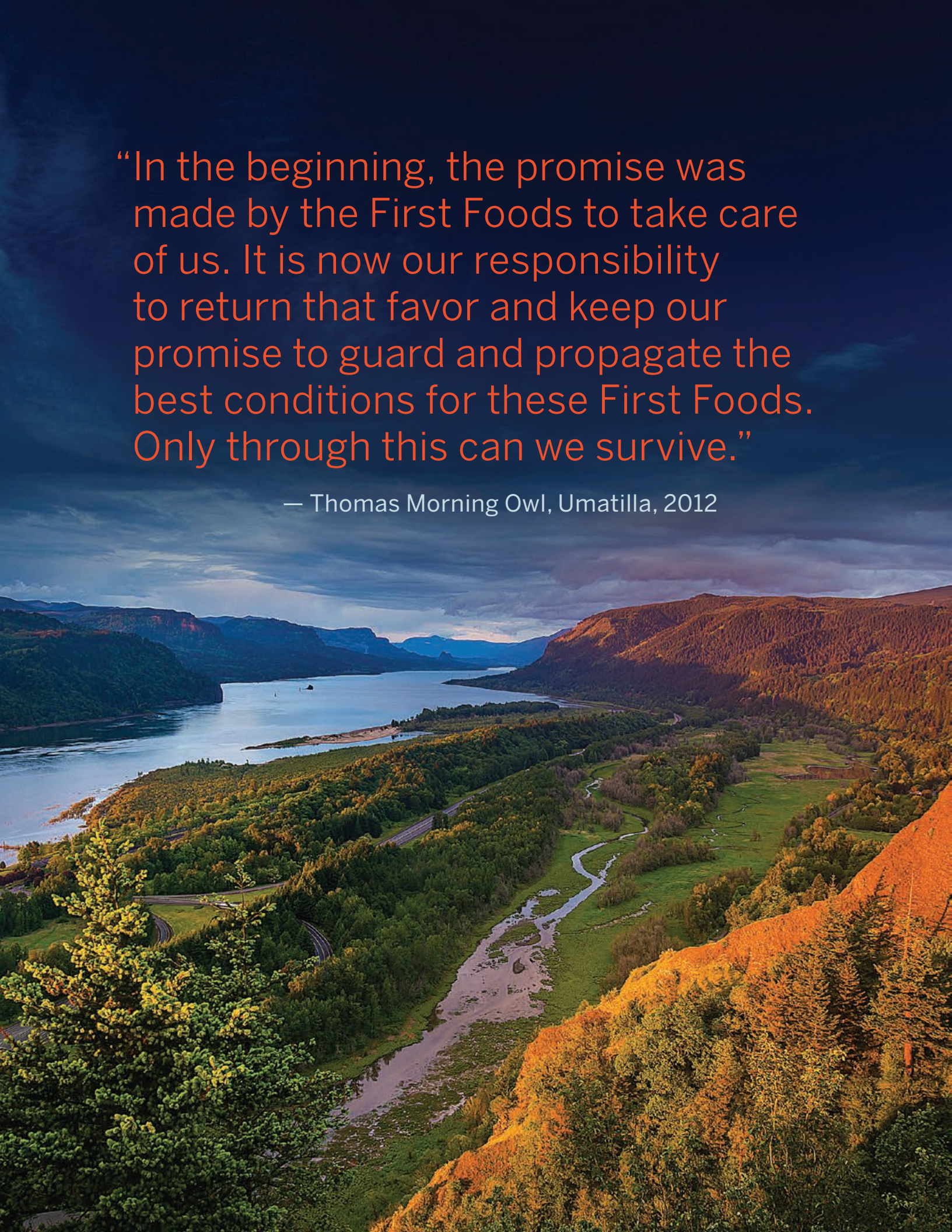
Exclusions under BLM's Solar Energy Development Program Alternative[190]

