



Brandon Clinton

Corps EIS Project Manager

United States Army Corps of Engineers

and

Anchor QEA

6720 South Macadam Street, Suite 125

Portland, OR 97219

(Submitted via the Chehalis Basin Strategy Website)

Applicant: Chehalis River Basin Flood Control Zone District (NWS-2014-1118)

RE: Conservation Northwest Comments on NEPA Draft Environmental Impact Statement for the Chehalis River Basin Flood Damage Reduction Project:

Nov 11<sup>th</sup>, 2020

Dear Mr. Clinton and Anchor QEA,

Thank you for the opportunity to provide comments on this important National Environmental Policy Act (NEPA) Draft Environmental Impact Statement (DEIS) for the Chehalis River Basin Flood Damage Reduction Project.

We are submitting these comments on behalf of Conservation Northwest (CNW). CNW is a non-profit environmental group based in Seattle, Washington with staff located on the ground in the areas where we work, including Thurston and Lewis Counties. Our mission is to protect, connect and restore the wildlands and wildlife of the Pacific Northwest. We focus on recovering native species and ensuring they have ample habitat in the right locations to thrive in the face of the human footprint on natural landscapes, as well as climate change. Habitat connectivity is therefore a key piece of our work and has been since our founding in 1989. We have an organizational program dedicated specifically to connectivity between the Cascades and Olympics (<https://www.conservationnw.org/our-work/habitat/cascades-to-olympics/>), which is one reason why the impacts of the proposed Flood Retention Expandable (FRE) and Flood Retention Only Facilities (FRO) are of great interest to us.

We provide here technical comments on habitat connectivity, climate change, forest practices, impacts on hydrology, permitting, and note others' technical comments on aquatic species and ecosystem processes. We also provide comments from a process perspective on the need to



continue developing a non-FRE local actions alternative, and the impact on the process at this point of not having potential mitigation measures clearly identified and described. While our comments are focused on the FRE, we feel they are still applicable to the FRO proposal, simply at a smaller scale.

## **General Comments**

First, we appreciate the unequivocal statements and identification of direct and significant adverse impacts of building and operating the Flood Retention Expandable (FRE) facility (or dam) to fish, wildlife, wetlands, water quality, and cultural resources. Even with the lack of adequate analysis of some of the impacts, the document leaves no doubt that proceeding with this proposed action would involve significant and potentially irreparable damages to natural systems and resources important to people in the Chehalis Basin and statewide.

Second, we think the NEPA DEIS is inadequate in its analysis of the impacts of climate change by failing to model for likely changes. While there is mention of the uncertainty of future climate and the impact on potential outcomes, the NEPA DEIS fails to model the likely changes to floods and hydrology that climate change will have on the environment. Projects like the FRE must analyze and model the impacts of climate change in order to make adequate assessments of natural system responses and the FRE's ability to reduce flooding in the future. Climate change is not something separate from the impacts of any proposed project but rather the day-to-day reality we all have to live with, and its severe impacts for which society has to plan, even in the face of aggressive national and global mitigation measures.

In fact, compared to the SEPA DEIS the NEPA DEIS lacks findings for key resources due to the lack of future climate modeling. One stark example is the fact that the SEPA DEIS shows nearly a 30% increase in precipitation/flooding overtime due to a changing climate, while less conservative NOAA models suggest a 50% increase. By omitting those models, the NEPA EIS fails to address and acknowledge potential future impacts of the project on fish, people, wildlife, and the landscape. Furthermore, the lack of key climate impact information, has led to the NEPA DEIS severely underestimating the hundreds of acres of habitat that will be lost, to an ever-increasing inundation area. We recommend that a supplemental NEPA DEIS is drafted that includes climate modeling, potentially the models used in the SEPA DEIS, it is difficult to support a project that intentionally omits key environmental influences and the future effectiveness of such a project.

