



DEPARTMENT OF  
**ECOLOGY**  
State of Washington

# **Final Cost-Benefit and Least Burdensome Alternative Analyses**

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*Chapter 173-518 WAC*

*Water Resources Management Program for the Dungeness Portion of the Elwha-Dungeness Water Resources Inventory Area (WRIA) 18*

November 2012

Publication no. 12-11-042

## Publication and Contact Information

This report is available on the Department of Ecology's website at <https://fortress.wa.gov/ecy/publications/SummaryPages/1211042.html>

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# **Final Cost-Benefit and Least Burdensome Alternative Analyses**

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## **Chapter 173-518 WAC Water Resources Management Program for the Dungeness Portion of the Elwha-Dungeness Water Resources Inventory Area (WRIA) 18**

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# Table of Contents

Table of Contents .....	1
Table of Tables .....	4
Executive Summary .....	6
Costs and benefits .....	6
Mitigation cost transfer .....	8
Least burdensome alternative .....	9
Chapter 1: Background and Introduction.....	10
1.1 Introduction .....	10
1.2 Description of the rule.....	10
1.3 Reasons for the rule.....	11
1.4 Document organization .....	15
Chapter 2: Baseline and the Rule.....	16
2.1 Introduction .....	16
2.2 Baseline .....	16
2.2.1 Issuance of new water rights.....	16
2.2.2 Permit-exempt groundwater use .....	16
2.2.3 Measuring water use .....	17
2.2.4 Reserves and maximum depletion amounts.....	17
2.2.5 Maximum allocations and storage .....	18
2.3 Analytic scope.....	18
2.4 Analyzed changes.....	18
2.4.1 Setting instream flows (establishing instream flow rights).....	18
2.4.2 Closing subbasins to new withdrawals .....	19
2.4.3 Mitigation requirement and water exchange.....	20
2.4.4 Measuring water use .....	21
2.4.5 Establishing reserves and maximum depletion amounts of water for future use ...	21
2.4.6 Establishing maximum allocation amounts for the Dungeness mainstem.....	23
2.4.7 Storage projects.....	23
Chapter 3: Likely Costs of the Rule.....	24
3.1 Introduction .....	24
3.2 Growth in the basin .....	24
3.3 Expected costs .....	26
3.3.1 Metering new permit-exempt uses.....	26

3.3.2	Fish losses in some areas .....	26
3.3.3	Increasing existing permit-exempt use .....	27
3.3.4	New permit-exempt users .....	29
3.3.5	Administering a water exchange market.....	30
3.3.6	Property values.....	31
3.3.7	Property taxes.....	32
3.3.8	Development and construction .....	33
3.4	Total expected costs .....	34
3.5	Mitigation cost transfer .....	35
Chapter 4: Likely Benefits of the Rule .....		37
4.1	Introduction .....	37
4.2	Growth in the basin .....	37
4.3	Expected benefits .....	39
4.3.1	Avoided fish losses .....	39
4.3.2	Increased certainty in development .....	39
4.3.3	Avoided legal costs .....	41
4.3.4	Protecting existing restoration .....	42
4.3.5	Beneficial storage projects.....	42
4.3.6	Benefits of connecting to existing water systems.....	42
4.3.7	Benefits of monitoring water .....	42
4.4	Total expected benefits.....	43
Chapter 5: Cost-Benefit Comparison and Conclusions .....		44
5.1	Introduction .....	44
5.2	Estimated costs.....	44
5.3	Estimated benefits .....	44
5.4	Final comments and conclusion .....	44
5.4.1	Reliance of conclusion on water exchange.....	44
5.4.2	Mitigation cost transfer.....	45
Chapter 6: Least Burdensome Alternative Analysis .....		47
6.1	Introduction .....	47
6.2	Alternatives considered .....	48
6.2.1	No action.....	49
6.2.2	No mitigation .....	49
6.2.3	Use of deeper aquifers .....	50

6.2.4	Lower minimum instream flows.....	50
6.2.5	No water measurement .....	50
6.2.6	State-funded mitigation.....	50
6.2.7	The rule .....	51
	References.....	52
	Appendix A: Map of Rule Area.....	54
	Appendix B: Monte Carlo Simulation of Likelihood of Litigation .....	55
	Appendix C: Mitigation Sensitivity .....	57
	New permit-exempt users .....	57
	Increase in existing permit-exempt use.....	58
	Appendix D: List of Assumptions .....	61
	Appendix E: Sensitivity of Results to Discount Rate .....	63
	Cost estimation.....	63
	Metering new permit-exempt uses.....	63
	Fish losses in some areas .....	63
	Increasing existing permit-exempt use .....	64
	New permit-exempt users .....	66
	Administering a water exchange market.....	67
	Property Values.....	68
	Total expected costs .....	68
	Benefits estimation.....	69
	Avoided fish losses .....	69
	Increased certainty in development .....	70
	Avoided legal costs .....	72
	Protecting existing restoration .....	72
	Beneficial storage projects.....	72
	Total expected benefits .....	72

# Table of Tables

Table 1: Costs of the rule .....	6
Table 2: Benefits of the rule.....	7
Table 3: Projected Growth in Permit-Exempt Water Use, by Subbasin (annual) .....	25
Table 4: Potential Impacts to Housing Demands.....	34
Table 5: Total Costs of the Rule (20-year present values).....	35
Table 6: Projected Growth in Permit-Exempt Water Use, by Subbasin (annual) .....	38
Table 7: Total Benefits of the Rule (20-year present values) .....	43
Table 8: New Permit Exempt Use Mitigation Costs (using alternate mitigation costs) .....	58
Table 9: Increasing Permit-Exempt Use Mitigation Costs (using alternate mitigation costs).....	60
Table 10: Total Costs of the Rule (20-year present values).....	69
Table 11: Total Benefits of the Rule (20-year present values) .....	73



# Executive Summary

This report reviews the economic analysis performed by the Washington State Department of Ecology (Ecology) to estimate the expected benefits and costs of the rule for the Water Resources Management Program for the Dungeness Portion of the Elwha-Dungeness Water Resources Inventory Area (WRIA) 18 (WAC 173-518). The Washington Administrative Procedure Act (RCW 34.05.328) requires Ecology to evaluate significant legislative rules to “[d]etermine that the probable benefits of the rule are greater than its probable costs, taking into account the qualitative and quantitative benefits and costs, and the specific directives, of the law being implemented.” Ecology expects the likely benefits of the rule to be larger than its likely costs.

The rule:

- Sets instream flow levels for the Dungeness mainstem, tributaries, and independent drainages.
- Closes subbasins to new surface water withdrawals for at least part (if not all) of the year.
- Requires mitigation of all new groundwater uses, and provides for a water exchange to facilitate mitigation. This includes permitted and permit-exempt uses.
- Requires metering of all new withdrawals. This includes permitted and permit-exempt uses.
- Establishes reservations (“reserves”) under RCW 90.54.050(1) for domestic (indoor) use.
- Establishes maximum depletion amounts to limit temporary adverse impacts for non-domestic water use under an approved mitigation plan, and set a limit on total impacts from all new water uses to closed surface waters.
- Establishes maximum allocation amounts for interruptible purposes from high flows from the Dungeness mainstem.
- Includes a provision allowing storage projects for environmental enhancement.

## Costs and benefits

Ecology estimated total costs of \$9.4 million – \$26.1 million associated with the rule. These costs are in present value terms, over 20 years.

**Table 1: Costs of the rule**

Cost	Rationale	Based on Building-Permit Growth	Based on Population Growth
Metering new permit exempt uses	Permit-exempt water users will be required to meter. They are not required to meter now.	\$1.4 million	\$2.1 million
Fish losses in some areas	Some streams will experience fish losses. They will have lower flows than projected now.	\$30 thousand	\$50 thousand

<b>Cost</b>	<b>Rationale</b>	<b>Based on Building-Permit Growth</b>	<b>Based on Population Growth</b>
Increasing existing permit-exempt use	Existing permit-exempt users who want to increase their water use will be required to mitigate, or forego the value of using more water. They can increase use of permit-exempt water up to 5,000 gallons per day (gpd) total at no cost now.	\$1.9 million	\$17.9 million*
New permit-exempt users	New permit-exempt users will be required to mitigate water use, or forego the value of development. They can use permit-exempt water up to 5,000 gpd at no cost now.	\$2.8 million	
Administering a water exchange market and processing water rights	The new water exchange mitigation market will require staff time from Ecology and Clallam County. There is no existing market.	\$3.1 million	\$3.1 million
Development and Construction	Increases in construction costs may result in fewer projects undertaken.	\$0.2 million	\$3.1 million
<b>Total Costs</b>		<b>\$9.4 million</b>	<b>\$26.1 million</b>

\*This value accounts for population-based growth projections including increases to existing use and new uses.

Ecology estimated total benefits of \$32.1 million – \$79.7 million associated with the rule. These benefits are in present-value terms, over 20 years.

**Table 2: Benefits of the rule**

<b>Benefit</b>	<b>Rationale</b>	<b>Based on Building-Permit Growth</b>	<b>Based on Population Growth</b>
Avoided fish losses	Some streams will experience avoided fish losses. They will have higher flows than projected now.	\$3.8 million	\$6.8 million
Increased certainty in development	Development will be less likely to be stopped by future closures resulting from legal challenges. Future development is at risk of this now.	\$19.9 million	\$62.1 million
Avoided legal costs	Legal challenge will be less likely on the grounds of instream and fish protection. Legal challenge is likely now.	\$2.4 million	\$4.8 million
Protecting existing restoration	Money has been invested in multiple restoration projects for salmon habitat. These investments lose value given projections of streamflow loss without the rule.	\$6.0 million	\$6.0 million
Potential value of avoided curtailment	Existing and future junior water users will be less likely to have use curtailed in favor of senior right holders. They are at risk of this now.	Not quantifiable	
Potential value of beneficial storage projects	Storage projects that benefit people and the environment will be possible. There is no allowance for these now.	Not quantifiable	
<b>Total Quantified Benefits</b>		<b>\$32.1 million</b>	<b>\$79.7 million</b>

## Mitigation cost transfer

Ecology estimated costs based on the most conservative interpretation of how the rule will be implemented: users of new or additional permit-exempt water will pay their own mitigation costs, beginning in 2013. At the time of this publication, Ecology is in the process of determining an alternate payment mechanism that would not require new water users to fully pay their mitigation costs. This alternate payment mechanism would likely involve the State directly or indirectly paying for the mitigation of new permit-exempt domestic water use, as defined in the rule. In addition to an alternate payment mechanism, Ecology considered the possibility of either deferring the rule or its effective date until the beginning of the 2013 biennium. Ecology is also requesting sufficient funding from the Washington Legislature to continue paying these mitigation costs in the future – currently requested at least for the next (2013-2015) biennium. Because the overall Cost-Benefit Analysis does not differentiate between *who* pays the costs of a rule, this alternate implementation plan (of the State paying for mitigation) would not impact the overall cost-benefit assessment. A change in implementation to a State-funded mitigation would, however, shift costs from residents in the Dungeness area to the Washington State general fund. Because the mechanism of implementation is not specified in the rule, Ecology kept the overall assessment in this Cost-Benefit Analysis to the most conservative assumption that all costs are borne by the public and businesses in the Dungeness rule area.

- If Ecology delays the effective date of the rule to the beginning of the 2013 biennium (or pays for mitigation in the mean time), and the Legislature funds all future mitigation, new permit-exempt water users in the Dungeness rule area do not pay out-of-pocket costs for indoor, domestic water. A large part of the cost burden would shift away from businesses and the public in the Dungeness rule area.
- If Ecology delays the effective date of the rule to the beginning of the 2013 biennium (or pays for mitigation in the mean time), the Legislature funds mitigation only for the 2013-2015 biennium, and the Legislature does not fund mitigation past 2015, new permit-exempt water users in the Dungeness basin would not pay out-of-pocket costs for indoor, domestic water until July 2015. Until then, a large part of the cost burden would shift away from businesses and the public in the Dungeness rule area. After July 2015, the expected costs to parties in the rule area would be identical to those illustrated in the analysis, discounted appropriately.

Ecology determined that delaying the effective date would not significantly reduce the burden of implementing the rule and chose to use available funds to offset the cost of mitigation for domestic use as described above. Ecology assumed that the smallest necessary mitigation package covering indoor, domestic water use (and incidental use such as washing cars or windows, or water for household pets) would cost \$1,000 per household. A State-funded mitigation mechanism would shift a portion of that burden away from households and businesses in the Dungeness rule area (though they would pay for additional consumptive water use). Ecology estimated this would shift \$1,000 per household or business of the burden onto public funding (paid for by state taxes and fees) and away from direct payment by households and businesses in the Dungeness rule area, assuming the availability of funds would not affect the annual increases in building permits or population.

Please recall the Dungeness rule area is in Washington State; it is likely a part of the burden will still fall on the Dungeness rule area. The amount depends on their tax burden due to Washington State and the funding sources used by Ecology and the state to pay for mitigation projects.

## **Least burdensome alternative**

Ecology determined that the content of the rule is the least burdensome alternative version of the rule considered. Ecology considered alternative rule contents that address the concerns through rule making:

- No action.
- No mitigation.
- Public funding for mitigation.
- Use of deeper aquifers.
- Lower minimum instream flows.
- No water measurement.
- The rule as adopted.

# Chapter 1: Background and Introduction

## 1.1 Introduction

This document reviews the economic analysis performed by the Washington State Department of Ecology (Ecology) to estimate the expected benefits and costs of the rule for the Water Resources Management Program for the Dungeness Portion of the Elwha-Dungeness Water Resources Inventory Area (WRIA) 18 (WAC 173-518). This document is intended to be read with the Least Burdensome Alternative (LBA) analysis (included in this document) and Small Business Economic Impact Statement (SBEIS; Ecology publication 12-11-043<sup>1</sup>) to develop an understanding of the full impact of the rule.