1. Lands with slopes greater than 5% determined through geographical information system (GIS) analysis using digital elevation models.
2. Lands with solar insolation levels less than 6.5 kWh/m^2/day determined through National Renewable Energy Laboratory solar radiation GIS data (http://www.nrel.gov/rredc/solar_data.html).
3. All Areas of Critical Environmental Concern (ACECs) identified in applicable land use plans (including Desert Wildlife Management Areas [DWMAs] in the California Desert District planning area).
4. All designated and proposed critical habitat areas for species protected under the Endangered Species Act (ESA) of 1973 (as amended) as identified in respective recovery plans (http://ecos.fws.gov/tess_public/TESSWebpageRecovery?sort=1).
5. All areas for which an applicable land use plan establishes protection for lands with wilderness characteristics.
6. Developed recreational facilities, special-use permit recreation sites (*e.g.*, ski resorts and camps), and all Special Recreation Management Areas (SRMAs) identified in applicable land use plans, except for those in the State of Nevada and a portion of the Yuma East SRMA in Arizona.
7. All areas where the BLM has made a commitment to state agency partners and other entities to manage sensitive species habitat, including but not limited to sage-grouse core areas, nesting habitat, and winter habitat; Mohave ground squirrel habitat; flat-tailed horned lizard habitat; and fringe-toed lizard habitat.
8. Greater sage-grouse habitat (currently occupied, brooding, and winter habitat) as identified by the BLM in California, Nevada, and Utah, and Gunnison's sage-grouse habitat (currently occupied, brooding, and winter habitat) as identified by the BLM in Utah.
9. All areas designated as no surface occupancy (NSO) in applicable land use plans
10. All right-of-way (ROW) exclusion areas identified in applicable land use plans.
11. All ROW avoidance areas identified in applicable land use plans.
12. In California, lands classified as Class C in the California Desert Conservation Area (CDCA) planning area.
13. In California and Nevada, lands in the Ivanpah Valley.
14. In Nevada, lands in Coal Valley and Garden Valley.
15. All Desert Tortoise translocation sites identified in applicable land use plans, project-level mitigation plans or Biological Opinions.
16. All Big Game Migratory Corridors identified in applicable land use plans.
17. 1ll Big Game Winter Ranges identified in applicable land use plans.
18. Research Natural Areas identified in applicable land use plans.
19. Lands classified as Visual Resource Management (VRM) Class I or II (and, in Utah, Class III) in applicable land use plans.
20. Secretarially designated National Recreation, Water, or Side and Connecting Trails and National Back Country Byways (BLM State Director approved) identified in applicable

[190] https://solareis.anl.gov/documents/fpeis/Solar_FPEIS_Volume_1.pdf#page=46

BLM and local land use plans (available at http://www.americantrails.org/NRTDatabase), including any associated corridor or lands identified for protection through an applicable land use plan.

21. All units of the BLM National Landscape Conservation System, congressionally designated National Scenic and Historic Trails (National Trails System Act [NTSA], P.L. 90-543, as amended), and trails recommended as suitable for designation through a congressionally authorized National Trail Feasibility Study, or such qualifying trails identified as additional routes in law (*e.g.*, West Fork of the Old Spanish National Historic Trail), including any trail management corridors identified for protection through an applicable land use plan. Trails undergoing a congressionally authorized National Trail Feasibility Study will also be excluded pending the outcome of the study.
22. National Historic and Natural Landmarks identified in applicable land use plans, including any associated lands identified for protection through an applicable land use plan.
23. Lands within the boundaries of properties listed in the National Register of Historic Places (NRHP) and any additional lands outside the designated boundaries identified for protection through an applicable land use plan.
24. Traditional cultural properties and Native American sacred sites as identified through consultation with tribes and recognized by the BLM.
25. Wild, Scenic, and Recreational Rivers designated by Congress, including any associated corridor or lands identified for protection through an applicable river corridor plan.
26. Segments of rivers determined to be eligible or suitable for Wild or Scenic River status identified in applicable land use plans, including any associated corridor or lands identified for protection through an applicable land use plan.
27. Old Growth Forest identified in applicable land use plans.
28. Lands within a solar energy development application area found to be inappropriate for solar energy development through an environmental review process that occurred prior to finalization of the Draft Solar PEIS.
29. Lands previously proposed for inclusion in SEZs that were determined to be inappropriate for development through the NEPA process for the Solar PEIS (limited to parts of the Brenda SEZ in Arizona; the previously proposed Iron Mountain SEZ area and parts of the Pisgah and Riverside East SEZs in California; parts of the De Tilla Gulch, Fourmile East, and Los Mogotes East SEZs in Colorado; and parts of the Amargosa Valley SEZ in Nevada).
30. In California, all lands within the proposed Mojave Trails National Monument and all conservation lands acquired outside of the proposed Monument through donations or use of Land and Water Conservation Funds.
31. In California, BLM-administered lands proposed for transfer to the National Park Service with the concurrence of the BLM.
32. Specific areas identified since the publication of the Supplement to the Draft Solar PEIS by the BLM based on continued consultation with cooperating agencies and tribes to protect sensitive natural, visual, and cultural resources (total of 1,066,497 acres [4,316 km^2]. Note there are some overlapping exclusions). Data and finer scale maps will be made available through the Solar PEIS project Web site (http://solareis.anl.gov). Note that in some cases, the description of these areas will be withheld from the public to ensure protection of the resource.