Third, we are very concerned with the lack of analysis of the “expandable” aspect of the FRE facility and absence of any linkage to the purpose and need statement of the potential for increasing the capacity and footprint of a larger dam. While we understand that a new analysis and permitting process would be required to use the expandable capacity, it is a disservice to the public to propose a structure with additional capacity and not do an upfront analysis of what the additional impacts would be. Once a structure like that is in place, it tilts the future pathway towards a decision to use the additional capacity. As such, an analysis of the additional impacts should be included now. Such segmentation calls into serious question whether the DEIS meets the requirements of NEPA.

### **Web and email**

conservationnw.org  
facebook.com/ConservationNW  
info@conservationnw.org

### **Seattle headquarters**

1829 10th Ave W, Suite B  
Seattle, WA 98119  
206.675.9747  
206.675.1007 (fax)



Fourth, from a process perspective, the public is left in an entirely unsettled place by having the mitigation for all significant impacts that were identified in the NEPA as broad statements or complete unknowns. While we realize that the NEPA approach is to focus more on prevention than post-project mitigation recommendations, nevertheless we think it lessens the accuracy of the impact statements if the post-project mitigation efforts are complete unknowns. There is no way to have any understanding or confidence that mitigation could be possible or adequate, so we are left to assume scenarios in which the public has to choose between the incomplete level of flood damage reduction provided by the FRE facility and loss of ecologically and culturally significant aspects of the natural environment. The damages from future flooding without some form of flood reduction work are also daunting and unacceptable to the people who would bear the brunt of those damages. The NEPA DEIS presents a no-win situation.

If further work occurs on analyzing the potential to build a dam, we recommend a much more thorough exploration of whether mitigation for the identified damages is possible, how climate will impact this project and the watershed (in addition to more specific items described below) in a supplemental EIS (as mentioned earlier in these comments). We also support the ongoing development of the non-FRE local actions alternative that is currently being pursued by the Chehalis Basin Board.

Although NEPA initially considered well over 50 alternatives to the FRE, it only offers the Flood Retention Only (FRO) as an alternative, essentially a smaller version of the FRE. Not providing a true alternative to the FRE appears to be one failure of this NEPA process. We understand that other avenues have been studied and have been dismissed, but the trade-offs laid out in the DEIS appear to set up a lose-lose scenario in which the public will not be well served. We are especially concerned about the heavy impact on the needs of the Chehalis and Quinault Tribes, and to residents in portions of the Basin who will not benefit from flood reduction, but will have to deal with the impacts of the dam. Given the information we have to date, we cannot support the approval of the proposed project.

### **Wildlife Habitat Connectivity Impacts**

Habitat connectivity is an essential requirement for resilient wildlife populations. The term refers to the ability of wildlife species to move from one portion/patch of habitat to another in order to meet daily and seasonal survival needs (feeding, resting, and breeding) and more medium and long-term requirements of colonizing new habitats when prior occupied areas no longer provide their survival needs, and for species to be able to maintain population numbers (demographic support and rescue) and genetic diversity over space and time to prevent extirpation and extinction. Maintaining connectivity is more difficult in landscapes where there has been habitat loss and degradation due to human land use activities (e.g. conversion of native forest to tree plantations or agricultural or urban uses), and when large barriers to movement such as highways have been constructed, e.g., the role of Interstate 5 ([https://www.conservationnw.org/wp-content/uploads/2020/01/Final\\_Stewart\\_CNW\\_Cascades\\_to\\_Olympics\\_Whitepaper\\_2019.pdf](https://www.conservationnw.org/wp-content/uploads/2020/01/Final_Stewart_CNW_Cascades_to_Olympics_Whitepaper_2019.pdf)) in blocking movement of wildlife between the Cascades, southwest Washington, and the Olympics (Stewart, 2020).

#### **Web and email**

conservationnw.org  
facebook.com/ConservationNW  
info@conservationnw.org

#### **Seattle headquarters**

1829 10th Ave W, Suite B  
Seattle, WA 98119  
206.675.9747  
206.675.1007 (fax)



In addition to the challenges of navigating human-altered landscapes, wildlife populations are now needing to confront climate change. When overall climate conditions and the underlying vegetative composition, structure and function of habitats change due to climate driven differences in precipitation and temperature, many species need to migrate to new areas in order to survive. If the landscapes they need to cross are inhospitable or have barriers to movement, climate-induced migrations may be impeded and fail (Krosby et al., 2018; Nunez et al., 2012; Washington Wildlife Habitat Connectivity Working Group (WWHCWG, 2011).