The Washington Administrative Procedure Act (RCW 34.05.328) requires Ecology to evaluate significant legislative rules to “[d]etermine that the probable benefits of the rule are greater than its probable costs, taking into account the qualitative and quantitative benefits and costs, and the specific directives, of the law being implemented.” Ecology’s analysis is based on the best available information at the time of this analysis.

## 1.2 Description of the rule

The rule:

- Sets instream flow levels for the Dungeness mainstem, tributaries, and independent drainages.
- Closes subbasins to new surface water withdrawals for at least part (if not all) of the year.
- Requires mitigation of all new groundwater uses, and provides for a water exchange to facilitate mitigation. This includes permitted and permit-exempt uses.
- Requires metering of all new withdrawals. This includes permitted and permit-exempt uses.
- Establishes reservations (“reserves”) under RCW 90.54.050(1) for domestic (indoor) use.
- Establishes maximum depletion amounts to limit temporary adverse impacts for non-domestic water use under an approved mitigation plan, and sets a limit on total impacts from all new water uses to closed surface waters.
- Establishes maximum allocation amounts for interruptible purposes from high flows from the Dungeness mainstem.
- Includes a provision allowing storage projects for environmental enhancement.

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<sup>1</sup> Available at <http://www.ecy.wa.gov/biblio/1211043.html>.

## 1.3 Reasons for the rule

There is a long history of active water management in the Dungeness watershed, dating to 1896 when construction started on the first irrigation ditch system. The surface water rights for the Dungeness River were adjudicated in superior court in 1924. The adjudication confirmed water rights totaling 518 cubic foot per second (cfs) during the irrigation season. This total diversion rate, confirmed by the Superior Court, compares to the mean monthly flows of 701 cfs during June and 171 cfs during September. June and September are the months with the highest and lowest streamflows, respectively, during the 1924-2011 period of record for the United States Geological Service (USGS) gage at River Mile 11.8. The daily mean flows in the late summer fall as low as 80 cfs.

The Department of Ecology started to address water resources management in the Dungeness watershed with the funding of a pilot project for the Dungeness-Quilcene in 1992. The Dungeness-Quilcene project was one of two pilots selected to implement the landmark Chelan Agreement on Water Resources.

The Chelan Agreement established a state-wide forum to review water management policies, and created a framework for the development of regional water management plans. The Jamestown S’Klallam Tribe nominated the Dungeness River as a pilot watershed planning project under the Chelan Agreement. Cooperation between Clallam County and the Jamestown S’Klallam Tribe developed since the 1980s was a key factor in their decision to negotiate rather than litigate over water issues:

“By the 1990’s faced with the situation of a serious decline in the runs of salmonids in the river, and the numerous factors contributing to their decline, the Jamestown S’Klallam Tribe had the choice of taking the issue to court, or attempting the new Chelan Agreement process to see if the needs of the fish, agriculture, and a rapidly growing populace could be met by negotiation.”

...

“As in similar processes, the negotiations commenced after all parties saw that it was in their interest to participate, and that they could no longer ignore the issues. Besides the degrading conditions of the watersheds, other issues that needed to be addressed immediately included the threat of a lawsuit by the Tribe that could entirely reallocate the region’s water supplies, and the fear that the State of Washington could remove matters from local control and develop an alternative water management scheme.”<sup>2</sup>

The Dungeness-Quilcene Plan (“DQ Plan”) was completed in 1994. Signatures included caucus representatives from business, environmental groups, fish, local government, recreation, state government, tribes, and a technical committee co-chair. The completed plan was forwarded to Ecology as “recommendations and strategies developed to provide

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<sup>2</sup> Seiter, Ann, Jamestown S’Klallam Tribe. *The Dungeness-Quilcene Water Resources Management Plan*. June 30, 1994. p. 1.7 (section 1, page 7).

protection and management for the quality and quantity of the region’s surface and ground-water.”

Some recommendations in the DQ Plan that are important in the context of this rule include the following:

- Instream flows should be protected and supplemented and improved in the future as possible, to provide minimum flows needed for stocks of salmonids and other species in the area’s rivers and streams.
- The Instream Flow Incremental Methodology (IFIM) numbers established for the Dungeness River as minimum instream flows should be adopted by rule, and given a priority date effective as of the date of the rule, for use in permitting. (The instream flow levels for the Dungeness River in Ecology’s rule are the same as those recommended in the DQ plan.)
- No surface water permits should be issued from small streams in eastern Clallam County.
- In order to provide water during low flow periods, the possibility for off-channel storage of water from irrigation diversions should be investigated.
- Meter all new community water systems and require that the State, County, City, or PUD with jurisdiction record total annual water use.

In 1998, Clallam County, the Lower Elwha Klallam Tribe, the Jamestown S’Klallam Tribe, the Agnew Irrigation District, and the City of Port Angeles were signatories to an intergovernmental agreement initiating another round of watershed planning under the newly enacted State Watershed Planning Act, Chapter 90.82 RCW. The 1998 agreement acknowledges the DQ Plan and clearly states “It is not the intent of the Initiating Governments to repeat, overturn, or delay implementation of technical studies, management recommendations, and water use agreements which were included in the [DQ Plan].”<sup>3</sup> The Dungeness River Management Team was one of two teams comprising the planning unit that conducted the new planning process, and in 2005 the Elwha-Dungeness Watershed Plan (the Watershed Plan) was adopted by the Board of Clallam County Commissioners. The watershed plan documents the over appropriation of the Dungeness watershed.<sup>4</sup>

The Watershed Planning Act specifies that local watershed planning groups can recommend instream flows to Ecology for rule making, and obligates Ecology to undertake rule making to adopt flows that are recommended through the watershed planning process. This Act also requires Ecology to consult with Tribes before adopting instream flows.

The Watershed Plan contains many recommendations, some of which are being implemented through this rule:

### Chapter 3.1 Water Quantity Recommendations:

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<sup>3</sup> Elwha-Dungeness Watershed Plan, 2005. Chapter 1 p. 21.

<sup>4</sup> Ibid. Chapter 2.3. p. 79.

- Allow groundwater withdrawals from deeper aquifers in continuity with surface water if impacts on stream flow are mitigated. Mitigation should address impacts to flows, water quality, and temperature. For example, flow mitigation might be accomplished by returning an amount of water to the potentially affected stream reach equivalent to the calculated impact. This will be refined in intergovernmental agreements, as recommended below.
- For all well construction activity in WRIA 18, follow and enforce the State Minimum Standards for Construction and Maintenance of Wells and the Water Well Construction Act or relevant Federal standards.
- Encourage all new water supply wells, including permit-exempt wells, to be drilled to the second aquifer or lower in the Dungeness Planning Area/East WRIA 18.
- For purposes of assessing aquifer and stream flow impacts, recharge capabilities of onsite septic systems should incorporate a realistic recharge quantity, such as 70-75% of in-house use, as well as recharge quality.
- For all new well construction activity, make it clear that the date of priority (i.e., seniority) of a water right is the date the water is put to beneficial use, not the date the well was drilled.
- New permit-exempt wells should be drilled only where public water service is unavailable. Unavailable means not within a reasonable timeframe, is not cost effective, or is not feasible. If new development lies within a reasonable distance from the boundaries of the service area of a public water system, that public water system should have been contacted and requested to provide service prior to land use approval.

#### Chapter 3.4 Instream Flow Recommendations

- Set instream flows for all WRIA 18 streams to protect flows adequate for all life stages of salmonids, as identified in Tables 3.4-1 and 3.4-2 (in the watershed plan).
- Develop seasonal closures for those WRIA 18 streams that are flow-limited during the low-flow season and that are recommended by Elwha-Morse Management Team (EMMT) or Dungeness River Management Team (DRMT), for consideration during rule making.
- Instream flows should be protected as well as supplemented and improved in the future as possible, to provide sufficient flows needed for healthy stocks of salmonids and other species in the area's rivers and streams.

In addition the Watershed Plan contemplated establishing reserves that would be replenished.

From Chapter 3.1 Future Water Availability Framework:

The proposed approach would be to define a mechanism that reserves a limited amount of groundwater. This amount would be replenished, over a length of time to be defined later, from conservation water savings or aquifer or off-channel storage, provided use of such reserved water would not degrade fish populations, or habitat, or beneficial uses and is

mitigated. Details of the legal framework for such a reserve and associated mitigation requirements would need to be worked out in the intergovernmental agreement and in the watershed plan's implementation plan and rule.

On March 24, 1999, Puget Sound Chinook salmon, including Dungeness River Chinook, were listed as threatened under the Federal Endangered Species Act (ESA). Historically, Dungeness Chinook runs have been estimated at 8,000 to 20,000 fish annually, but in 1993 the annual run of returning adult Chinook to the Dungeness River hit bottom, with a total return of 43 fish. Water conservation by the agricultural water users and an experimental hatchery program to raise Chinook in captivity (initiated in the mid-1990s) may have helped bring Dungeness Chinook back from the brink of extinction. Since 1999 three other members of the salmon family have been listed for protection under the ESA for the North Olympic Peninsula: summer chum, bull trout, and steelhead. These species are found in the Dungeness River and in several of the smaller streams in the watershed.

The adjudicated water rights to the Dungeness River held by the irrigation districts and companies frequently exceed the flow in the river for several months each year. The irrigators' water rights were originally affirmed through a superior court adjudication in 1924. Recognizing their key role in the watershed, the Dungeness River Agricultural Water Users Association (WUA) has worked with State, Tribal, local, and federal resource agencies to reduce the impact of their diversions on the river through irrigation efficiency projects to reduce waste, and voluntary agreements to limit diversions during the low flow time of year.

Work on this water management rule began after adoption of the Elwha-Dungeness Watershed Plan in 2005. Ecology worked with local governments, Tribes, business owners, environmental and civic organizations, residents and others in eastern Clallam County to draft rule language. In early November 2010 discussions began with Clallam County, WUA and Tribes about delaying rule filing while local entities worked on water management issues crucial to rule implementation that were beyond the scope of a rule. A Cooperators Agreement among Clallam County, the Sequim-Dungeness Water Users Association, and Ecology was signed in February 2011. While not signing the Agreement, the Jamestown S'Klallam Tribe conveyed its support of shared goals through a letter to Ecology in which it pledged to participate in the work group process.

The goals of the formal Agreement are to:

- Prevent permanent reductions in Dungeness River flows or small streams due to new appropriations.
- Supply adequate and reliable water for new uses.
- Maintain sustainable agriculture in the Dungeness Valley.
- Restore stream flows in the mainstem Dungeness and, where feasible, small streams.
- Have in place an instream flow rule that protects instream resources and existing water rights within 18 months after the Agreement is signed.

This agreement in principal led to the formation of the Local Leaders Water Management Work Group (LLWG). This group met from December 2010 until early 2012 and on March 5, 2012, produced a report titled Summary Report and Recommendations on Water Management in the Dungeness Watershed that documents the work of the LLWG. The LLWG accepted the premise that all new consumptive uses of water are obligated to be mitigated. In anticipation of rule adoption, the group worked on mitigation supply and demand, water banking procedures, outreach, funding studies, and a flow restoration strategy.

## 1.4 Document organization

Ecology organized this document into the following sections:

- **Baseline and the rule (Chapter 2):** Description and comparison of the baseline requirements in state and federal laws and rules, to the rule. How both apply in context.
- **Likely costs of the rule (Chapter 3):** Analysis of the types and size of costs Ecology expects impacted parties to incur from the rule.
- **Likely benefits of the rule (Chapter 4):** Analysis of the types and size of benefits expected to result from the rule.
- **Cost-benefit comparison and conclusions (Chapter 5):** Discussion of the complete implications of the Cost-Benefit Analysis. Comments on the results.
- **Least burdensome alternative analysis (Chapter 6):** Analysis of considered alternatives to the rule.

# Chapter 2: Baseline and the Rule

## 2.1 Introduction

In this chapter, Ecology describes the baseline compared to the rule. The baseline is the regulatory context, and how it applies in the absence of Ecology adopting the rule.

In this chapter, Ecology also describes the rule, and identifies which elements of the rule require analysis under the Washington Administrative Procedure Act (Chapter 34.05 RCW). Complexities in the scope of analysis are discussed in the preceding chapter.

## 2.2 Baseline

Ecology compared the rule to a baseline representing what will most likely happen if Ecology does not adopt the rule. This baseline includes the regulatory framework of other state and federal laws and rules, and how they will be applied. For the rule, this includes a broad set of existing state and federal laws and rules, including (but not limited to) the Water Code (Surface Water Code; Chapter 90.03 RCW; adopted 1917), Regulation of Public Groundwaters (Groundwater Code; Chapter 90.44 RCW), and Water Resources Act of 1971 (Water Resources Act; Chapter 90.54 RCW).

### 2.2.1 Issuance of new water rights

Under the Water Resources Act, Ecology has a legal obligation to protect, and where possible enhance flows in the state's perennial rivers and streams. Ecology last issued a water right certificate in the Dungeness watershed in 1999. Technical review of applications since that time indicated that further diminished streamflows will be detrimental to fish, and groundwater withdrawals will impact stream flow. Currently, Ecology is not reviewing water right applications because of this context. In addition, surface waters may have a flow limit proviso through a surface water source limitation issued under RCW 77.57.020.

Therefore, under the baseline, Ecology does not believe water right permits can be issued in response to new water rights applications.

### 2.2.2 Permit-exempt groundwater use

Some new water uses are exempt from permitting under the groundwater permit-exemption law (RCW 90.44.050). Permit-exempt uses of groundwater can be established for beneficial uses for:

- Single homes
- Small developments
- Irrigation of small lawns and gardens
- Industrial use

- Stockwatering

Although exempt from permitting before using groundwater, these uses remain subject to all other state water laws and regulation. For example:

- Only one groundwater exemption is allowed for any one group domestic project regardless of the size of the project.
- The quantity of water in a permit-exempt water right is established through regular beneficial use, and can be lost when that regular use diminishes or ceases.
- All wells in a single project (combined together) must pump no more than 5,000 gallons per day (gpd) to be covered under this permit-exemption. If the cumulative total of withdrawn groundwater for an industrial or domestic project exceeds 5,000 gpd, a water right is required.