“In the beginning, the promise was made by the First Foods to take care of us. It is now our responsibility to return that favor and keep our promise to guard and propagate the best conditions for these First Foods. Only through this can we survive.”
— Thomas Morning Owl, Umatilla, 2012

APPENDIX G:

Tribal Cultural Resources

In the past, non-Indian archaeologists had control of how tribal cultural resources were managed on tribal, federal, state, and private lands. Management decisions, often based on values other than protection of the resources, resulted in the destruction of sites important to tribes. The CRITFC member tribes each have cultural resources programs established to protect these important tribal resources.[191]

For instance, the cultural resources program of the Nez Perce Tribe has the following mission:

> *The mission of the Cultural Resource Program (CRP) is to promote the understanding and use of nimíipuu'neewit (traditional Nez Perce life-ways) as integral components of Tribal culture and regional management. The CRP fulfills its programmatic purpose by:*
>
> - *Assisting Tribal Leadership in treaty rights protection,*
> - *Documenting traditional and ancestral knowledge,*
> - *Integrating **nimíipuutimpt** within our Tribal community and infrastructure, and*
> - *Protecting sites, landscapes, and associated knowledge integral to the perpetuation of **nimíipu'neewit** through meaningful consultation*
> - *The Cultural Resource Program consists of 4 major areas that work to fulfill these goals: Archaeology/Tribal Historic Preservation Office (THPO), Ethnography, NAGPRA, Language, and Hanford Cultural.*

The following sections of this appendix provide a brief overview of tribal viewpoints concerning cultural resources and how they are recognized and valued.

Differences Between Tribal and Non-Tribal Viewpoints Concerning Cultural Resources

This holistic, interconnected view of the world and all the resources in it is sometimes hard for nonnative people to understand. It is from the view that the Nez Perce interpretation of cultural resources arises. Federal and State legislation is designed to protect "Historic Properties". Historic properties are narrowly defined in federal law as "any prehistoric or historic district, site, building, structure, or object included in, or eligible for inclusion on the National Register including artifacts, records, and material remains related to such a property or resource". This definition differs greatly from the holistic belief of the tribes that water, air, animals, soil, rock, fish, birds along with those items included in the Federal definition should be considered

[191] https://www.nezpercecultural.org/what-we-do; https://ctuir.org/departments/natural-resources/cultural-resources-protection/ https://warmsprings-nsn.gov/program/cultural-resources/; https://www.yakama.com/programs/

cultural resources. While many of these items in themselves may not be adequately considered historic properties by narrow interpretations of federal law, they certainly contribute to the reasons that individual locations or items can be considered historic properties. They often provide the contextual link to the landform and the overall tribal cultural environment, which is vital to understanding a property's significance.

This context often divides the native and nonnative view of cultural resource protection. Tribal people believe that this holistic viewpoint is extremely important when addressing cultural resources. In fact, this was so important that the tribes protected key cultural activities such as fishing, hunting, and gathering in the treaties of 1855. This context is especially significant when dealing with the prehistoric cultural manifestations remaining on the landscape within the tribal traditional area.

It bears repeating that Tribes look at cultural resources differently than archaeologists do. Most generally, the tribes note that a cultural resource is any place that is valued by a tribe because of some sort of association with the tribe's ancestors. The tribes also point out that cultural resources can be either places or practices. The practices are centered around people's actions which may or may not require a special place. It is the 'action' that is special to the cultural tradition or lifeway. The places are physical locations on the land that are important because something special is done there (vision questing, medicine gathering), because special things are located there (important plants, herbs, animals), because people did something there in the past (lived, buried the dead, etc.), or because they are associated with traditions (origin places, etc.). These places are generally considered under the archaeologist's term "site" or "Traditional Cultural Property" (TCP).