Conservation Northwest submitted scoping comments for the development of the SEPA Draft EIS noting the importance of analyzing the impacts of the proposed FRE facility and the airport levee on wildlife habitat connectivity corridors. We noted that the programmatic SEPA EIS (DOE 2017) discussed the potential impacts to elk migration using work from 2010 done by the Washington Wildlife Habitat Connectivity Working Group (<https://wacconnected.org/>). We asked that the SEPA Draft EIS coordinate with that group as they, along with Cascades to Coast Landscape Collaborative (<https://www.ctoclc.org/>) are conducting updated analyses on wildlife connectivity corridors through the Chehalis Basin.

Unfortunately, neither the SEPA nor this NEPA DEIS include substantial and relevant habitat or landscape connectivity analyses. Thus, federal agencies conducting NEPA should also be coordinating its connectivity analysis with these groups, with the goal of incorporating their work into the final NEPA EIS. This work is on-going but has produced landscape level connectivity maps (<https://databasin.org/maps/adf2a065528c42f892bd20883e6b0bd1>) showing the area around the FRE, FRO, temporary reservoir, quarries, and the airport levee to be within key “naturalness” linkage corridors, connecting protected areas and conserved areas between the Cascades, Olympics, Willapa Hills, and the coast (Gallo et al., 2020). These linkages could be important pathways for a wide range of native species to meet a variety of life history needs and longer-term population connectivity and genetic exchange. Furthermore, the linkage overlapping the FRE site, and temporary reservoir area, is one of the widest intact corridors in the basin. Fragmenting this area further could potentially cause serious landscape-scale mobility issues for a wide range of native terrestrial and semiaquatic wildlife.

The above-mentioned workgroups are producing species specific connectivity maps (e.g., Pacific fisher and beaver) through the Chehalis Basin, showing complex networks for different species and ecological processes. These products should be available early next year (2021) and should be incorporated into any supplemental analysis, and development of additional alternatives. Our assessment from the more general naturalness corridors and the impacts on changes in vegetation cover within the FRE facility footprint and temporary reservoir identified in the DEIS, is that a direct and high (significant) impact finding should be considered.

We are surprised to see that the NEPA DEIS contains little analysis of habitat connectivity issues, and while addressed in an overarching sense is not evaluated as an independent resource, as we would recommend. While connectivity is addressed for elk in a narrow way, other ecological and species’ needs were either overlooked or lumped together without an aggregated analysis of independent or interdependent network needs. Given that there are numerous potentially long-ranging species that may appear in the FRE footprint area, including cougar,

#### Web and email

conservationnw.org  
facebook.com/ConservationNW  
info@conservationnw.org

#### Seattle headquarters

1829 10th Ave W, Suite B  
Seattle, WA 98119  
206.675.9747  
206.675.1007 (fax)



bear, fisher, wolf, and deer, NEPA should go further in identifying the migratory or dispersal routes that will be disrupted by both construction and operation of the facility. Another area the NEPA document could better analyze is the permanent loss of habitat connectivity for smaller terrestrial and semiaquatic species that rely on the riparian valley bottoms to access suitable habitat and for longer ranging movements.

The operation of the FRE will cause some species to avoid this section of the riparian corridor permanently or on occasion, therefore disruption of habitat connectivity should be analyzed and called out as an impact of facility operation as well as construction. Different types of noise and human disturbances can cause different flight responses in wildlife, depending on group size, age, season, and closeness to safety or preferred habitat type (Stankowich, 2008). In fact, even minor traffic noise or human used recreation trails can cause disturbances in some nesting bird and wildlife populations, the interaction varies greatly between species and human activity type (Gaines et al., 2003; Shilling et al., 2018). Unfortunately, the NEPA DEIS does not analyze these phenomena in a way to make an informed impact assessment on FRE construction or operations. These disruptions diminish habitat connectivity potential within and around wildlife corridors and linkages, while reducing usable habitat for some species. More should be done to understand what interactions will occur when new noises and disturbances are added permanently to the area.

