

INTERIM PROGRESS REPORT

“Integrating Climate Change into Culvert Design and Permitting”

Submitted December 31, 2015

Grant # 91-1632572

WDFW Contract #14-01023

1. Administrative Information

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Organization: Washington Department of Fish and Wildlife

Project Title and Number: Integrating Climate Change into the Design and Permitting of Culverts

Number: 91-1632572

Period of Time Covered in Report: August 2014-December 2015

2. Purpose and Objectives:

The purpose of this project is to integrate climate change projections into the design and permitting of culverts by WDFW. The goals as originally proposed were to incorporate climate change data into WDFW water crossing design guidance and permitting process by 1) translating available hydrologic projections derived from downscaled climate projections into metrics used by WDFW in the design of water crossing passage structures, and 2) mapping decision pathways to indicate where and how to incorporate climate information.

The target audience is WDFW staff and managers engaged in culvert design and permitting, as well as staff from other organizations interested in the question of whether and how to integrate future climate projections into the design guidance and standards for water crossing structures.

The issue the project aimed to address was that the agency’s current design standards and the guidance developed for WDFW and others does not account for future changes in hydrology from climate change, even though water crossing structures are designed for 30-100 years.

3. Progress to Date

The table below lists the tasks originally described in the project proposal on the left, and outlines the status and progress for each in the right column. As the project progressed, we discovered the need for some minor changes in several of the tasks – these changes and the reasoning behind them are discussed in the table.

TASK (as stated in original proposal)	STATUS
1. Project kick-off and regular project meetings. Clarify roles, assignments, deliverables and timelines.	Completed. Kickoff meeting and regular project meetings have been held as needed throughout the project.
2. Map decision process. Create preliminary visual map of the decision process for designing and permitting water crossings structures, illustrating when various types of input are used.	Completed. Project staff Jennie Hoffman conducted interviews with representatives from the engineering division responsible for culvert design guidance at WDFW, and created a visual map of key steps in the process.

<p>3. Identify decision elements influenced by climate change and develop climate change screening questions.</p>	<p>Completed. Jennie Hoffman identified climate considerations, or questions, that could potentially affect the performance of the culvert at each stage of the process, and captured these in a flow chart format.</p> <p>The project team reviewed these considerations to determine the need for changes to the design process. This was a learning process for the entire team, as we realized that the capacity of staff to assess and identify alternatives to the kinds of considerations raised in this analysis was limited for a variety of reasons. The team determined that an exhaustive analysis of each climate consideration in design of a culvert wasn't feasible, or necessarily useful. Further, the team recognized that bankfull width can serve as an integrator of the effects of most climate considerations. Changes in bankfull width (BFW) would serve as a useful indicator of changes to hydrology expected as a result of climatic change.</p>
<p>4. Translate hydrologic projections derived from downscaled climate projections to data critical for designing and permitting fish passage structures. Develop algorithm linking commonly available climate change projections with key metrics for three types of watersheds: rain-dominated, snow-dominated, and mixed rain and snow.</p>	<p>Completed.</p> <p>Data on projected changes in stream hydrology was provided by project staff from the Climate Impacts Group (Ingrid Tohver) and applied to a formula to determine projected changes in bankfull width across the state .</p> <ul style="list-style-type: none"> • The percentage change in bankfull width (BFW) ranges from negative 15.5% in some watersheds in the Columbia Basin to an increase of 26% in watersheds in the Cascade mountains, for the period of 2030- 2059, and from -21% to 43% for the 2070-2099 time period in the same respective ecoregions. Maps will be provided in the final report. • The implications of these findings for future culvert function are significant. • No slope culvert would be undersized in a % of grid cells, which increases the likelihood that the culvert will become a barrier to fish passage. • Stream-sim culverts are more robust, but still projected to be under-sized in many cases. <p>Note: We also decided to refine our scope somewhat. The original proposal anticipated addressing both culverts and bridges, and used the broad term of "water crossing structures". In the course of the project we realized that the vast majority of permitted structures are culverts, and that our project would be most effective at this stage of our research by focusing specifically on culverts.</p>