Another important point is that cultural resources may be places where plants, animals, or minerals are found that are needed to maintain the ways of life passed down from the ancestors. Cultural resources significant to the tribes world-view include such things as the Indian people themselves, their communities, and their way of life; native elders with their unique information regarding their personal histories as well as tribal histories; clean air; clean water where salmon and other fish, eels, and other riverine resources so highly prized by the tribes for their traditional subsistence live; the root grounds providing a multitude of edible roots traditional to their dietary needs; and the berry patches, especially huckleberries.

Clearly, a crucial cultural resource for the Columbia River treaty tribes as well as other Northwest tribes, is the salmon. Many of the archaeological sites along the Columbia and Snake rivers show evidence of the antiquity of the relationship between tribal members and these fish. Should this relationship be broken by the extinction of the salmon, the loss to the tribes' culture would be immeasurable.

Cultural Dimensions of Socioecological Systems

The following analysis and the italicized language is adapted from: *Cultural Dimensions of Socioecological Systems: Key Connections and Guiding Principles for Conservation in Coastal Environments*, Melissa R. Poe, Karma C. Norman, & Phillip S. Levin. 2013 NOAA Fisheries, Northwest Fisheries Science Center, 2725 Montlake Blvd East, Seattle, WA 98112-2097, USA. This report describes five categories of sociocultural values. Following each italicized bullet is an expression of the cultural context in from a tribal viewpoint.

1. **Cultural connections to ecosystems are rooted in meanings, *values, and identity*. Cultural ecosystem meanings and values are deeply rooted and define a person or community; they are implicit in senses of place and often form the basis of community, individual, and professional identities.**

TRIBAL CONTEXT:

There is so much to this word or this way, this Tamanwit. It's how we live. It's our lifestyle. There is so much that we as Indian people are governed by, through our traditions, our culture, our religion, and most of all, by this land that we live on. We know through our oral histories, our religion, and our traditions how time began. We know the order of the food, when this world was created, and when those foods were created for us. We know of a time when the animals and foods could speak. Each of those foods spoke a promise. They spoke a law—how they would take care of the Indian people and the time of year when they would come. All of those foods got themselves ready for us—our Indian people who lived by the land. It was the land that made our lifestyle. The foods first directed our life. Today, we all have these traditions and customs that recognize our food: our first kill, first fish, first digging, the first picking of berries. All of those things are dictated to us because it was shown and it directed our ancestors before us.[192]

[192] CTUIR Comprehensive Plan, 2010. https://ctuir.org/system/files/FinalCompPlan/pdf (quoting Armand Minthorn, *As Days Go By*, 2006).

2. Cultural dimensions of ecosystems are embedded in *local ecological knowledge* (LEK) and practice. Local knowledge is not simply "passed down" through generations *per se*, but continually regenerated through practical engagements with ecosystem components, articulated through language, local meanings, methods, and cultural practices and frameworks.

TRIBAL CONTEXT:

When we were created we were given our ground to live on, and from that time these were our rights. This is all true. We had the fish before the missionaries came....This was the food on which we lived.... My strength is from the fish; my blood is from the fish, from the roots and the berries. The fish and the game are the essence of my life.... We never thought we would be troubled about these things, and I tell my people, and I believe it, it is not wrong for us to get this food. Whenever the seasons open, I raise my heart in thanks to the Creator for his bounty that this food has come.[193]

3. *Informal economics* must be considered in addressing negative impacts to tribal fisheries. Subsistence fishing and harvesting, for example, is a practice often motivated by food provisioning rather than catching or processing species for sale and income generation. Subsistence fishing includes personal or family-level consumption to meet or supplement household food needs, or procurement for others distributed through sharing, gifting, and bartering. Subsistence feeds bodily and spiritual nourishment and is linked to culture, LEK, social relations, and food traditions.

TRIBAL CONTEXT:

When God created Indians on the Earth, he gave us everything. Main thing was salmon and meat. And all the vegetables—the potatoes, celery—everything, you name it, that's what he gave to us. And that's what we were raised on.[194]

4. *Resource management and governance* institutions shape and are shaped by cultural dimensions of ecosystems. Mechanisms such as harvest controls (*e.g.*, timing, location, species, quantities, and techniques), formal and customary rules of access to resources, and decision-making processes constitute governance.