Wildlife-vehicle collisions (WVC) are a physical artifact of fragmented wildlife populations near roadways. Larger mammals like deer and elk have the greatest potential to cause human injuries or end human life (Bissonette & Cramer, 2006). Furthermore, when that road exists in or around a migratory corridor for ungulates those roads show higher than average WVCs (Yinhai Wang et al., 2010). However, all species that move over or around roadways experience WVCs, in fact smaller species like amphibians and rodents are killed frequently on roadways, but usually go unreported. The proposed facility will increase traffic in the area greatly during construction and presents the very real possibility of WVCs occurring to a wide range of local species. In addition, the operation of the facility will also cause higher traffic volumes than are currently present in the area, which could lead to collisions, especially with small low-mobility animals. The DEIS should address the very real potential of WVCs, to accurately assess the impacts on wildlife populations from habitat fragmentation created by the construction and operation of the facility and its associated roads.

Lastly, there are frequent assumptions in the NEPA DEIS around carrying capacity, available habitat, and functioning linkages. The DEIS suggests species may move to adjacent habitat, without doing any evaluation of the functionality or accessibility of that habitat. If species move to adjacent habitat there must be available habitat, meaning the area cannot already be at its local carrying capacity. Also, the DEIS does not address the linkages that these species will need to move to adjacent habitat, this is especially true for smaller low-mobility species. Although the DEIS does state the uncertainty around such claims, it could do more to address this issue, especially if this logic lessens the assessed impacts or skews where and how mitigation should be deployed. Glossing over the carrying capacity or movement potential and assuming there is opportunity for species to relocate, could be a failing in the NEPA DEIS and may result in more loss of wildlife than is currently suggested in the NEPA DEIS.

#### Web and email

conservationnw.org  
facebook.com/ConservationNW  
info@conservationnw.org

#### Seattle headquarters

1829 10th Ave W, Suite B  
Seattle, WA 98119  
206.675.9747  
206.675.1007 (fax)



## Marbled Murrelets

We concurred with the SEPA DEIS assessment that there is potential for significant adverse impact to marbled murrelets. We also agree with the NEPA DEIS that the impacts would be both direct and high. If nesting habitat is found in areas of planned forest removal, habitat of at least similar, if not better, condition that is at risk of being harvested should be permanently protected. Protecting habitat that is already under ESA restrictions would not sufficiently mitigate the loss because there would be no net gain. The Washington Department of Natural Resources recently completed an amendment ([https://www.dnr.wa.gov/publications/lm\\_mm\\_hcp\\_amendment\\_formatted.pdf](https://www.dnr.wa.gov/publications/lm_mm_hcp_amendment_formatted.pdf)) to their federal Habitat Conservation Plan (DNR, 2019.). Their incidental take permit allows for the harvest of suitable unoccupied habitat. We recommend that if the proposed project were to be built, that the proponents purchase or place an easement on suitable habitat on DNR lands that would otherwise be lost to harvest under their HCP. The habitat should be in southwest Washington and be close to other habitat and occupied sites so it can function in a manner to support murrelet recovery.

If suitable habitat is found in the footprint of the FRE facility or would be harvested in the temporary reservoir area, and that habitat is found to be occupied, we would strongly oppose allowing an occupied stand being harvested. To date, we are unaware of USFWS allowing direct take of known occupied sites in Washington State given the declining status of the population. We do not think that just waiting until after the breeding season to remove the habitat and replacing it with suitable unoccupied habitat elsewhere is an acceptable impact to the species.

## Forest Practices and Hydrological Regimes

The NEPA DEIS does not contain an adequate analysis of the role of forest harvest extent and timing on either the incidence of floods or problems with summer low flows, high water temperature and low dissolved oxygen on the Chehalis River and its tributaries. We note that a process is underway to conduct modeling on this topic but that it has yet to be completed. We think that having such information is important to decision-making about both flood reduction and aquatic species restoration in the Chehalis Basin. The results of such an analysis should also serve as a basis for designing alternatives to the FRE facility which address flooding in a wider portion of the Basin, and for ensuring resilient aquatic and semiaquatic species populations in the face of climate change.