While permit-exempt groundwater withdrawals do not require a water right permit, to the extent the groundwater is regularly and beneficially used, the water user establishes a water right equivalent to a water right permit obtained from Ecology.

### **2.2.3 Measuring water use**

Existing state law (RCW 90.03.360) requires metering of all new withdrawals in each of the 16 state-wide fish-critical basins, which includes the Dungeness watershed (WRIA 18). Fish-critical basins are the 16 basins across Washington State where low flows are a known limiting factor to salmon populations. They were identified by the statewide salmon recovery strategy. While all new permitted withdrawals are required to meter their diversions, Ecology has not enforced a metering requirement for permit-exempt groundwater withdrawals in the Dungeness.

### **2.2.4 Reserves and maximum depletion amounts**

Under existing laws and rules, there are no established reserves within the Dungeness watershed.

Permit-exempt users currently may withdraw water as allowed by local regulations and RCW 90.44.050. Ground and surface waters are connected, consequently, each permit-exempt use results in a near-continuous, but very small, incremental adverse impact to surface waters. The new uses are subject to interruption or curtailment if their use interferes with or injures a senior surface water or groundwater right holder's ability to obtain water. The baseline does not include a cumulative limit on these flow reductions. The risk of litigation by one or more senior right holders to protect their water rights increases incrementally with each new impact, especially in light of the 1924 surface water adjudication.

## 2.2.5 Maximum allocations and storage

There are no existing conditions placed on flow reductions (depletions) during high streamflow periods, nor is there any specific allowance for certain types of storage projects. However, as described above, no applications for water rights are currently being reviewed.

## 2.3 Analytic scope

The requirements in the rule that are dictated by state and federal rules (to the extent that Ecology has no discretion in determining them) are exempt from this analysis. The rule for the Dungeness, however, includes no such requirements. As Ecology has discretion in determining the specific contents of the rule (even if guided by broader state and federal rule), all requirements are analyzed relative to the baseline.

## 2.4 Analyzed changes

Ecology qualitatively or quantitatively analyzed the impacts of the following rule elements.

- Setting instream flows (establishing instream flow rights)
- Closing subbasins to new unmitigated withdrawals
- Mitigation requirement and water exchange
- Measuring water use
- Establishing reserves and maximum depletion amounts of water for future use
- Establishing maximum allocation amounts for the Dungeness mainstem
- Storage projects

### 2.4.1 Setting instream flows (establishing instream flow rights)

#### *Rule*

The rule sets instream flows for nine rivers and streams in the Dungeness watershed planning area of the Elwha-Dungeness, WRIA 18. Under this rule, instream flows have a priority date in relationship to other water rights. The priority date is the effective date of the rule. Washington water law protects instream flows from impairment by new water uses (except for domestic uses accessing reserved water) and water right changes and transfers.

#### *Baseline*

Under the Water Resources Act (Chapter 90.54 RCW), Ecology has a legal obligation to protect, and where possible enhance flows in the state's perennial rivers and streams. Ecology last issued a water right permit in the Dungeness watershed in 1999. Technical review of applications since that time indicated that further diminishment of streamflows will be detrimental to fish, and groundwater withdrawals will adversely impact stream flow.

### ***Primary change***

The adopted instream flows do not fundamentally change the situation for existing water users. Setting instream flows does not affect existing water rights or require that water be put back into streams. Under the rule, Ecology approves a water right application for a new use only if mitigation, sufficiently protective of stream flows, is proposed. Adopting instream flows establishes a water right that helps protect current and future restored flows by integrating their protection into establishment of new water uses.

## **2.4.2 Closing subbasins to new withdrawals**

### ***Rule***

The rule legally closes all surface waters in the Dungeness watershed (WAC 173-518-050). The mainstem Dungeness (excludes tributaries) is closed seasonally from July 15- November 14, and the eight smaller streams are closed year-round. The rule also makes a finding that surface water and groundwater are hydraulically connected. Therefore, it restricts groundwater withdrawals, including new permit-exempt groundwater withdrawals,<sup>5</sup> to prevent adverse impacts to closed surface waters.

There are four exceptions to the closures that provide for new water uses (WAC 173-518-070):

- The proposed use is non-consumptive (WAC 173-518-070(3)(b)).
- The proponent chooses to submit a mitigation plan as defined in WAC 173-518-075 and required by WAC 173-518-070(3)(a)(ii), and such plan is approved by Ecology.
- The proponent chooses to purchase mitigation credits from the water exchange as authorized in WAC 173-518-070(3)(a)(i).
- The proponent can show that the proposed use will not adversely affect any closed surface waters (WAC 173-518-070(3)(c)).

### ***Baseline***

The Dungeness River and all but one of the streams named in the rule are administratively closed (no new permits are being issued) or have a flow limit proviso through a surface water source limitation issued under RCW 77.57.020. Currently Ecology is not approving new water right applications for water from these streams. However, some uses for new water may be approved under the groundwater permit-exemption law (RCW 90.44.050). Although exempt from permitting, these uses remain subject to all other state water laws. Permit-exempt uses are at elevated risk of being litigated if senior water right holders believe their rights are being impaired,

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<sup>5</sup> In the state Groundwater Code, the “groundwater permit-exemption” allows for certain uses of small quantities of groundwater; including domestic, industrial, stockwatering, and non-commercial irrigation of less than one-half acre of land. RCW 90.44.040. *See also* Washington Attorney General Opinion (2005 Op. Atty Gen. Wash. No. 17 and 2009 Op. Atty Gen. Wash. No. 6).

and subject to regulation (the use can be interrupted or curtailed) if the use is found to be causing impairment to a senior water right.

***Primary change***

The ‘closures with exceptions’ listed above are generally consistent with current rule and administrative practice for water right permit applications, and do not require analysis. The closures will affect new permit-exempt withdrawals that are presently available under RCW 90.44.050. However, new uses are increasingly at risk of litigation or interruption as described above. Future permit-exempt groundwater uses will be allowed, through mitigation and accessing reserves for domestic use, although it will not be “business as usual”.

### **2.4.3 Mitigation requirement and water exchange**

***Rule***

The rule establishes a requirement for mitigation and allows mitigation through a water exchange (WAC 173-518-070(3)(a) and WAC 173-518-075). Future water users may submit a mitigation plan, the fundamentals of which are found in WAC 173-518-075, or mitigate effects of their water use through purchase of credits from the water exchange.

***Baseline***

Under current conditions, water right permit applications are not being reviewed. Although it is currently feasible to get a water right permit with an approved mitigation plan, none have yet been proposed by a permit applicant in the Dungeness basin. If eligible, water users may currently secure water under the groundwater permit-exemption law (RCW 90.44.050). Although exempt from permitting, these uses remain subject to all other state water laws and regulations. They are subject to rules (the use can be interrupted or curtailed) in the future, if they impair a senior water right.

***Primary change***

The rule establishes a requirement that all future water users, permitted and permit-exempt alike, must mitigate their consumptive use impact before establishing a new water use. The rule specifies what must be included in a mitigation plan if a future water user chooses to submit one. The specifications listed in the rule generally reflect current agency practice for mitigation of permitted water use. In addition the rule includes additional considerations for mitigation that are unique to this watershed (WAC 173-518-075(2)(b)):

- Projected domestic use
- The likelihood that mitigation can be obtained to offset projected stream depletions
- Water budget neutrality with respect to the Dungeness River watershed
- Maximizing instream benefits during the critical low-flow period

The rule also allows mitigation through a water bank (the Dungeness Water Exchange) – the details of which exist outside of the rule. If a future water user chose to purchase credits from the mitigation bank, then there will be a cost involved to the user. The resulting benefit received for that cost is the use of water that will be more secure against interruption, in favor of senior water rights and the instream flow limitations. Also, the new use will be more secure against litigation initiated by the federal government or a tribe to protect instream flow rights associated with the treaty right to take fish.

Water use backed by a mitigation plan and from the purchase of bank credits may continue as long as there is:

- Water in place to offset the impacts of the new water use.
- Water for domestic use available from the reserves in the streams affected by the new use.

#### **2.4.4 Measuring water use**

***Rule***

The rule requires water meters for all new water withdrawals.

***Baseline***

Existing state law requires metering of all new withdrawals in each of the 16 state-wide fish-critical basins, which includes the Dungeness watershed (WRIA 18). While all new permitted withdrawals are required to meter, Ecology has not enforced a metering requirement for permit-exempt groundwater withdrawals in the Dungeness.

***Primary change***

Water meters will be required for all new permit-exempt groundwater withdrawals.

#### **2.4.5 Establishing reserves and maximum depletion amounts of water for future use**

***Rule***

The rule creates reserves and maximum depletion amounts of water intended to meet the community's needs for new water use. Reserves are relied upon to supply water for domestic use after rule adoption, before mitigation projects can be implemented.

Into the future, the reserves will continue to be needed in some areas. Technical studies show us that mitigation projects are not likely to be found in some areas. Mitigation projects will likely also be imperfect in time and place for the smaller streams across the watershed.

Ecology has created the reserves through a determination that their establishment will serve the overriding consideration of the public interest (OCPI), as required by RCW 90.54.020(3)(a). The OCPI determination is necessary for new year-round withdrawals to occur in these subbasins, as they impair flows needed for in-stream

environmental values during low flow months. New uses drawing from the reserves must nevertheless mitigate the impact to streams from consumptive use.

The reserves sizes were developed by the Department of Fish and Wildlife and Ecology, and reflect a one percent impact (loss) to habitat during the low flow period. The Dungeness mainstem and Matriotti Creek will together have a combined reserve. The allocation of water in the reserves will allow a non-interruptible water right for qualifying domestic uses.

The concept of maximum depletion amounts is new to instream flow rules. The maximum depletion amounts are not in addition to the reserves. The maximum depletion amounts are not to be exceeded, and they will work in conjunction with the reserves to allow for non-domestic water use under an Ecology approved mitigation plan. Over time, mitigation projects will be implemented to ensure the total impact of all new water use is kept below the maximum depletion amount. This ensures that spatial or temporal imperfections in approved mitigation plans and new domestic uses relying on the reservations do not result in adverse flow impacts that exceed one percent loss of habitat. If the maximum depletion amount is fully depleted for any subbasin, unless water (i.e., “water for water”) is found for mitigation, no new water use that adversely affects the streamflow in that subbasin may begin.

New permit-exempt well use may not occur where an existing municipal water supplier can provide service. Permit-exempt uses from the reserves must comply with the reserve criteria in WAC 173-518-070 and -085.

### ***Baseline***

Before the rule, no reserves were established in the Dungeness subbasins. Permit-exempt users currently withdraw water as allowed by local regulations and state law under RCW 90.44.050, resulting in near-continuous, small, incremental adverse impacts to surface waters. Although exempt from permitting, permit-exempt groundwater remained subject to all other state water laws and rules in the future and subject to litigation if they impair senior water rights.

### ***Primary change***

Residential users are gaining a reliable water supply (uninterruptible) through the use of reserves and the mitigation requirement in the rule. Ecology has a legislative mandate to set instream flows to protect instream resources. If the rule only established instream flow levels and did not establish reserves, maximum depletion amounts, and a mitigation framework, then a dependable, uninterrupted water supply for new domestic water rights would not be available.

The rule provides water for new withdrawals that meet the conditions of use for the reserves and maximum depletion amounts in WAC 173-518-080 and -085. The rule requires potential new users to hook-up to a public water purveyor when possible.

The reserves and maximum depletion amounts also set a limit on the total impact to surface water resulting from new mitigated water use. This limit to total impact, coupled with the mitigation requirement to reduce the impact even further, will result in permanent protection of instream resources.

## **2.4.6 Establishing maximum allocation amounts for the Dungeness mainstem**

### ***Rule***

The maximum allocation amounts establish the amount of water that can be captured when stream flows in the Dungeness mainstem are generally expected to be at their highest. The amount of water captured cannot adversely impact the instream flows and are only be available during the seasonal open period on the mainstem Dungeness. Users seeking water from the maximum allocation must obtain a water right permit and, due to the relative infrequency of these high flows in the Dungeness River, the water use associated with such a permit may only be for interruptible purposes. These interruptible purposes include storage, and Dungeness mitigation and restoration projects.

### ***Baseline***

Currently, there are no conditions placed on the high flows, but water right permit applications are not being approved that conflict with an administrative closure or have a flow limit proviso through a surface water source limitation issued under RCW 77.57.020.

### ***Primary change***

The rule allows 25-35 cfs of high flows (varying by month) above the instream flow levels to be captured. This may provide water for storage, and Dungeness mitigation and restoration projects, and will allow permit applications for these projects to be reviewed and approved if found effective in storage, mitigation, or restoration.

## **2.4.7 Storage projects**

### ***Rule***

The rule includes a provision allowing new storage projects using water from the Dungeness River for environmental enhancement or other uses consistent with the watershed plan. Such projects are potentially not subject to the instream flows, but are subject to a consultation process with Tribes and other resource agencies. The consultation process will form the basis for conditioning and monitoring of the new permit to store water.

### ***Baseline***

Currently, water right permit applications are not being approved.

### ***Primary change***

The rule allows flexibility for storage projects that are found to provide significant benefits to the community and the environment.

# Chapter 3: Likely Costs of the Rule

## 3.1 Introduction

Ecology estimated the expected costs associated with the rule, as compared to the baseline as described in section 2.2 of this document. The baseline is the regulatory circumstances in the absence of the rule. The costs analyzed here are associated with the rule elements listed in section 2.4 of this document.