TRIBAL CONTEXT:

In addition, the Treaty of 1855 does not expressly state that the Yakima Nation relinquished its jurisdiction over matters pertaining to fishing rights. As the treaty constitutes a grant of rights from the Indians to the Government, Winans, supra, 198 U.S. at 381, 25 S.Ct. 662, 49 L.Ed. 1089, any rights not granted must be considered retained by the Tribe. Here, the Indians qualified their fishing right only to the extent of permitting citizens of the territory to fish 'in common' with them at 'usual and accustomed fishing

[193] Testimony of George Meninock before the Washington Supreme Court in 1913 at page 146 in Meyer Resources, Inc., "Tribal Circumstances and Impacts of the Lower Snake River Project on Nez Perce, Yakama, Umatilla, Warm Springs and Shoshone Bannock Tribes", April 1999 https://www.critfc.org/wp-content/uploads/2014/11/circum.pdf [hereinafter *Meyer Report*]

[194] *Meyer Report* at 374.

places' off the reservation. Given this fact and the vital role of fishing in the Yakima culture, we conclude that the Yakima Nation did reserve the authority to regulate Tribal fishing at 'all usual and accustomed places', whether on or off the reservation.[195]

5. *Sociocultural health* and ecosystem health are integrated. For a human community that is culturally attached to salmon changes to the trophic structure (or food web) within which salmon is embedded will have specific implications for cultural wellbeing in ways that aggregated ecological integrity measures may not reveal.

TRIBAL CONTEXT:

Traditional activities such as fishing, hunting, and gathering roots, berries and medicinal plants build self-esteem for Nez Perce peoples—and this has the capacity to reduce the level of death by accident, violence and suicide affecting our people. When you engage in cultural activities you build pride. You are helped to understand "what it is to be a Nez Perce"—as opposed to trying to be someone who is not a Nez Perce. In this way, the salmon, the game, the roots, the berries and the plants are the pillars of our world.

— Leroy Seth, Nez Perce Elder[196]

In sum, there's a huge connection between salmon and tribal health. Restoring salmon restores a way of life. It restores physical activity. It restores mental health. It improves nutrition and thus restores physical health. It restores a traditional food source, which we know isn't everything—but it's a big deal. It allows families to share time together and builds connections between family members. It passes on traditions that are being lost. If the salmon come back, these positive changes would start.

— Chris Walsh, Yakama Psycho-Social Nursing Specialist[197]