There is recent research and modeling that shows that forested watersheds managed on 50 year rotations or less result in substantially lower stream flows than either un-managed forests, or forests that are managed on longer (80 years or more) cutting cycles or through commercial thinning without final harvest (McKane et al, 2018; Perry & Jones, 2017; Segura et al., 2020). It is especially important to note that Segura et al. (2020) found that standard forest riparian buffers did not significantly mitigate for reduced flows in harvested sub-basins, thus requiring an examination of whole watershed management on the ability of streams to meet state and federal

### Web and email

conservationnw.org  
facebook.com/ConservationNW  
info@conservationnw.org

### Seattle headquarters

1829 10th Ave W, Suite B  
Seattle, WA 98119  
206.675.9747  
206.675.1007 (fax)



standards for water quality and endangered species conservation. There is also the potential that having a larger proportion of the forested watersheds of the upper Chehalis Basin in older forests would dampen the frequency and intensity of floods, though this needs the benefit of the modeling effort that is planned.

Having increased older forest in the upper and lower Basin would improve overall habitat conditions and connectivity for several wildlife species. Such an outcome would store more carbon, thus contributing local solutions to mitigating climate change. We recognize that changes in practices like lengthening rotations on private lands would require voluntary financial incentives. Assessing how state and federal programs could accomplish adequate payment programs for longer rotations should be a part of broader solutions considered for meeting the purposes of the Chehalis Basin Strategy.

We recommend that the forest practices modeling work on peak and low flows be completed and incorporated into any subsequent analysis of a proposed dam, and used in the development of non-dam options for reducing flood damages and for restoring aquatic species.

### **Permitting & Cost-Benefit Analysis**

We are concerned to learn that the Corps released the NEPA EIS and the application for a (404) permit to the public at the same time, without making explicit separate processes for both the permit and the EIS. Regardless, it would appear the NEPA EIS document does not demonstrate required tests for a permit to be approved. The EIS does not offer adequate options for mitigation to known significant adverse impacts, the alternatives offered are essentially the same project, and the discipline report for water quantity and quality does not adequately describe the impacts of the construction of the FRE facility. We want to be clear; we do not believe the Corps should be approving any permits at this time, as the tests for any such permit have not been met. Furthermore, if the Corps seeks to properly meet the permitting standards, then there will need to be another more explicit permit public hearing process.

We realize that producing a cost-benefit analysis is not an obligatory action under NEPA guidelines. However, a massive landscape altering project like the FRE, deserves an honest attempt on the part of the Corps to offer the public a true framework for understanding what could be gained and lost if such a project is initiated. Finally, we feel the Corps should offer a cost-benefit analysis, even if not required, because if the Corps is going to approve a permit for the project or refine the draft EIS to be more robust, the Corps will need to be aware of the trade-offs taking place so they can properly educate the public on what a project like this truly costs. Given that dam projects have a history of cost overruns, understanding how the potential for higher than projected costs affects the public's willingness to begin construction of something that could end up costing them more than we originally agreed to.

### **Impacts on Aquatic Species, Ecosystem Processes, and Tribal Treaty Rights**

We did not undertake our own analysis of the adequacy of the DEIS's treatment of impacts to salmon, steelhead, other aquatic species nor the suite of aquatic and related terrestrial ecosystem

#### **Web and email**

conservationnw.org  
facebook.com/ConservationNW  
info@conservationnw.org

#### **Seattle headquarters**

1829 10th Ave W, Suite B  
Seattle, WA 98119  
206.675.9747  
206.675.1007 (fax)



processes that would be affected by the dam. Several other groups have taken on that task. We are however very concerned about the facts that 1) the DEIS does identify significant and likely irreparable damages to aquatic species, semiaquatic species, the resident orca population and critical ecosystem processes and services; and 2) The Quinault Indian Nation identifies in their formal SEPA comments