To the extent possible, Ecology has quantified these impacts, and has otherwise described them qualitatively to include in overall assessment of the costs of the rule.

## 3.2 Growth in the basin

Many of Ecology's estimations of costs and benefits resulting from the rule are based on projected household growth in the Dungeness, which results in increased water use. See Appendix A for a map of subbasins in the affected region. Ecology used two bases to estimate projected growth:<sup>6</sup>

- Clallam County building permits
- Projected population growth

Using building permits from the region affected by the rule,<sup>7</sup> Ecology projected one estimate of the number of households that will, each year, potentially rely on new permit-exempt groundwater uses. Ecology estimated this number by:

1. Summing the number of building permits using wells, other, or unnamed sources of water in each year 1987 – 2008.
2. Allocating areas across subbasins.
3. Averaging the number of building permits in each subbasin across all years.

Using projected population growth in the region affected by the rule, Ecology projected an alternate estimate of the number of households that will, each year, potentially rely on new permit-exempt groundwater uses. Ecology estimated this number by:

1. Using projected population in each year in Sequim, and in unincorporated Clallam County. This accounted for higher likely growth in the Sequim area.<sup>8</sup>

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<sup>6</sup> Ecology also projected growth in the number of households a third way, using the Office of Financial Management's Low, Middle, and High population growth projections for Clallam county. Based on those growth projections, the area affected by the rule grows (at the Middle estimate) by 50 households per year. (The Low change in the number of households would be a reduction of 71 per year, while the High would increase the number of households by 131 per year.) Using this method to determine growth numbers would affect estimates of costs and benefits throughout this document by making them both smaller, but this method also does not account for the likely higher growth in urban areas as compared to Clallam County overall. Ecology, therefore, retained the two growth scenarios used

<sup>7</sup> Clallam County building permit data, 1987 – 2008.

<sup>8</sup> Aylward and Cronin, 2011.

2. Dividing by a household size of 2.21 people per household, to calculate the projected number of households in Sequim and in Clallam County areas of the Dungeness.
3. Subtracting across each year to calculate the household growth in each area.
4. Dividing projected annual household growth in Sequim across Gierin and Bell subbasins. These are the two subbasins straddled by Sequim.
5. Apportioning projected household growth in unincorporated Clallam County (outside Sequim) across remaining subbasins based on the proportions of building permits in each of those subbasins.

**Table 3: Projected Growth in Permit-Exempt Water Use, by Subbasin (annual)**

	<b>Building-Permit Growth Scenario: Number of new building permits per year</b>	<b>Population Growth Scenario: Number of new domestic uses per year</b>
Bagley Creek Subbasin	11.91	16.74
Bell Creek Subbasin	13.41	111.59
Cassalery Creek Subbasin	18.43	25.91
Dungeness River and Matriotti Creek Subbasins	69.43	97.59
Gierin Creek Subbasin	11.70	97.41
McDonald Creek Subbasin	17.59	24.72
Siebert Creek Subbasin	19.95	28.05

Ecology used these numbers in calculating the impacts to fish under the rule. In addition, to maintain conservative estimates of net benefit, Ecology subtracted the number of households likely to have domestic use supported under Sequim’s existing water right (209 households for 15 years), in calculations of metering and development.

For permit-exempt water users, Ecology also estimated the number of those uses that are likely to significantly increase. For purposes of the analysis Ecology needed a way to estimate additional water use beyond what a household is currently using. To do this Ecology used residentially zoned properties with existing mobile homes to estimate this use.

Based on Clallam County residential property sales records (2005-2012), there are 457 mobile homes in the area affected by the rule. These homes may, in the future, choose to additionally develop their property, and thereby require more water use. Ecology could not determine how many of these homes currently use a permit- exempt well, or how many would use one if they increased water use. Ecology looked at mobile homes to approximate the number of people who would increase permit-exempt water use from current (non-zero) use levels. Mobile homes are sometimes used on residential land while building homes on site.

Not all mobile homes would necessarily build new homes on site (mobile homes may be permanent residences as well). As a conservatively high estimate Ecology assumed all of

these mobile homes (457) will additionally develop their property (build a new home or expand an existing) in the next five years, and thereby would require more water use and incur mitigation costs.<sup>9</sup>

### 3.3 Expected costs

Ecology estimated costs likely to result from the rule, associated with:

- Metering new permit-exempt uses.
- Fish losses in some areas.
- Increasing existing permit-exempt use.
- New permit-exempt users.
- Administering a water exchange market.

#### 3.3.1 Metering new permit-exempt uses

Ecology estimated the costs associated with metering new permit-exempt users. Ecology uses an estimate of \$500 per meter. This cost is not likely to vary by subbasin. Using the two projections of growth in the area affected by the rule (see Table 3), Ecology estimated nominal costs of \$1.6 million – \$2.5 million, over 20 years. This is the cost range if 20 years worth of new users installed meters today. Ecology then discounted this cost range, based on the flow of new permit-exempt users each year, over 20 years, at a discount rate of 1.58 percent.<sup>10</sup> This gave Ecology a range of present-value costs, over 20 years, of \$1.4 million – \$2.1 million.

#### 3.3.2 Fish losses in some areas

Ecology estimated the costs associated with the rule in areas where it is likely to result in lower quantities of water available to fish, and result in fish losses. While the rule sets instream flows that are largely protective of salmon (see Chapter 4 for a discussion of this benefit), Ecology acknowledges that some areas of the affected subbasins are not likely to have sufficient and appropriate mitigation available under the rule for new uses,<sup>11</sup> and will likely rely on the reserve for the 15 gpd consumptive amount for indoor domestic use. As compared to a baseline in which households developing in these areas use 250 gpd of water, this is still an improvement, but the 15 gpd use for these households will still likely result in minor fish losses.

Based on projected growth in each subbasin (Table 3), the groundwater model (relating groundwater and surface water across the subbasins), and salmon habitat needs, Ecology estimated the rule will result in the loss of 6 – 10 spawning fish over 20 years.<sup>12</sup> Ecology

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<sup>9</sup> If fewer homes increase their water use, then we would expect fewer mitigation costs in the affected areas.

<sup>10</sup> 1.58 percent is the average real rate of return on United States Treasury I-Bonds. This is an estimate of the risk free rate of return a person or business could receive on an investment, and is therefore the rate at which future receipts and payments are discounted in terms of current value.

<sup>11</sup> Upstream areas of Bagley, Siebert, McDonald, Matriotti, Dungeness, and Bell subbasins.

<sup>12</sup> The calculations of fish losses are included in the rule file for this rule making.

uses a 20-year value of a returning spawning salmon of \$5,000.<sup>13</sup> Ecology calculated the total cost of salmon losses under the rule is \$30 thousand – \$50 thousand.

### 3.3.3 Increasing existing permit-exempt use

Ecology estimated the costs associated with existing permit-exempt users increasing their permit-exempt use (and therefore creating a new use) in the future. This might result from additions to existing homes, building a home on a property currently using a mobile home, or subdividing a property to house multiple families (e.g., forming a duplex).

Ecology estimated the lowest number of existing users increasing permit-exempt water use in the future as zero. This is based on the fact that one of the estimates of future household growth is based on population growth, and therefore already reflects growth in water use among existing users. (Population growth reflects both people moving to the area, who will move into duplexes or second residences on a property, and families getting larger and requiring larger houses and more water.)

For permit-exempt water users, Ecology also estimated the number of those uses that are likely to significantly increase. For purposes of the analysis Ecology needed a way to estimate additional water use beyond what a household is currently using. To do this Ecology used residentially zoned properties with existing mobile homes to estimate this use.

Based on Clallam County residential property sales records (2005-2012), there are 457 mobile homes in the area affected by the rule. These homes may, in the future, choose to additionally develop their property, and thereby require more water use. Ecology could not determine how many of these homes currently use a permit-exempt well, or how many would use one if they increased water use. Ecology looked at mobile homes to approximate the number of people who would increase permit-exempt water use from current (non-zero) use levels. Mobile homes are sometimes used on residential land while building homes on site.

Not all mobile homes would necessarily build new homes on site (mobile homes may be permanent residences as well). As a conservatively high estimate Ecology assumed all of these mobile homes (457) will additionally develop their property (build a new home or expand an existing) in the next five years, and thereby would require more water use and incur mitigation costs.<sup>14</sup>

From an analysis done by the Local Leaders Water Management Work Group (LLWG), of prospective project types, Ecology used a range of \$1,500 – \$16,500 per acre-foot (AF). This is the full range of “middle” estimates of cost per acre-foot, for projects rated

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<sup>13</sup> Based on a University of Washington study (Layton, *et al.* 1999), the 20-year average between high and low status quo salmon populations give us \$300 as the annual value for each adult spawner. Columbia River Initiative gave us existence values of \$268 (Huppert, 2004). Bonneville Power Administration gave us restoration values of \$400 per adult fish. From these reports 16 year values for fish would range from \$4,288 to \$6,400. Ecology has chosen to use a 20-year real estimated value of \$5,000 for an adult returning spawner.

<sup>14</sup> If fewer homes increase their water use, then we would expect fewer mitigation costs in the affected areas.

with “high” or “very high” effectiveness in mitigation. Assuming a typical household will use 250 gpd, this means mitigation will likely require a purchase of 0.28 AF per household, or a cost of \$420 – \$4,620 per household. We constrain the lower bound to \$1,000 however, because of estimates from The Dungeness Water Exchange Mitigation Plan, which predicts \$1,000 as the least expensive mitigation package.<sup>15</sup> The range we use to estimate costs is therefore \$1,000 – \$4,620 per household.

This estimate is likely an overestimate of actual costs, because:

- Not all existing households increasing water use in the future will be likely to increase by the full water use of a typical household, as they will have an already established a permit-exempt water use level.
- Mitigation will be required for only consumptive use, which will be some subset of the 250 gpd total water use in a household.

Because Ecology could not determine the degree to which households might consume less than 250 gpd, Ecology chose to use the conservatively high cost.<sup>16</sup>

Ecology multiplied the number of existing permit-exempt users likely to increase permit-exempt water use in the future (up to 457; recalling that the low-end estimate is zero; see above) by the range of per-household costs, and discounted this value over time, at a discount rate of 1.58 percent. The range of 20-year present value costs will be \$0 – \$2.0 million if all of these households had mitigation available. Ecology estimated, however, that about 93.8 percent of households will be able to mitigate, while the rest (6.2 percent) will have to rely on the indoor domestic use reservation, and forego outdoor water use at a cost of \$1,000 per household.<sup>17</sup> This 6.2 percent will still pay mitigation costs for the water from the reserve, at a use rate of up to 15 gpd, paying an additional \$1,000 per household in mitigation costs. We use an estimate of \$1,000 for mitigation costs because it is the likely minimum cost for mitigation, and households that rely on indoor domestic use reservations would only be able to rely on the minimum use (15 gpd).

The final present value, then, of mitigation (where available) or foregoing outdoor water use (where necessary) is a total cost, over 20 years, of \$0 – \$1.9 million to existing permit-exempt households.<sup>18</sup>

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<sup>15</sup> Draft: The Dungeness Water Exchange Mitigation Plan, Washington Water Trust, July 2012.

<sup>16</sup> When unable to make more precise estimates (due to uncertainty or data limitations), Ecology chose to overestimate costs and underestimate benefits, to conservatively estimate net benefits of the rule.

<sup>17</sup> Willingness to pay for outdoor water use is based on the analysis provided in Zhang, 2005. Ecology used this willingness to pay value, because replacement costs for services such as trucking in water and water storage for outdoor use were higher, and households would only purchase these replacement services if their willingness to pay exceeded the costs. As a result, Ecology performed calculations based on households without mitigation foregoing purchasing replacement water.

<sup>18</sup> Ecology also performed this analysis assuming the net value of an improvement to land is lost. Ecology used the \$33 thousand difference between undeveloped and developed property, and determined the present value estimates under that assumption would equal \$0 to \$2.8 million.

### 3.3.4 New permit-exempt users

Ecology estimated the costs associated with new permit-exempt users in the area affected by the rule in the future. This might result from population growth in the area, as well as people moving into the area.

Ecology used the projected range of growth in permit-exempt users (households) discussed in this document (see Table 3). Ecology accounted for new population that will likely use Sequim’s existing water right by subtracting 15 years of 209-person growth from population-based growth in the Gierin and Bell subbasins from the projections in Table 3. The rule requires people with access to such a system to connect to it, rather than rely on a permit-exempt well.

After the Sequim water right is fully in use, however, these new households can use permit-exempt wells. This adjustment resulted in the Gierin and Bell subbasins effectively experiencing zero growth in permit-exempt uses for the first 15 years under the rule, under the population-based growth projection.<sup>19</sup>

New permit-exempt water uses will be required to mitigate use under the rule. From an analysis done by the Local Leaders Water Management Work Group, of prospective mitigation project types, Ecology used a range of \$1,500 – \$16,500 per acre-foot (AF). This is the full range of “middle” estimates of cost per AF, for projects rated with “high” or “very high” effectiveness in mitigation. Assuming a typical household will use 250 gpd, this means mitigation will likely require a purchase of 0.28 AF per household, or a cost of \$420 – \$4,620 per household. We constrain the lower bound to \$1,000 however, because of estimates from The Dungeness Water, which predicts \$1,000 as the least expensive mitigation package Plan. The range we use to estimate costs is therefore \$1,000 – \$4,620 per household.

This estimate is likely an overestimate of actual costs, because mitigation will be required for only consumptive use, which will be some subset of the 250 gpd total water use in a household. Because Ecology could not determine the degree to which households might consume less than 250 gpd, Ecology chose to use the conservatively high cost<sup>20</sup>

Ecology multiplied the number of new permit-exempt users in each year, by the range of per-household costs, and discounted the value over time, at a discount rate of 1.58 percent. The range of 20-year present value costs will be \$2.8 million – \$18.8 million if all of these households had mitigation available. Ecology estimated, however, that about 93.8 percent of households will be able to mitigate, while the rest (6.2 percent) will have to rely on the indoor domestic use reservation, and forego outdoor water use at a cost of

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<sup>19</sup> This affected the present-value calculation, as these subbasins were not expected to experience costs resulting from this particular impact of the rule until 2028, when a typical new household can no longer rely on Sequim’s existing water right.