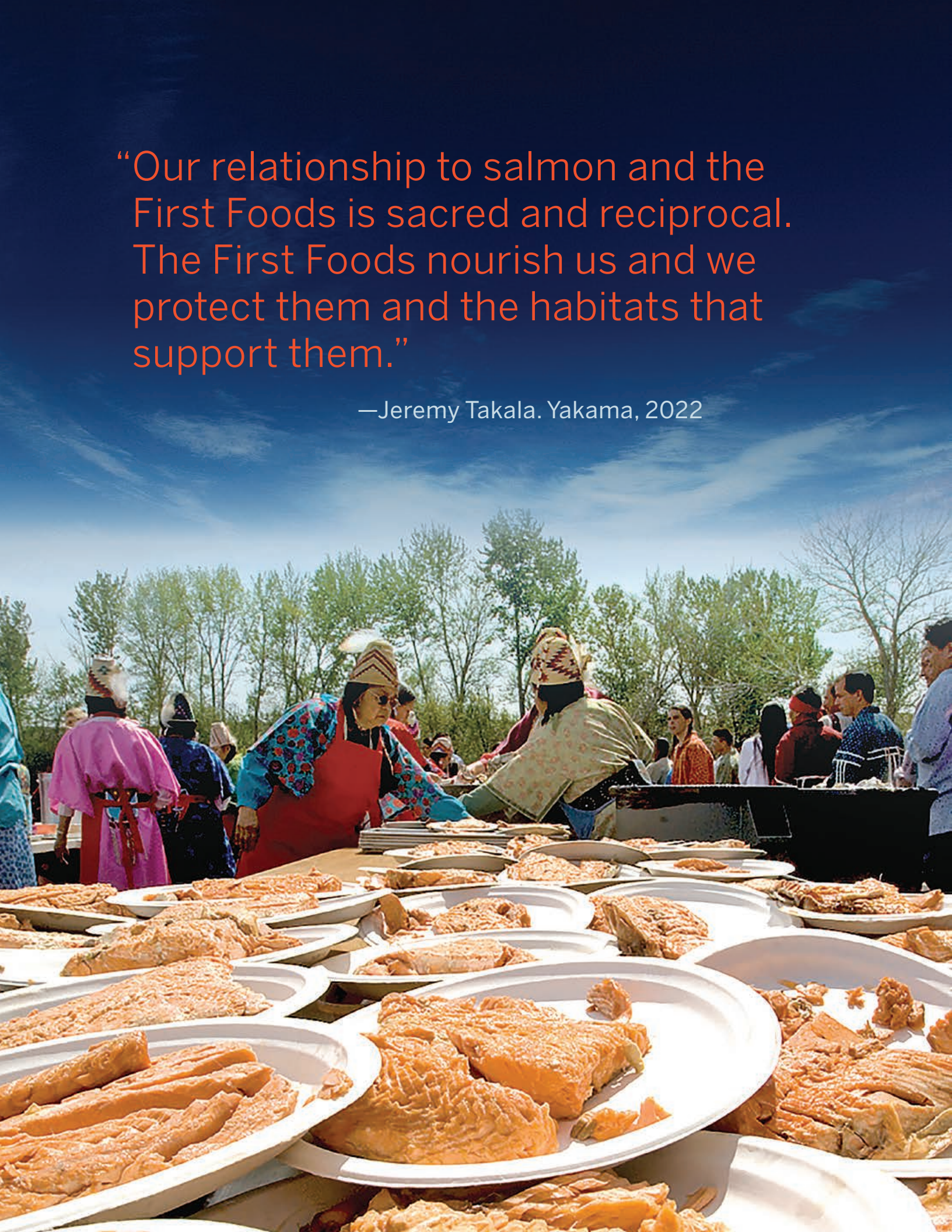
Conclusion

As can be seen from the foregoing, tribal cultural resources are broader in scope than the archeological resource focus that flows from federal laws such as the National Historic Preservation Act or the protection of human remains that is required by the Native America Graves Protection Act. Tribal cultural resources are sometimes thought of as the tangible representations of tribal history and culture that are a reminder of who tribal people are, where they came from and historic values.

[195] *Settler v. Lameer,* 507 F.2d 231, 237 (9th Cir. 1974)

[196] *Meyer Report* at 5.

[197] *Meyer Report* at 5-6.



"Our relationship to salmon and the First Foods is sacred and reciprocal. The First Foods nourish us and we protect them and the habitats that support them."

—Jeremy Takala. Yakama, 2022

APPENDIX H:

First Foods Appendix

Aligning environmental management with ecosystem resilience: a First Foods example from the Confederated Tribes of the Umatilla Indian Reservation, Oregon, USA

Quaempts, E. J., K. L. Jones, S. J. O'Daniel, T. J. Beechie, and G. C. Poole. 2018.

ABSTRACT

The concept of "reciprocity" between humans and other biota arises from the creation belief of the Confederated Tribes of the Umatilla Indian Reservation (CTUIR). The concept acknowledges a moral and practical obligation for humans and biota to care for and sustain one another, and arises from human gratitude and reverence for the contributions and sacrifices made by other biota to sustain human kind. Reciprocity has become a powerful organizing principle for the CTUIR Department of Natural Resources, fostering continuity across the actions and policies of environmental management programs at the CTUIR. Moreover, reciprocity is the foundation of the CTUIR "First Foods" management approach. We describe the cultural significance of First Foods, the First Foods management approach, a resulting management vision for resilient and functional river ecosystems, and subsequent shifts in management goals and planning among tribal environmental staff during the first decade of managing for First Foods. In presenting this management approach, we highlight how reciprocity has helped align human values and management goals with ecosystem resilience, yielding management decisions that benefit individuals and communities, indigenous and nonindigenous, as well as human and nonhuman. We further describe the broader applicability of reciprocity-based approaches to natural resource management.