<p>5. Assess sensitivity of design and permitting decisions to changes in climate-sensitive data input.</p>	<p>Completed (Tasks 5 and 6). The findings indicate that in certain areas of the state, culverts sized according to current regulations or guidelines are at risk of failing to pass fish under future hydrologic projections.</p>
<p>6. Assess adequacy of current culvert design standards in light of project findings, by assessing risk (both in terms of overdesign and of failure) implicit in current stream crossing design standards by location and crossing type.</p>	<p>The report introduces the term “actionable risk”. Actionable risk is a concept that addresses the question, “when is the risk of failure great enough for us to act?”. For this project, we evaluated the likelihood of undersized culverts throughout Washington, and identified places that meet or exceed hypothetical criteria for risk of potential failure that would compel to action (“act” in this case means to increase the size of the culverts). Our hypothetical criteria for “actionable risk” are those places where more than half of the climate models indicate that BFW will increase and the mean change in BFW is at least 10%.</p>
<p>7. Develop options for alternative procedures or protocols to improve adequacy. This may include annotated process maps, decision trees, decision matrices, screening questions, or other relevant decision tools.</p>	<p>In Progress. WDFW Project Staff are meeting with agency managers to explore options for incorporating the findings from this project into procedures or guidance. We are also identifying next steps in terms of additional analyses that may be needed before introducing any amended process or protocols to stakeholders.</p>
<p>8. Prepare a written report summarizing methodology and findings, including discussion of applying the decision map and matrix/assessment. The report will include options for specific recommendations for policy changes or refinements to support climate-informed water crossing decisions.</p>	<p>In Progress. A draft report is currently being circulated among project team members for edits.</p>
<p>9. Plan and conduct two workshops to disseminate findings.</p>	<p>Completed. We had originally planned to conduct one workshop for WDFW staff and managers, and the other for an external audience. However, as the project got underway we found it would be more productive to combine these audiences, and instead to host one workshop earlier in project development as a “technical workshop”, inviting experts and others to provide feedback on methodology and preliminary findings, and the other as more of a dissemination tool later in the project timeline. The first workshop was held on June 3, 2015. The second workshop was advertised to a much broader audience and was held on November 13th, 2015.</p>

<p>10. Disseminate findings more broadly through a presentation as part of the USFWS National Conservation Training Center adaptation webinar series, and as a case study in climate-related NCTC trainings.</p>	<p>Not completed. We are waiting until completing a final project report to schedule a webinar.</p>
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4. Project Timeline

This project was originally scheduled to be completed by December 31st, 2015. In late October we requested a time extension until March 31st, 2016, which was granted. This extra time was needed to allow us time to prepare a quality report and to complete our analysis of alternative procedures and protocols to incorporate project findings into management decisions (described in Task 7 in the table above).

5. Communication and Outreach

Workshops

As described under section 3, “Progress”, we have conducted two workshops for this project; the first to vet the project findings with experts and others working in this field, and the second to introduce the results to a broad group of interested persons. Attendance was excellent for the first workshop (25 attendees, mostly invited experts from external organizations), though light for the second (about 20 attendees, mostly from WDFW).

Once our project report is finalized, we intend to circulate broadly through WDFW communication channels (agency newsletters and websites), as well as working with the NPLCC to determine other opportunities for making the project findings available.

Presentations

WDFW project staff Jane Atha organized a session on the topic of Climate Change and Stream Crossings for the Northwest Climate Conference, held in Idaho on November 3-5, 2015, and she presented on this project as part of that session.

We also presented a summary of the project to climate change coordinators from other state agencies on October 13th, 2015, in Olympia, WA.

Meetings with Managers

We also held a meeting with key management staff within the agency to explore options for integrating the information generated by this project into either voluntary or mandatory guidance or regulation. Attendees at that meeting included:

- Jeff Davis, Assistant Manager, Habitat Program
- Margen Carlson, Deputy Assistant Manager, Habitat Program, WDFW
- David Price, Restoration Section Manager, Habitat Program, WDFW
- Julie Henning, Ecosystem Services Manager, Habitat Program, WDFW (supervisor for fish passage section)
- Randi Thurston, Hydraulic Permit Approval Manager, Habitat Program, WDFW

Followup meetings were held with Julie Henning and Margen Carlson to discuss strategies for outreach to key stakeholders (tribes, local governments, forest products industry).

6. Signature [provided on mailed copy]