([https://static1.squarespace.com/static/5ea74f37fc31534cf56f0946/t/5eb9c991e85fc52b2fef48b3/1589234071989/FINAL+QIN+Chehalis+DAM+DEIS+comment+5\\_11\\_2020.pdf](https://static1.squarespace.com/static/5ea74f37fc31534cf56f0946/t/5eb9c991e85fc52b2fef48b3/1589234071989/FINAL+QIN+Chehalis+DAM+DEIS+comment+5_11_2020.pdf)) several materially significant short-comings in the quality of the analysis, leading to an underestimate of the already large impacts identified (*Chehalis Dam DEIS Quinault Comments*, 2020). These analytical shortcomings should be rectified in a supplemental analysis, should a decision to proceed with additional work considering a dam be made.

We also note the Quinault Indian Nation's assertion that their treaty rights would be violated by proceeding with this project. In addition, the Chehalis Tribe has firmly rejected the notion of building a structure on such a culturally significant and life sustaining river. The peoples that have inhabited the Basin since time immemorial have rejected the notion of a dam on the Chehalis River, due to their connection to the land we feel it is imperative to listen to their voices and hear their concerns. Therefore, we could not support such an outcome when SEPA was released and the NEPA document has only reaffirmed and galvanized our initial response, that such an outcome is indeed, unacceptable.

## Conclusion

While we appreciate the effort that went into developing this NEPA DEIS, there are too many omissions and shortcomings to be able to use this document as a basis to approve the proposed project. We also fully understand that doing nothing in the face of future projected flooding in the Chehalis Basin is not an option. We strongly encourage the U.S Army Corps of Engineers to withhold any approval or permitting of the proposed FRE facility or FRO facility at this time.

We also strongly encourage the Corps and other federal partners to support the Chehalis Basin Board as they continue to develop a basin-wide local actions alternative that does not include the FRE/FRO facility. We applaud the multi-stakeholder approach suggested by the Governor that the Board is currently developing to realize an alternative to the FRE/FRO. Furthermore, we encourage them to continue to consider the input of as many stakeholders as possible, while developing a long-term strategy for reducing flooding impacts throughout the Basin and restoring aquatic ecosystems. The solutions are likely to require significant public funds so we also encourage the federal agency partners and Congress to support the state effort by considering increased investment in both finding alternative pathways and funding those solutions, which will likely involve adapting and moving human infrastructure, in addition to building wildlife underpasses at key locations across major highways in the Basin. Such investments (<https://www.nytimes.com/2020/05/18/opinion/coronavirus-unemployment-youth.html>) would also have a positive stimulus effect on the economy, which is sorely needed at this time, and likely for some time into the future given the Covid-19 situation (*The New York Times*, 2020). The scale of the issues may not allow Washington State to be able to solve the problems of flooding and aquatic habitat restoration on our own.

### Web and email

conservationnw.org  
facebook.com/ConservationNW  
info@conservationnw.org

### Seattle headquarters

1829 10th Ave W, Suite B  
Seattle, WA 98119  
206.675.9747  
206.675.1007 (fax)





Thank you for the opportunity to comment.

Paula Swedeen, Ph.D.

Policy Director  
Conservation Northwest

Brian Stewart, M.E.S.

Cascade to Olympics Program Coordinator  
Conservation Northwest

## References

Bissonette, J. A., & Cramer, P. (2006). Wildlife and Roads: A resource for mitigating the effects of roads on wildlife using wildlife crossings such as overpasses, underpasses, and sidewalks. <http://www.wildlifeandroads.org/descisonguide>

Chehalis Dam DEIS Quinault Comments. (2020). Retrieved November 11, 2020, from <https://chehalisdeisquinaultcomments.squarespace.com/>

Final State Trust Lands Habitat Conservation Plan Amendment, Marbled Murrelet Long-term Conservation Strategy. (2019). 286.

Gaines, W. L., Singleton, P. H., & Ross, R. C. (2003). Assessing the cumulative effects of linear recreation routes on wildlife habitats on the Okanogan and Wenatchee National Forests.