Find full document at:

Aligning environmental management with ecosystem resilience: a First Foods example from the Confederated Tribes of the Umatilla Indian Reservation, Oregon, USA. Ecology and Society 23(2):29. https://doi.org/10.5751/ES-10080-230229

APPENDIX I:

COLUMBIA RIVER INTER-TRIBAL FISH COMMISSION

700 NE Multnomah Street, Suite 1200
Portland, Oregon 97232

(503) 238-0667
F (503) 235-4228
www.critfc.org

March 26, 2021

Frank Afranji, President
Northwest Power Pool
7505 NE Ambassador Pl, #R
Portland, OR 97220
Via email frank.afranji@nwpp.org

Dear Mr. Afranji:

We have reviewed the Conceptual Design document for the Northwest Power Pool (NWPP) Resource Adequacy (RA) program. This document describes a collaborative effort by all 17 Balancing Authorities (BAs) in the greater Pacific Northwest (PNW) area to establish a region-wide approach to address resource adequacy issues in serving the region's electricity demands.

We are writing to ensure that your process addresses important fish and wildlife protection considerations.

Background

The Columbia River Inter-Tribal Fish Commission (CRITFC) is comprised of the Yakama, Nez Perce, Umatilla, and Warm Springs tribes. These four tribes signed treaties in 1855 with the United States. Among other things, the treaties reserved the tribes' rights to take fish that pass their usual and accustomed fishing places. Numerous federal court decisions have affirmed these rights.[1] For the tribes and CRITFC to accomplish their mission, salmon and Pacific lamprey populations need to be rebuilt. The operations of the dams on the Columbia and Snake rivers continue to be a main deterrent to anadromous fish restoration.

CRITFC developed an Energy Vision for the Columbia River in 2003 to reduce the pressures of the Pacific Northwest's electricity needs on the Columbia River and its ecosystem, particularly salmon. The Vision was prepared following the West Coast energy crisis of 2001 when many salmon protection measures on the Columbia River were curtailed.

CRITFC updated the Energy Vision in 2013. That document included recommendations on reducing peak demand, increasing energy efficiency and renewable resources, strategically siting resources, and strategies to address emergency dry years. The Energy Vision noted that

[1] E.g. Sohappy v. Smith, 302 F.Supp. 899 (D.Or. 1969), aff'd, United States v. Oregon, 529 F.2d 570 (9th Cir. 1976); Washington v. Washington State Commercial Passenger Fishing Vessel Ass'n, 443 U.S. 658 (1979); United States v. Winans, 198 U.S. 371 (1905); Confederated Tribes of the Umatilla Indian Reservation v. Alexander, 440 F.Supp. 553 (D.Or. 1977).

"Appropriate planning of regional resources can provide the Northwest with a robust energy system that withstands most unknown future events and keeps costs stable, while protecting fish and wildlife."

The 2013 *Energy Vision for the Columbia River* had four goals:

1. Reduce the stress of new and changing energy demands on the Columbia River's fish and wildlife resources.

2. Lessen the demand for fossil-fuel generation that contributes to climate change.

3. Serve the energy demands of consumers more cheaply than they are served today to better capture the value of the Columbia River for the Northwest.

4. Provide increased protection for ratepayers and fish and wildlife against unanticipated events, such as those the region faced in 2001.

The day-to-day and seasonal operations of the hydroelectric system to meet peak and seasonal electricity loads cause changes in river conditions that continue to kill salmon and other important species. While changes in operations have lessened the frequency and severity of these occurrences, their effects are still significant.

Hydropower is used to serve peak loads because dams can react to demand by quickly putting more or less water through the turbines that generate electricity. Serving peak loads with hydropower kills millions of juvenile salmon every year. During certain times of the year, so much water is drawn down to generate electricity that salmon redds (gravel nests where salmon lay eggs) are uncovered or dewatered and their eggs die. Daily fluctuations change river water levels and juvenile fish that feed and live near the shore can be stranded and die when water levels are reduced. Migration of fish is interrupted when flows decrease because there is less demand for electricity and therefore less water moving through the reservoirs behind the dams. Fluctuations in reservoirs hurt resident fish by dewatering habitat and food supplies and reducing nutrients in the reservoirs.

Water held behind storage dams for power generation would, under natural conditions, be in the river aiding the swift and timely downstream migration of young salmon. Saving this water for winter and summer energy production alters the natural (or normative) river conditions that aid juvenile salmon migration and would help in the restoration of fish to harvestable levels.

A lot has changed since our work in 2013. Electricity disruptions in California, Texas, and elsewhere have increased attention on resource adequacy and grid integration issues. CRITFC is in the process of updating the Energy Vision, which we hope to complete in 2021. We have sought comments from regional energy experts on the scope of the new document and would welcome your comments. We have attached a copy of the 2013 document.