<sup>20</sup> When unable to make more precise estimates (due to uncertainty or data limitations), Ecology chose to overestimate costs and underestimate benefits, to conservatively estimate net benefits of the rule.

\$1,000 per household.<sup>21</sup> This 6.2 percent will still pay mitigation costs for the water from the reserve, at a use rate of up to 15 gpd, paying an additional \$1,000 per household in mitigation costs. We use an estimate of \$1,000 for mitigation costs because it is the likely minimum cost for mitigation, and households that rely on indoor domestic use reservations would only be able to rely on the minimum use (15 gpd).<sup>22</sup>

The final present value, then, of mitigation (where available) or foregoing outdoor water use (where necessary) is a total cost, over 20 years, of \$2.8 million – \$17.9 million to new permit-exempt use households.<sup>23</sup>

### **3.3.5 Administering a water exchange market**

Ecology estimated the costs associated with administering a water exchange market to facilitate mitigation of new water uses and processing water rights. This cost will be borne by Ecology and by Clallam County. Ecology estimated that administering the market will require:

- Ecology: Two full-time-equivalent (FTE) Environmental Specialist 4 (ES4) for the first two years, and one thereafter.
- Clallam County: The equivalent of 0.5 FTE Environmental Planner 1 (EP1)

Ecology based salary assumptions on the salary schedules of represented employees:

- Top-step annual salary of \$64,428 for an ES4.
- Top-step annual salary of \$43,368 for an EP1.

Ecology calculated additional overhead costs for each FTE employee based on the Standard Cost Assumptions for fiscal note preparation created by the Washington State Office of Financial Management. (These are the cost assumptions recommended for calculating costs presented to the state Legislature.) Overhead costs included:

- Benefits
- Goods and services
- Travel

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<sup>21</sup> Willingness to pay for outdoor water use is based on the analysis provided in Zhang, 2005. Ecology used this willingness to pay value, because replacement costs for services such as trucking in water and water storage for outdoor use were higher, and households would only purchase these replacement services if their willingness to pay exceeded the costs. As a result, Ecology performed calculations based on households without mitigation foregoing purchasing replacement water.

<sup>22</sup> Willingness to pay for outdoor water use is based on the analysis provided in Zhang, 2005. Ecology used this willingness to pay value, as replacement costs for services such as trucking in water and water storage for outdoor use were higher, and households would only purchase these replacement services if their willingness to pay exceeded the costs. As a result, Ecology performed calculations based on households without mitigation foregoing purchasing replacement water.

<sup>23</sup> Ecology also performed this analysis assuming the net value of an improvement to land is lost. Ecology used the \$33 thousand difference between undeveloped and developed property, and determined that assumption would raise present value costs to \$4.2 to \$15.0 million.

- Indirect costs of rents, utilities, executive and administrative support, employee services, communications, budget and accounting, and central services.

Including overhead costs and salary in the cost calculation, Ecology used the following costs associated with each FTE administering the water exchange.

- \$121,358 annually for an ES4.
- \$83,684 annually for an EP1.

Discounting these costs over time, and accounting for the number and type of FTE required to administer the water exchange, Ecology calculated total present-value costs over 20 years of \$3.1 million.<sup>24</sup>

### 3.3.6 Property values

The burden of mitigation costs will likely be shared between the property owner who sells the property and the developer who buys the property to build on (or similarly, if the individual property owner is building on his own land, he effectively sells the property to himself, forgoing the opportunity of selling the undeveloped property to someone else).

For a moment, instead assume the entire burden falls on the owner of the property (as opposed to being shared with the developer who purchases the property). Imagine two identical properties (in both attributes and location), except one property has an established water right and the other does not – by assuming the entire burden falls on the property owner we are assuming the difference in property value will be the expected cost of mitigation.<sup>25</sup> Again, as mentioned above, the difference in value instead will be somewhere between zero and the expected mitigation cost.

In this example, when the entire burden falls on the owner of the property, the developer is indifferent between the two properties, one affected by the rule, and one not affected. The developer must pay an additional mitigation fee in order to develop, but they are able to purchase the property for less, by the amount of the mitigation fee. The owner of the property is worse off by the cost of mitigation at the date of development. The loss in value to the original property owners will be a function of the estimated development over 20 years. The losses to property

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<sup>24</sup> Ecology also performed this analysis assuming the net value of an improvement to land is lost. Ecology used the \$33 thousand difference between undeveloped and developed property, and determined that assumption would raise present value costs to \$2.1 million over 20 years.

<sup>25</sup> The difference in value is at most the cost of mitigation to satisfy a no-arbitrage condition – this condition illustrates that if the property value decreased by more than the cost of mitigation, one might buy the property, pay the cost of mitigation, and be better off equal to the difference. For example, imagine again two identical properties (in both attributes and location), except there is an established water right on one property and not on the other. Assume the property with an established water right is valued at \$200,000, the cost of mitigation is \$1,000, and the property without a water right is valued at \$195,000. Given that these properties are otherwise identical, one could buy the property with no water right, pay the cost of mitigation, and be better off by \$4,000.

owners are equal to the estimates for when the burden falls entirely on the developer instead (as estimated [above](#) in Section 3.3.3), when counted at the expected dates of transaction (when we expect properties to be bought for development). By estimating at the expected dates of transaction we are estimating according to when we expect them to realize their loss.

To clarify:

- Section 3.3.3 estimates property value impacts based on all costs being incurred by the property developer.
- This section estimates property value impacts based on all costs being incurred by the property seller.
- In any given situation costs for mitigation may be shared between buyers and sellers, but the total impacts should not be greater than the total cost of mitigation for a given property.

### 3.3.7 Property taxes

If some of the burden from mitigation costs falls on the property owner, because they don't have a water right, the assessed value of their property will fall. There are at least two impacts resulting from this, impacts on:

1. Decisions that are based on the value of the property
2. The amount of property taxes paid

First, a decrease in assessed value plays into any decision that is a function of the value of the property – for example if the property owner sought a loan and desired to use the property as collateral. If property values decrease, or increase, this will influence the ability to make other decisions that rely on the value of the property.

Second, it is likely that the property owner will pay less in property taxes to the county. Assuming a revenue-neutral change (such that the county takes in the same amount of money in taxes), the county must raise taxes somewhere else. Property owners affected by the rule may be better off, and others may be worse off, but the change in efficiency likely depends on whether the new tax mix is more or less distortionary<sup>26</sup> than the previous allocation. We will note that given a revenue-neutral change however, the total amount of taxes collected remains the same, while total government expenditures would also remain the same.

If we assume there is not a revenue-neutral change, and the county takes in fewer taxes, some property owners will pay less, and the government will have fewer tax dollars to spend in the community. Whether this is an overall good or bad depends on whether a dollar spent by a household<sup>27</sup> would have larger or smaller impact than a dollar spent by the government.

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<sup>26</sup> Distortionary taxes alter the behavior or decisions of those affected by them.

<sup>27</sup> "Household" can mean an individual or a family or group.

### 3.3.8 Development and construction

If net construction costs increase (because developers must pay a mitigation fee in order to develop), we might expect less construction projects undertaken in the time period in question. For a moment, assume the entire burden of the mitigation cost falls on developers. If instead land values were depressed, the net impact to developers might be smaller, and the decrease in the quantity of construction projects might also be smaller.

We look at the impact to the quantity of construction projects undertaken using estimates for both the price elasticity of demand and supply in the housing market. For any increase in price we would expect a percent decrease in the number of projects undertaken or demanded. We assume the price of improvements is equal to the costs of construction, an average of \$125,580.78.<sup>28</sup> We assume a 10 percent increase in price results in a 6.42 percent decrease in demand.<sup>29</sup> The necessary assumptions here are an estimate of -0.642 as the price elasticity of demand, that the price elasticity of supply is perfectly elastic, and that adjustment is instantaneous. If the price elasticity of supply is more inelastic, or adjustment is not instantaneous, a commensurate increase in price will result in a smaller decrease in demand. The point estimate is similar to others in the housing literature,<sup>30</sup> although we caution that estimates of elasticity seem fairly sensitive to the geographic area in question. A specific estimate for the rule area, although outside the scope of this analysis, is not easily substituted for.

Because it appears that the estimate used above is roughly similar to others in the literature, we believe the example below provides a reasonable illustration of the potential impacts to housing demand. For the mitigation costs used in Section 3.3.3 (\$420 and \$4,260), and assuming the rates of development that will require mitigation above,<sup>31</sup> we estimate that new construction projects will decrease by approximately 7 – 113 projects over 20 years. We then multiply the forgone projects by the average value of residential improvements minus the costs of construction in the Dungeness area, which is approximately \$33 thousand. We use this to obtain our forgone net benefit of construction projects, equal to approximately \$0.2 million – \$3.1 million.

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<sup>28</sup> Using Clallam County parcel data and assuming 53.8% of total parcel price is equal to construction costs from the National Association of Home Builders (total parcel price includes both the value of improvements and the value of the land).

<sup>29</sup> Hanushek & Quigley, 1980, REStat.

<sup>30</sup> (-0.7) Polinsky & Ellwood, 1979 REStat; (-0.89) Maisel, Burnham & Austin, 1971 REStat; (-0.57) Lee & Kong, 1977 SEJ.

<sup>31</sup> 162.42 developments per year that require mitigation as a lower bound, and 193.01 for the first 15 years, with 402.01 for the last five years, as an upper bound.

**Table 4: Potential Impacts to Housing Demands**

Year	Projects forgone (low)	Projects forgone (high)	Discounted forgone net benefit (low)	Discounted forgone net benefit (high)
1	0.3345	4.4321	\$10,770.86	\$142,733.00
2	0.3345	4.4321	\$10,603.32	\$140,512.89
3	0.3345	4.4321	\$10,438.40	\$138,327.32
4	0.3345	4.4321	\$10,276.04	\$136,175.74
5	0.3345	4.4321	\$10,116.20	\$134,057.63
6	0.3345	4.4321	\$9,958.85	\$131,972.47
7	0.3345	4.4321	\$9,803.95	\$129,919.74
8	0.3345	4.4321	\$9,651.45	\$127,898.93
9	0.3345	4.4321	\$9,501.33	\$125,909.56
10	0.3345	4.4321	\$9,353.55	\$123,951.13
11	0.3345	4.4321	\$9,208.06	\$122,023.17
12	0.3345	4.4321	\$9,064.84	\$120,125.19
13	0.3345	4.4321	\$8,923.84	\$118,256.73
14	0.3345	4.4321	\$8,785.03	\$116,417.34
15	0.3345	4.4321	\$8,648.39	\$114,606.56
16	0.3345	9.2314	\$8,513.87	\$234,994.83
17	0.3345	9.2314	\$8,381.44	\$231,339.66
18	0.3345	9.2314	\$8,251.08	\$227,741.35
19	0.3345	9.2314	\$8,122.74	\$224,199.00
20	0.3345	9.2314	\$7,996.40	\$220,711.76
Total	6.6900	112.6385	\$186,369.62	\$3,061,874.01

The above illustrates that while we may expect a percent decrease in demand due to an increase in the price of developing improvements and new projects, the expected mitigation costs comprise a fairly small share of construction costs. We note this estimate only measures the net benefit from developing improvements and new projects, not total economic activity. For an analysis of the jobs impacts and second-round impacts to supporting industries from the decrease in construction projects, please see the Small Business Economic Impact Statement (SBEIS; Ecology publication 12-11-043; we have consolidated all analyses using the Washington State Input-Output Model in the SBEIS document).

### 3.4 Total expected costs

Where quantifiable, Ecology calculated total expected costs associated with the rule, in present value, over 20 years as shown below.

**Table 5: Total Costs of the Rule (20-year present values)**

<b>Cost</b>	<b>Based on Building-Permit Growth Projection</b>	<b>Based on Population-Based Growth Projection</b>
Metering new permit-exempt uses	\$1,383,432	\$2,088,795
Fish losses in some areas	\$30,000	\$50,000
Increasing existing permit-exempt use	\$1,916,958	\$17,915,569*
New permit-exempt users	\$2,766,864	
Administering a water exchange market	\$3,064,703	\$3,064,703
Forgone development and construction	\$186,370	\$3,061,874
<b>TOTAL</b>	<b>\$9,348,327</b>	<b>\$26,180,941</b>

\*This value accounts for population-based growth projections including increases to existing use and new uses.

### 3.5 Mitigation cost transfer

Ecology estimated costs based on the most conservative interpretation of how the rule will be implemented: users of new or additional permit-exempt water will pay their own mitigation costs, beginning in 2013. At the time of this publication, Ecology is in the process of determining an alternate payment mechanism that would not require new water users to fully pay their mitigation costs. This alternate payment mechanism would likely involve the State directly or indirectly paying for the mitigation of new permit-exempt domestic water use, as defined in the rule. In addition to an alternate payment mechanism, Ecology considered the possibility of either deferring the rule or its effective date until the beginning of the 2013 biennium. Ecology is also requesting sufficient funding from the Washington Legislature to continue paying these mitigation costs in the future – currently requested at least for the next (2013-2015) biennium. Because the overall Cost-Benefit Analysis does not differentiate between *who* pays the costs of a rule, this alternate implementation plan (of the State paying for mitigation) would not impact the overall cost-benefit assessment. A change in implementation to a State-funded mitigation would, however, shift costs from residents in the Dungeness area to the Washington State general fund. Because the mechanism of implementation is not specified in the rule, Ecology kept the overall assessment in this Cost-Benefit Analysis to the most conservative assumption that all costs are borne by the public and businesses in the Dungeness rule area.