### Web and email

conservationnw.org  
facebook.com/ConservationNW  
info@conservationnw.org

### Seattle headquarters

1829 10th Ave W, Suite B  
Seattle, WA 98119  
206.675.9747  
206.675.1007 (fax)



(General Technical Paper PNW-GTR-586; p. 79). U.S. Department of Agriculture, Forest Service, Pacific Northwest Research Center.

Gallo, J., Butts, E., Miewald, T., & Foster, K. (2020). Comparing and Combining Omniscape and Linkage Mapper Connectivity Analyses in Western Washington (p. 6314158 Bytes). figshare. <https://doi.org/10.6084/M9.FIGSHARE.8120924>

Krosby, M., Theobald, D. M., Norheim, R., & McRae, B. H. (2018). Identifying riparian climate corridors to inform climate adaptation planning. *PLOS ONE*, 13(11), e0205156. <https://doi.org/10.1371/journal.pone.0205156>

Mckane, Bob, J. Halama, P. Pettus, B. Barnhart, A. Brookes, K. Djang, G. Blair, J. Hall, J. Kane, P. Swedeen, AND L. Benson. How Visualizing Ecosystem Land Management Assessments (VELMA) modeling quantifies co-benefits and tradeoffs in Community Forest management. To be Presented at Northwest Community Forest Forum, Astoria, OR, May 10 - 11, 2018.

Nunez, T., Lawler, J. J., McRae, B. H., Pierce, S., Krosby, M., & Tewksbury, J. (2012). Connecting landscapes to address climate change. *Conservation Biology*, 27, 407–416.

Opinion | The Pandemic Has Created a Youth Unemployment Crisis. We Can Fix It. - The New York Times. (n.d.). Retrieved November 11, 2020, from <https://www.nytimes.com/2020/05/18/opinion/coronavirus-unemployment-youth.html>

Perry, T. D., & Jones, J. A. (2017). Summer streamflow deficits from regenerating Douglas-fir forest in the Pacific Northwest, USA: Summer streamflow deficits from regenerating Douglas-fir forest. *Ecohydrology*, 10(2), e1790. <https://doi.org/10.1002/eco.1790>

Segura, C., Bladon, K. D., Hatten, J. A., Jones, J. A., Hale, V. C., & Ice, G. G. (2020). Long-term effects of forest harvesting on summer low flow deficits in the Coast Range of Oregon. *Journal of Hydrology*, 585, 124749. <https://doi.org/10.1016/j.jhydrol.2020.124749>



- Shilling, F., Collins, A., Louderback, A., Farman, P., Guarnieri, M., Longcore, T., Banet, B., & Knapp, H. (2018). Wildlife-Crossing mitigation effectiveness with traffic noise and light. A research report from the National Center for Sustainable Transportation. (p. 14) [Research]. National Center for Sustainable Transportation.
- Stankowich, T. (2008). Ungulate flight responses to human disturbance: A review and meta-analysis. *Biological Conservation*, 141(9), 2159–2173.  
<https://doi.org/10.1016/j.biocon.2008.06.026>
- Stewart, B. C. (2020). Recommendations for Improving and Maintaining Habitat Connectivity Over/Under I-5 in Southwest Washington [Connectivity Report]. Conservation Northwest. [https://www.conservationnw.org/wp-content/uploads/2020/01/Final\\_Stewart\\_CNW\\_Cascades\\_to\\_Olympics\\_Whitepaper\\_2019.pdf](https://www.conservationnw.org/wp-content/uploads/2020/01/Final_Stewart_CNW_Cascades_to_Olympics_Whitepaper_2019.pdf)
- Washington Wildlife Habitat Connectivity Working Group (WHCWG). (2011). Washington Connected Landscapes Project: Climate Gradient Corridors Report. Washington Departments of Fish and Wildlife, and Transportation. <http://www.waconnected.org>
- Yinhai Wang, Yunteng Lao, Yao-Jan Wu, & Joanathan Corey. (2010). Identifying High Risk Locations of Animal-Vehicle Collisions on Washington State Highways (Final WA-RD 752.1 (TNW 2010-04); p. 93). Washington State Department of Transportation.