The 2021 update will focus on ways to reduce the impacts of the electricity system on fish and wildlife, including:

- Ways to reduce greenhouse gases that cause global warming;
- Appropriate siting of new technologies to help assure that tribal resources, such as first foods and cultural resources are protected;
- Integration of electricity in the western United States and Canada, including transboundary issues with Canada;
- The potential to increase the availability of energy efficiency, renewable resources, distributed resources, and smart grid technology to meet future energy needs; and
- Ways to reduce the risk of grid-caused wildfires, which have ravaged the Western States.

The Power Pool Resource Adequacy Program

Based on the Resource Adequacy Program Conceptual Design dated August 2020, we understand that you are currently in the detailed design phase of your process. We also note that the resource adequacy project will focus on capacity. The 2013 Energy Vision included a number of recommendations on reducing peak demand and addressing capacity issues. We expect this will be a major focus of our 2021 update.

We further note that the draft Resource Adequacy Program suggests that "the capacity program will not initially focus on longer time-horizon of fuel-related issues (e.g., dry water years), though we understand those issues are important." The 2013 Energy Vision included recommendations on dry-year strategy to address the kinds of problems the region has experienced in the past. We urge the Power Pool to expand its scope to include an energy resource adequacy program to address dry years that can adversely affect the northwest economy and its important natural resources, including salmon.

It is our understanding that this effort is specifically designed to address PNW 2020 - 2030 capacity shortfalls. If successful, the Northwest Power Pool Resource Adequacy program will achieve electric system reliability while minimizing pressure on the FCRPS/existing PNW hydro system as the de facto fallback when the region is capacity short (with predictable adverse impacts on salmon). A principal feature of this program should establish a planning reserve margin (PRM), or reliability buffer, to guard against unanticipated reliability events and protect the region's natural and cultural resources. While individual utility PRMs have typically centered around 15 percent, the Resource Adequacy program should increase this buffer to 20 percent which would parallel what the CAISO has already recommended to help solve California's reliability problems. This single change could also provide measures for a dry water year strategy as described in section 3.5.2 of the attached CRITFC's 2013 Energy Vision.

CRITFC recognizes that many conditions have changed since 2013 and is in the process of updating the Energy Vision. There may be better ways to maintain the reliability of the electrical system while protecting anadromous fish.

The actions described in the forward showing program conceptual design (Section 2) and the operational program conceptual design (Section 3) appear to include the traditional techniques to track and address resource adequacy. As CRITFC works to prepare its 2021 update of the Energy Vision, we are struck by the significant improvements in the costs of renewable resources and energy efficiency and the advancements in storage, microgrids, and demand management.

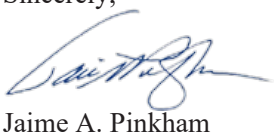
California's experiences have shown that these renewable and significant future distributed resources must be considered and addressed as resource adequacy programs are developed. There appear to be additional opportunities for interregional energy transfers. Given the importance of resource adequacy, the region's public utility commissions may also be willing to address time-of-use and other pricing techniques to address peak loads. We recommend the Power Pool expand its scope to address these additional ways to improve resource adequacy.

We believe it is important for the Northwest Power Pool to fully consider fish and wildlife protections as part of its resource adequacy program. We would like to see fish and wildlife protection incorporated into the goals and objectives and detailed analysis of your resource adequacy program. There may be ways to improve resource adequacy and also improve the survival of anadromous fish. There may be other alternatives that make things worse for these important tribal resources.

The Northwest Power Pool and its members have the expertise to evaluate these issues. We ask Pool's program to include a dry-year strategy, recognize new energy and policy opportunities, and address the effects on fish and wildlife in providing resource adequacy for the PNW.

We would also be willing to discuss ways to coordinate our update of the Energy Vision with the work you are doing. For questions and follow up, please contact Christine Golightly, Policy Analyst, via email at golc@critfc.org

Sincerely,



Jaime A. Pinkham
Executive Director

Cc: Bill Drummond, Board Chair, Northwest Power Pool, WKDrummond@comcast.net
Richard Devlin, Chair, Northwest Power and Conservation Council
John Hairston, Administrator, Bonneville Power Administration

Attachment

Columbia River Inter-Tribal Fish Commission (CRITFC)
700 NE Multnomah St., Suite 1200 • Portland, Oregon 97232 • www.critfc.org

www.critfc.org/energy-vision