- If Ecology delays the effective date of the rule to the beginning of the 2013 biennium (or pays for mitigation in the mean time), and the Legislature funds all future mitigation, new permit-exempt water users in the Dungeness rule area do not pay out-of-pocket costs for indoor, domestic water. A large part of the cost burden would shift away from businesses and the public in the Dungeness rule area.

- If Ecology delays the effective date of the rule to the beginning of the 2013 biennium (or pays for mitigation in the mean time), the Legislature funds mitigation only for the 2013-2015 biennium, and the Legislature does not fund mitigation past 2015, new permit-exempt water users in the Dungeness basin would not pay out-of-pocket costs for indoor, domestic water until July 2015. Until then, a large part of the cost burden would shift away from businesses and the public in the Dungeness rule area. After July 2015, the expected costs to parties in the rule area would be identical to those illustrated in the analysis, discounted appropriately.

Ecology determined that delaying the effective date would not significantly reduce the burden of implementing the rule and chose to use available funds to offset the cost of mitigation for domestic use as described above. Ecology assumed that the smallest necessary mitigation package covering indoor, domestic water use (and incidental use such as washing cars or windows, or water for household pets) would cost \$1,000 per household. A State-funded mitigation mechanism would shift a portion of that burden away from households and businesses in the Dungeness rule area (though they would pay for additional consumptive water use). Ecology estimated this would shift \$1,000 per household or business of the burden onto public funding (paid for by state taxes and fees) and away from direct payment by households and businesses in the Dungeness rule area, assuming the availability of funds would not affect the annual increases in building permits or population.

Please recall the Dungeness rule area is in Washington State; it is likely a part of the burden will still fall on the Dungeness rule area. The amount depends on their tax burden due to Washington State and the funding sources used by Ecology and the state to pay for mitigation projects.

# Chapter 4: Likely Benefits of the Rule

## 4.1 Introduction

Ecology analyzed the benefits of the rule, compared to the baseline as described in section 2.2 of this document. The baseline is the regulatory circumstances in the absence of the rule. The benefits analyzed here are associated with the rule elements listed in section 2.4 of this document.

To the extent possible, Ecology has quantified these impacts, and has otherwise described them qualitatively to include in overall assessment of the benefits of the rule.

## 4.2 Growth in the basin

Many of Ecology's estimations of costs and benefits resulting from the rule are based on projected household growth in the Dungeness, which will result in increased water use. See Appendix A for a map of subbasins in the affected region. Ecology used two bases to estimate projected growth:<sup>32</sup>

- Clallam County building permits.
- Projected population growth.

Using building permits from the region affected by the rule,<sup>33</sup> Ecology projected one estimate of the number of households that will, each year, potentially rely on new permit-exempt groundwater uses. Ecology estimated this number by:

1. Summing the number of building permits using wells, other, or unnamed sources of water in each year 1987 – 2008.
2. Dividing permits across subbasins.
3. Averaging the number of building permits in each subbasin across all years.

Using projected population growth in the region affected by the rule, Ecology projected an alternate estimate of the number of households that will, each year, potentially rely on new permit-exempt groundwater uses. Ecology estimated this number by:

1. Using projected population in each year in Sequim, and in unincorporated Clallam County. This accounted for higher likely growth in the Sequim area.<sup>34</sup>

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<sup>32</sup> Ecology also projected growth in the number of households a third way, using the Office of Financial Management's Low, Middle, and High population growth projections for Clallam county. Based on those growth projections, the area affected by the rule would grow (at the Middle estimate) by 50 households per year. (The Low change in the number of households would be a reduction of 71 households per year, which the High change in the number of households would be 131 new households per year.) Using this method to determine growth numbers would affect estimates of costs and benefits by making them smaller, but this method also does not account for the likely higher growth in urban areas as compared to Clallam County overall.

<sup>33</sup> Clallam County building permit data, 1987 – 2008.

<sup>34</sup> Aylward and Cronin, 2011.

2. Dividing by a household size of 2.21 people per household, to calculate the projected number of households in Sequim and in Clallam County areas of the Dungeness.
3. Subtracting across each year to calculate the household growth in each area.
4. Dividing projected annual household growth in Sequim across Gierin and Bell subbasins. These are the two subbasins straddled by Sequim.
5. Apportioning projected household growth in unincorporated Clallam County (outside Sequim) across remaining subbasins based on the proportions of building permits in each of those subbasins.

**Table 6: Projected Growth in Permit-Exempt Water Use, by Subbasin (annual)**

	<b>Building-Permit Growth Scenario: Number of new building permits per year</b>	<b>Population Growth Scenario: Number of new domestic uses per year</b>
Bagley Creek Subbasin	12	17
Bell Creek Subbasin	13	112
Cassalery Creek Subbasin	18	26
Dungeness River and Matriotti Creek Subbasins	69	98
Gierin Creek Subbasin	12	97
McDonald Creek Subbasin	18	25
Siebert Creek Subbasin	20	28

Ecology used these numbers in calculating the impacts to fish under the rule. In addition, to maintain conservative estimates of net benefit, Ecology subtracted the number of households likely to have domestic use supported under Sequim’s existing water right (209 households for 15 years), in calculations of development values.

For permit-exempt water users, Ecology also estimated the number of those uses that are likely to significantly increase. For purposes of the analysis Ecology needed a way to estimate additional water use beyond what a household is currently using. To do this Ecology used residentially zoned properties with existing mobile homes to estimate this use.

Based on Clallam County residential property sales records (2005-2012), there are 457 mobile homes in the area affected by the rule. These homes may, in the future, choose to additionally develop their property, and thereby require more water use. Ecology could not determine how many of these homes currently use a permit- exempt well, or how many would use one if they increased water use. Ecology looked at mobile homes to approximate the number of people who would increase permit-exempt water use from current (non-zero) use levels. Mobile homes are sometimes used on residential land while building homes on site.

Not all mobile homes would necessarily build new homes on site (mobile homes may be permanent residences as well). As a conservatively high estimate Ecology assumed all of

these mobile homes (457) will additionally develop their property (build a new home or expand an existing) in the next five years , and thereby would require more water use and incur mitigation costs.<sup>35</sup>

## 4.3 Expected benefits

Ecology estimated benefits likely to result from the rule, associated with:

- Avoided fish losses.
- Increased certainty in development.
- Avoided legal costs.
- Protecting existing restoration.
- Beneficial storage projects.
- Connecting to existing water systems.
- Monitoring water.

### 4.3.1 Avoided fish losses

By setting instream flows, the rule is likely to provide more salmon habitat and therefore prevent fish loss. Ecology estimated the benefits associated with the rule's protection of salmon. Ecology compared the rule's mitigation and reservations allowing for up to 15 gpd of domestic use, to the baseline of 250 gpd of unmitigated use for each new permit-exempt water use projected in the affected area. Ecology used the growth projection range for each subbasin (Table 6), the groundwater model (relating groundwater and surface water across the subbasins), and salmon habitat needs, to estimate that the rule will result in 751 – 1,369 spawning fish saved over 20 years. Ecology uses a 20-year value of a returning spawning salmon of \$5,000.<sup>36</sup> Ecology calculated the total benefit of avoided salmon losses under the rule is \$3.8 million – \$6.8 million.

### 4.3.2 Increased certainty in development

Under the baseline, future development in the Dungeness basin is at risk for lack of water availability, causing impairments, and lawsuits. As more development occurs across the subbasins, there is more risk of a permit-exempt use impairing a senior water right. There is also risk that a larger (basin-wide) lawsuit will be brought by a tribe or at the federal level (e.g., because of salmon loss and tribal claims to instream flow to support the treaty right to take fish), halting future development in the basin. By requiring

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<sup>35</sup> If fewer homes increase their water use, then we would expect fewer mitigation costs in the affected areas.

<sup>36</sup> Based on a University of Washington study (Layton, *et al.* 1999), the 20-year average between high and low status quo salmon populations give us \$300 as the annual value for each adult spawner. Columbia River Initiative gave us existence values of \$268 (Huppert 2003). Bonneville Power Administration gave us restoration values of \$400 per adult fish. From these reports 16 year values for fish would range from \$4,288 to \$6,400. Ecology has chosen to use a 20-year real estimated value of \$5,000 for an adult returning spawner.

mitigation of new water uses, and therefore maintaining more water instream, the rule reduces the likelihood of a lawsuit or a successful lawsuit.

#### **4.3.2.1 Curtailment**

While, under the baseline, junior water rights (including established permit-exempt rights) are subject to curtailment, Ecology has not curtailed permit-exempt water use in the Dungeness. Since it could not, therefore, confidently estimate the degree to which curtailment occurs under the baseline, Ecology did not quantify the most likely value of increased certainty in avoiding water use limitations (curtailment in low-water years). This value, however, to each new user will be the percentage reduction in the likelihood of curtailment, multiplied by the net value of improving a property using additional water.

The average value of residential improvements minus the costs of construction in the Dungeness is nearly \$33 thousand.<sup>37</sup> For illustrative purposes (not included in the quantitative assessment of benefits in this document), if the certainty of a reliable and ongoing supply of water (not occasionally interrupted, or possibly subject to suit by a senior water-right holder) increased by 1 percent, new future developers using permit-exempt water will benefit by \$0.9 million – \$1.3 million in present value over 20 years. Existing permit-exempt water users seeking to use more water in the future can benefit up to \$127 thousand in present value over 20 years.<sup>38</sup> If the likelihood is reduced by 10 percent, the benefits will be ten times those above.

#### **4.3.2.2 Development ban**

Ecology estimated the value of increased certainty in development arising from reduced likelihood that a large lawsuit will limit or ban future development in the basin. This large suit might be filed based on infringement on time immemorial tribal water rights, or federal protection of salmon and their watersheds. Under the baseline, such a lawsuit (and its success) becomes increasingly likely over time, as the forecast growth in households using permit-exempt wells (new uses and increases in use) reduces streamflows without any required mitigation. The rule reduces this likelihood by setting protective instream flows, and requiring mitigation of new water uses. While users of new<sup>39</sup> water will have to pay for mitigation, they will gain the benefits of development (property value and use of the improvement).

Ecology estimated the reduced likelihood of a large lawsuit based on a behavioral model of the decision whether to litigate. The model compared the costs associated with a lawsuit (less the benefit of avoiding fish losses in some upstream areas; see

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<sup>37</sup> Ecology started with the average value of a residential improvement in the affected areas, and subtracted the average cost of construction as a percentage of housing value (National Association of Home Builders, 2011).

<sup>38</sup> Future households: 3,249 annual future households, benefitting \$33 thousand each, discounted as a uniform flow over 20 years. Existing households: 457 households, benefitting \$33 thousand each, discounted as a uniform flow over 20 years.

<sup>39</sup> “New” includes increases in water use either from zero, or from existing use.

Chapter 3 for details), to the benefits of salmon saved by a ban on development. Ecology estimated that the baseline risk of a lawsuit is 14.1 – 27.7 percent.<sup>40</sup>

Ecology accounted for new population that will likely use Sequim’s existing water right by subtracting 15 years of 209-person growth from population-based growth in the Gierin and Bell subbasins from the projections in [Section 4.2](#). The rule requires people with access to such a system to connect to it, rather than rely on a permit-exempt well. After the Sequim water right is fully in use, however, these new households can use permit-exempt wells. Ecology made this adjustment to maintain overall conservative estimates of net benefits (these growth values are used in both cost and benefit calculations). This adjustment resulted in the Gierin and Bell subbasins effectively experiencing zero growth in permit-exempt uses for the first 15 years under the rule, under the population-based growth projection.<sup>41</sup>

For each of the next 20 years, Ecology multiplied the reduction in the likelihood of banning development, by the projected number of new households, and the value of being able to develop. The average value of residential improvements<sup>42</sup> minus the costs of construction in the Dungeness is nearly \$33 thousand.<sup>43</sup> Just having water does not alone create a property improvement, but gives the developer the ability to spend money on construction inputs to create that improvement; the value of being able to improve, therefore is the difference between the value of the improvement and what it cost to build the improvement.

Ecology estimated that new water users (including brand-new uses and increasing existing uses under any water source) will benefit from increased certainty in development by \$19.9 million – \$62.1 million in present value over 20-years.

### 4.3.3 Avoided legal costs

Ecology estimated the value of avoiding legal costs of a lawsuit of the type described above. Such a large suit might be filed based on infringement on time immemorial tribal water rights, or federal protection of salmon and their watersheds. Ecology used the same 14.1 – 27.7 percent reduction in the likelihood of such a suit (see previous subsection, “Development ban”), multiplied by the prospective costs of a large-long-term suit of \$20

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<sup>40</sup> Ecology allowed for the suit to occur in any year in the coming 20 years, and last up to 20 years, using a Monte Carlo simulation that iterated random length and timing of a suit and counted the frequency with which a suit occurred. Ecology estimated that, based on this decision structure, a suit would occur with 14.1 – 27.7 percent likelihood. The rule reduces these frequencies to zero by allocating instream water rights and requiring mitigation. This range depends on the number of fish lost or saved under the rule. Ecology used this range as the reduced likelihood of a large lawsuit banning development through closing the basin to new water use.

<sup>41</sup> This affected the present-value calculation, as these subbasins were not expected to experience costs resulting from this particular impact of the rule until 2028, when a typical new household can no longer rely on Sequim’s existing water right.

<sup>42</sup> Residential improvements are the value of real estate minus the value of the land itself.

<sup>43</sup> Ecology started with the average value of a residential improvement in the affected areas, and subtracted the average cost of construction as a percentage of housing value.

million.<sup>44</sup> Based on these values, Ecology calculated that avoiding a large lawsuit over 20 years will result in \$2.4 million – \$4.7 million in avoided legal costs in the state.

#### **4.3.4 Protecting existing restoration**

Fish protection is not just a function of water (as is assumed in the fish estimates in this analysis; it is also a function of various habitat quality attributes (woody debris, water temperatures, streambank vegetation, contamination, etc.). When the effectiveness of these individual attributes in creating good habitat also depends on water, the reduction in instream flows that would occur under the baseline would BOTH directly impact fish stocks through water quantity, and indirectly impact fish stocks by reducing the effectiveness of other habitat quality variables. In the past 20 years, Washington State has made \$6.0 million in investments in habitat restoration in the Dungeness.

To the extent that the rule reduces instream flow losses directly affecting fish, and indirectly affecting fish through reduced habitat function, it saves a loss in that \$6.0 million of created value. The assertion is with the instream flows proposed, the investments in habitat restoration create value worth \$6.0 million. They create no value without the proposed flows.

#### **4.3.5 Beneficial storage projects**

Ecology could not confidently determine the extent or characteristics of likely future storage projects with a sufficient degree of certainty. Storage projects that benefit both instream and out-of-stream uses, however, will be possible under the rule. This benefit is included qualitatively.

#### **4.3.6 Benefits of connecting to existing water systems**

The rule benefits people that can connect to a public water supply, as well as the existing suppliers of water. Residents that can connect to, for example, the Sequim water supply, benefit through an increased certainty of water, and continuous water quality. This requirement will also benefit water providers, as they will have guaranteed new water demand where development takes place, and will, and likely also will continue expanding at their outer limits as long as water supply within the water right supports it.

#### **4.3.7 Benefits of monitoring water**

The rule will likely create benefits for households monitoring water use following the metering requirements. Those using water meters have the ability to monitor and gauge their own water usage, and guard against leaks. Leaks can cause water contamination, and monitoring and earlier discovery of leaks could allow households to avoid the costs of remediating or replacing contaminated wells. Monitoring water use could also provide records to demonstrate regular and beneficial use, if challenged.

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<sup>44</sup> Based on legal costs over time in Yakima averaged to \$1 million per year. *Department of Ecology v. Acquavella*, Yakima County Superior Court No. 77-2-01484-5.

## 4.4 Total expected benefits

Ecology calculated total expected benefits associated with the rule, in present value, over 20 years as shown in Table 7 below.

**Table 7: Total Benefits of the Rule (20-year present values)**

<b>Benefit</b>	<b>Based on Building-Permit Growth Projection</b>	<b>Based on Population-Based Growth Projection</b>
Avoided fish losses	\$3,755,000	\$6,845,000
Increased certainty in development	\$19,867,471	\$62,050,161
Avoided legal costs	\$2,401,794	\$4,718,419
Protecting existing restoration	\$6,027,814	\$6,027,814
Potential value of avoided curtailment	Qualitative	
Potential value of beneficial storage projects	Qualitative	
<b>TOTAL QUANTIFIABLE</b>	\$32,052,079	\$79,641,394

Estimates do not match summaries in 5.3 and Table 2 because of rounding.

# Chapter 5: Cost-Benefit Comparison and Conclusions

## 5.1 Introduction

As discussed in Chapter 1, the Washington Administrative Procedure Act (RCW 34.05.328) requires Ecology to evaluate significant legislative rules to “[d]etermine that the probable benefits of the rule are greater than its probable costs, taking into account both the qualitative and quantitative benefits and costs, and the specific directives of the statute being implemented.”

## 5.2 Estimated costs

As described in Chapter 3, Ecology estimated total costs of \$9.4 million – \$26.1 million associated with the rule. These costs are in present value terms, over 20 years. See [Section 3.4](#).

## 5.3 Estimated benefits

As described in Chapter 4, Ecology estimated total benefits of \$32.1 million – \$79.7 million associated with the rule. These benefits are in present value terms, over 20 years. See [Section 4.4](#).

## 5.4 Final comments and conclusion

Based on qualitative and quantitative assessment of the likely costs and benefits, Ecology concludes that there is reasonable likelihood that estimated benefits of the rule exceed its costs.

### 5.4.1 Reliance of conclusion on water exchange

This conclusion relies heavily on the function of a water exchange market for mitigation. Ecology also calculated the impacts of the rule without a water exchange market, and in that case, costs will greatly exceed benefits (largely due to inability to mitigate new uses resulting in basin-wide reliance on the indoor domestic water reserves, and the almost immediate depletion of those reserves terminating any ability to develop within the basin without a pre-existing, permanent, senior water right). Based on available evidence, however, Ecology believes the water exchange market will adequately function to support the mitigation and development assumptions used in the analysis in Chapters 3 and 4 of this document.<sup>45</sup>

This evidence includes:

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<sup>45</sup> This means Ecology assumed adequate mitigation would be available for 93.8 percent of new users, and the remaining 6.2 percent would rely on reserves, because they would have difficulty finding sufficient and appropriate mitigation.

- A multi-faceted assessment of long-run supply and demand for mitigation (with demand corresponding to the population-based (and highest) growth projections used in Ecology’s analysis).
- Assessment of the pricing of mitigation with “high” or “very high” success.
- Inclusion of the costs of administering a water exchange in Ecology’s analysis.
- The basing of mitigation quality and appropriateness on a data-based groundwater model, relating the subbasins, straights, and surface water in the basin.

Based on these sources and their contribution to Ecology’s analysis, Ecology believes it is likely that a water exchange market with sufficient and adequate mitigation will function in the Dungeness and associated subbasins. Therefore, Ecology believes there is sufficient evidence that the benefits of the rule exceed the costs.

#### **5.4.2 Mitigation cost transfer**

Ecology estimated costs based on the most conservative interpretation of how the rule will be implemented: users of new or additional permit-exempt water will pay their own mitigation costs, beginning in 2013. At the time of this publication, Ecology is in the process of determining an alternate payment mechanism that would not require new water users to fully pay their mitigation costs. This alternate payment mechanism would likely involve the State directly or indirectly paying for the mitigation of new permit-exempt domestic water use, as defined in the rule. In addition to an alternate payment mechanism, Ecology considered the possibility of either deferring the rule or its effective date until the beginning of the 2013 biennium. Ecology is also requesting sufficient funding from the Washington Legislature to continue paying these mitigation costs in the future – currently requested at least for the next (2013-2015) biennium. Because the overall Cost-Benefit Analysis does not differentiate between *who* pays the costs of a rule, this alternate implementation plan (of the State paying for mitigation) would not impact the overall cost-benefit assessment. A change in implementation to a State-funded mitigation would, however, shift costs from residents in the Dungeness area to the Washington State general fund. Because the mechanism of implementation is not specified in the rule, Ecology kept the overall assessment in this Cost-Benefit Analysis to the most conservative assumption that all costs are borne by the public and businesses in the Dungeness rule area.

- If Ecology delays the effective date of the rule to the beginning of the 2013 biennium (or pays for mitigation in the mean time), and the Legislature funds all future mitigation, new permit-exempt water users in the Dungeness rule area do not pay out-of-pocket costs for indoor, domestic water. A large part of the cost burden would shift away from businesses and the public in the Dungeness rule area.
- If Ecology delays the effective date of the rule to the beginning of the 2013 biennium (or pays for mitigation in the mean time), the Legislature funds mitigation only for the 2013-2015 biennium, and the Legislature does not fund mitigation past 2015, new permit-exempt water users in the Dungeness basin would not pay out-of-pocket costs for indoor, domestic water until July 2015. Until then, a large part of the cost burden would shift away from businesses and the public in the Dungeness rule area. After July 2015, the

expected costs to parties in the rule area would be identical to those illustrated in the analysis, discounted appropriately.

Ecology determined that delaying the effective date would not significantly reduce the burden of implementing the rule and chose to use available funds to offset the cost of mitigation for domestic use as described above. Ecology assumed that the smallest necessary mitigation package covering indoor, domestic water use (and incidental use such as washing cars or windows, or water for household pets) would cost \$1,000 per household. A State-funded mitigation mechanism would shift a portion of that burden away from households and businesses in the Dungeness rule area (though they would pay for additional consumptive water use). Ecology estimated this would shift \$1,000 per household or business of the burden onto public funding (paid for by state taxes and fees) and away from direct payment by households and businesses in the Dungeness rule area, assuming the availability of funds would not affect the annual increases in building permits or population.

Please recall the Dungeness rule area is in Washington State; it is likely a part of the burden will still fall on the Dungeness rule area. The amount depends on their tax burden due to Washington State and the funding sources used by Ecology and the state to pay for mitigation projects.

# Chapter 6: Least Burdensome Alternative Analysis

## 6.1 Introduction

RCW 34.05.328(1)(d) requires Ecology to "...[d]etermine, after considering alternative versions of the rule and the analysis required under (b) and (c) of this subsection, that the rule being adopted is the least burdensome alternative for those required to comply with it that will achieve the general goals and specific objectives stated under (a) of this subsection."

Ecology assessed alternatives to the rule, and determined whether they met the general goals and specific objectives of the authorizing statute. Of those that meet these objectives, Ecology determined whether they were the least burdensome.

This rule is adopted under the authority of RCW 90.54.020, and RCW 90.82.080 and is intended to carry out the fundamentals listed in RCW 90.54.020. The fundamentals of particular importance in this rule making include:

- Preserving and protecting adequate and safe water supplies to satisfy human domestic needs (RCW 90.54.020(5)).
- Protecting the quality of the natural environment, including retaining base flows in rivers and streams to preserve fish, wildlife, and other environmental values (RCW 90.54.020(3)(a)).
- Giving full recognition in the administration of water allocation and use programs to the natural interrelationships of surface and groundwaters (RCW 90.54.020(9)).

The decision to propose a water management rule for the east WRIA 18 watersheds is based on the following interrelated factors:

- Ecology is obligated pursuant to RCW 90.82.130(3) to propose a rule to implement recommendations in the WRIA 18 watershed management plan adopted by the watershed planning unit and the Clallam County Commission.
- Ecology is required by RCW 90.54.020 to protect perennial streams and rivers with base flows adequate to protect fisheries and other aquatic resources. Without a rule or a successful lawsuit by one or more parties to protect senior water rights including federal instream flow rights, new groundwater uses will increase stream flow reductions during periods when flows in the Dungeness River and several small streams on the Dungeness alluvial fan are below the level necessary to protect fisheries that rely on existing habitat.

The major elements of the rule are:

- **Set instream flows and close surface waters to new diversions.** Adopt instream flow levels recommended in the 2005 Elwha-Dungeness Watershed Plan. The

Dungeness River is closed to new diversions from July 15 to November 15. Smaller rivers are closed all year.

- **Require mitigation for all new consumptive use of water, including permit-exempt withdrawals.** Mitigation through the Dungeness water exchange is allowed, or individuals can propose their own mitigation. Mitigation obligations and credits are calculated using the Dungeness groundwater model.
- **Establish reserves of water for future domestic use.** Reserves allow flexibility for new domestic uses of water to start immediately after rule adoption, and in places where water-for-water mitigation is available.
- **Set maximum allocations from the mainstem Dungeness during the open period.** New diversions from the Dungeness during the open period are subject to instream flows, meaning the diversion is required to cease when instream flows are not met. In addition, to protect channel forming flows, a total maximum allocation of 25 cfs can be diverted from November 16 to April 30, and 35 cfs from May 1 to July 14.
- **Maximum depletion amounts for the Dungeness River and small streams.** Maximum depletion amounts limit the maximum future impact to surface waters from future groundwater uses, to 1 percent of the low observed or estimated stream flow. The maximum depletion amount enables Ecology to approve mitigation plans where the mitigation plan does not offset all predicted impacts in all affected subbasins, but the mitigation plan is otherwise water budget-neutral as defined in the rule, while limiting the total amount of future impact that may be authorized through mitigation plan approval.
- **Allow storage projects.** New storage projects for environmental enhancement or other uses consistent with the watershed plan can be allowed. Such projects will potentially not be subject to instream flows, but subject to a consultation process with the tribes and other resource agencies, conditioning, and monitoring.
- **Require measuring new water use.** All new uses of water need to be metered.
- **Require new users to first request service from a public water supply.** If public water supply is not available, then new uses from private wells are allowed.

## 6.2 Alternatives considered

The rule includes obligations Ecology accepted (as a governmental entity participating in the watershed planning process) when it consented to the watershed plan. The rule is also based on additional available information from several years of continuing dialogue among the Dungeness River Executive Council and the Local Leaders Water Management Work Group. Ecology considered alternative rule contents that address the above concerns through rule making:

- **No action.**
- **No mitigation:** Ecology considered proposing a rule with a reservation for domestic use that did not include a mitigation requirement.

- **Use of deeper aquifers:** Ecology considered requiring new groundwater users to use the second or third aquifers, where the deeper aquifers are available, as recommended in the watershed plan and by the LLWG.
- **Lower minimum instream flows:** Ecology considered proposing a rule with lower minimum instream flows for the Dungeness River than the recommended flows in the watershed plan.
- **No water measurement:** Ecology considered proposing a rule that did not require measuring new water use.
- **Public funding for mitigation:** Ecology considered using its available and eligible funds to reduce the burden of the rule's mitigation requirement. Ecology also considered asking the Legislature to fund ongoing mitigation of domestic water use as defined in the rule at least for the next (2013-2015) biennium. This option is being used as part of implementation, though not in the rule proper. Ecology also considered the possibility of deferring the rule effective date until the beginning of the 2013 biennium.
- **The rule as adopted:** Ecology considered the rule contents.

Each of these options is described in greater detail below, with a discussion of whether and why it is included in the rule language.

### 6.2.1 No action

Ecology determined that taking no action is not appropriate because it would not protect base flows in perennial streams as directed by RCW 90.54.020, nor would it fulfill the obligations accepted under RCW 90.82.130.

### 6.2.2 No mitigation

Adopting a rule with a reservation for domestic use that did not include a mitigation requirement would result in a reservation that, on one smaller stream, would be depleted before the 20-year planning horizon if growth rates in the rural areas continue at the current rate. This alternative would not implement the planning unit recommendation to replenish or repay the reservations through a later water management action, nor would it provide a basis for funding such water management actions.

This alternative would not require (nor provide for) a means of replacement of the reservations, reducing the cost to new domestic users. Once any of the reservations are exhausted, mitigation would be required for new domestic water uses. Compared to the rule, a trend of increasing risk to federal reserved rights to instream flow for fisheries in the tribes' usual and accustomed fishing areas and to other existing rights to surface water, particularly in the smaller streams, would continue.

### **6.2.3 Use of deeper aquifers**

Ecology considered a rule requirement for new groundwater users to withdraw water from the second or third aquifers where the deeper aquifers are available. This alternative would implement recommendations from the watershed plan and the LLWG.

This alternative would result in an overall reduction in the amount of impacts to closed surface waters, but a more widely distributed impact across the watershed. This might result in impacts to smaller streams where mitigation is not available, and, if reserves for those streams are depleted, might restrict development in the watershed.

It would also result in improved quality of potable water from new wells drilled in areas with high nitrate levels in the shallow aquifer. However, this requirement results in an increased cost of approximately \$10,000 for each new well drilled where deeper aquifers are available.

### **6.2.4 Lower minimum instream flows**

Lower minimum instream flows would provide reduced levels of fisheries protection with respect to new future uses by reducing the minimum instream flows to as low as 105 cfs.

This alternative would not result in a reliable supply of water for new domestic water users. It would improve reliability for other types of new water users. Periodic curtailment of these non-domestic uses would still be necessary.

### **6.2.5 No water measurement**

Not requiring measuring of new water use would reduce construction costs for new water users, and eliminate the costs to maintain a flow meter. To achieve equivalent assurance from the mitigation program without water use metering, an increase in the amount of mitigation to offset the lack of verification would be needed. Consequently, this alternative would only reduce the overall burden on water users required to comply with the rule if it is combined with no mitigation requirement.

### **6.2.6 Public funding for mitigation**

Public funding of a portion of the mitigation obligation imposed by the rule would reduce the financial burden on new water users. Ecology considered establishing in rule that the state pay for mitigation of new consumptive water use in the Dungeness basin. This option was not viable in rule language, as Ecology does not have the legislature's authority on budget funding issues. Executive branch spending is subject to legislative approval at least every two years. Instead, Ecology has determined it has sufficient funds to offset the cost of domestic use related to the anticipated mitigation obligation for new water users from the effective date of the rule until the end of the current biennium on June 30, 2013. Ecology has also determined it will support a budget request to offset the cost of domestic use related to the anticipated mitigation obligation for new water users at least for the next (2013-2015) biennium. These decisions do not alter the rule's

requirements, nor would they alter the responsibility of new water users in the future to bear the cost of mitigation for new domestic water use if the legislature decides not to fund it. For the degree to which this shifts burden from Dungeness residents and businesses to Washington State as a whole (including Dungeness), see section 3.5 of the Cost-Benefit Analysis above.

If Ecology delays the effective date of the rule to the beginning of the 2013 biennium (or pays for mitigation in the meantime), and the Legislature funds all future mitigation, new permit-exempt water users in the Dungeness rule area do not pay out-of-pocket costs for indoor, domestic water. A large part of the cost burden would shift away from businesses and the public in the Dungeness rule area. If Ecology delays the effective date of the rule to the beginning of the 2013 biennium (or pays for mitigation in the mean time), the Legislature funds mitigation only for the 2013-2015 biennium, and the Legislature does not fund mitigation past 2015, new permit-exempt water users in the Dungeness rule area would not pay out-of-pocket costs for indoor, domestic water until July 2015. Until then, a large part of the cost burden would shift away from businesses and the public in the Dungeness rule area. After July 2015, the expected costs to parties in the rule area would be identical to those illustrated in the analysis, discounted appropriately. Ecology determined that delaying the effective date would not significantly reduce the burden of implementing the rule and chose to use available funds to offset the cost of mitigation for domestic use as described above.

### **6.2.7 The rule as adopted**

The watershed plan for the Dungeness includes recommendations for a “Future Water Availability Framework” that includes the use of a domestic water reservation with later replacement through “storage, reclamation, desalinization, saved water or other means of providing water supply that does not impinge on limited surface waters.” In the rule, the mitigation requirement tied to the use of the reservation accomplishes this watershed plan recommendation.

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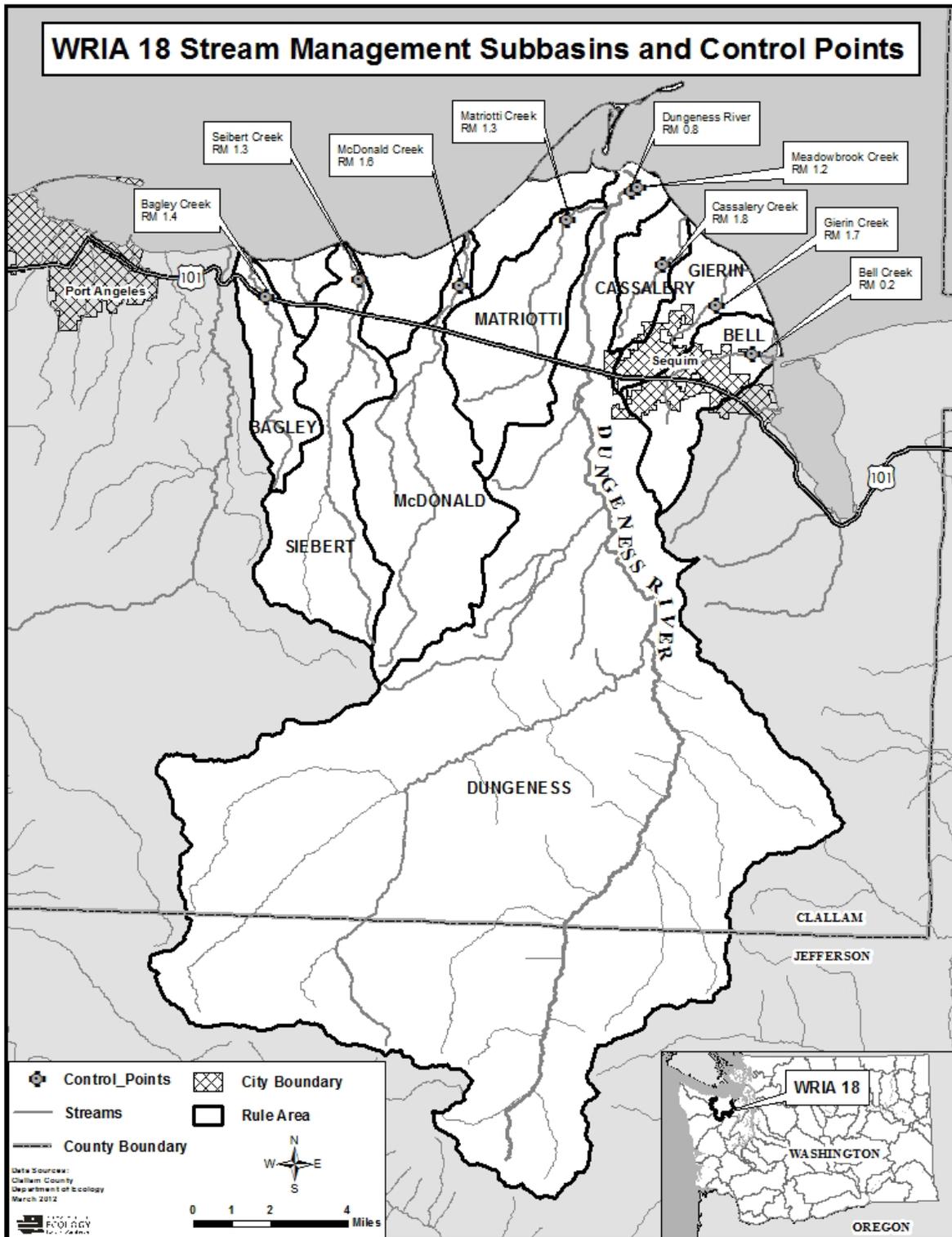
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# Appendix A: Map of Rule Area



## Appendix B: Monte Carlo Simulation of Likelihood of Litigation

We assume that the cost of litigation for potential litigants ranges from \$300,000 to \$800,000 per year with equal likelihood, and that the length of litigation ranges from 1 to 20 years with equal likelihood. We make these assumptions based on the reported litigation costs and length of litigation of the Lummi Tribe during similar litigation.<sup>46</sup>

Between the two states of the world (with the rule and without), there is an increase of 751 to 1,369 spawning fish saved over 20 years when the rule is in place. If someone chooses to litigate, we assume that he is better off by half of that increase in value.<sup>47</sup> This value is equal to the increase in the number of spawning fish, multiplied by \$5,000, the value for each fish we used above in the analysis. This value assumes that 2,000,000 households are willing to pay a total of \$5,000 if the stock of fish increased by one additional fish after 20 years.<sup>48</sup> This therefore assumes that the litigant derives utility for the value that 2,000,000 households are willing to pay.

We assume the potential litigant is indifferent between \$100 with certainty and a 50% chance of gaining \$200 (with a 50% chance of winning \$0).<sup>49</sup> Given the above assumptions, the probability that a potential litigant chooses to litigate is between 14.1 and 27.7 percent.

This is meant as a simple illustration of the tradeoffs that a potential litigant faces. They derive utility from increases in the fish population that always results from the litigation, but must pay the costs of litigation. They will choose to litigate only when they believe the costs of litigation are sufficiently small. We will note that the probability a litigant chooses to litigate is relatively small – less than a one in three chance – as litigation is expensive.

The expected avoided costs related to avoided litigation are relatively large because program experience shows that when they choose to litigate, it results in a development ban over the twenty year period.<sup>50</sup> The costs of a development ban are large, and are derived from our estimates of the number of future developments (based on building permits and population growth) and the average value of residential improvements in the Dungeness less costs of construction (nearly \$33 thousand). In turn, the expected avoided costs (the probability of the

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<sup>46</sup> Please see “Settlements and Groundwater: Lessons Learned”, Merle Jefferson Sr., August 24, 2009. The length of litigation found in the presentation is actually 6 years, but we have looked at the entire 20 year period. If for example we assumed a normal distribution around a mean of 6 years, with a standard deviation of 2 years, the likelihood of litigation would be greater than our current estimates.

<sup>47</sup> The rationale here is the Boldt decision, or *United States v. Washington*, 384 F. Supp. 312 (W.D. Wash. 1974), but other possible litigants might be advocacy groups or government agencies with an interest or responsibility to safeguard the stock to the extent that all Washington citizens value it.

<sup>48</sup> 2,000,000 households is a rough approximation of the number of households in Washington State.

<sup>49</sup> They are risk neutral. This functional form is chosen mostly for computational simplicity.

<sup>50</sup> Specifically, that it is the minimum and most likely form of relief (as opposed to curtailment, for example).

development ban multiplied by the cost when it occurs) result in a range of \$19.9 million – \$62.1 million.

Code:

```
clear;
close all;

n = 100000;
litu = zeros(n,1);
discount = zeros(20,1);
for k = 1:20
    discount(k,1) = (1/1.0158)^(k-1);
end

%fish = sum(((5000*751)/40)*discount);
fish = sum(((5000*1369)/40)*discount);

for i = 1:n
    j = randi(20,1,1);

    ucost = 300000 + (800000 - 300000)*rand(1,1);
    sumucost = sum(ucost*discount(1:j));

    if (sumucost < fish)
        litu(i,1) = 1;
    end
end

mean(litu)
```

# Appendix C: Mitigation Sensitivity

## New permit-exempt users

Ecology used a range of \$1,500 – \$16,500 per acre-foot (AF) for the costs to new permit-exempt users in the area affected by the rule. This is the full range of “middle” estimates of cost per AF, for projects rated with “high” or “very high” effectiveness in mitigation. In this appendix, we also estimate the costs of mitigation using the range of “low” estimates of the cost per AF (\$700 – \$8,800) and the range of “high” estimates of the cost per AF (\$2,600 – \$23,300), for projects rated with “high” or “very high” effectiveness in mitigation. We constrain the lower bound to \$1,000 however, because of estimates from The Dungeness Water Exchange Mitigation Plan, which predicts \$1,000 as the least expensive mitigation package. The range we use to estimate costs is therefore \$1,000 – \$8,800 and \$1,000 – \$23,300 per household.

These estimates are from an analysis done by the Local Leaders Water Management Work Group of prospective mitigation types.

These estimates are likely an overestimate of the actual costs, because mitigation is required for only consumptive use, which will be less than the 250 gpd total water use in a household. Because Ecology could not determine the degree to which households might consume less than 250 gpd, we chose to use the conservatively high cost.

Ecology used the projected range of growth in permit-exempt users (households) discussed in this document (see Table 3). We accounted for new population that will likely use Sequim’s existing water rights by subtracting 15 years of 209-person growth from population-based growth in the Gierin and Bell subbasins from the projections in Table 3. The rule requires people with access to such a system to connect to it, rather than rely on a permit-exempt well.

After the Sequim water right is fully in use, however, these new households might use permit-exempt wells. This adjustment resulted in the Gierin and Bell subbasins effectively experiencing zero growth in permit-exempt uses for the first 15 years under the rule, under the population-based growth projection.

Ecology multiplied the number of new permit-exempt users in each year, by the range of per-household costs, and discounted the value over time, at a discount rate of 1.58 percent. The range of 20-year present value costs using the “low” estimates of mitigation costs will be \$2.8 – \$10.0 million if all of these households had mitigation available. Ecology estimated, however, that about 93.8 percent of households will be able to mitigate, while the rest (6.2 percent) will have to rely on the indoor domestic use reservation, and forego outdoor water use at a cost of \$1,000 per household.<sup>51</sup> This 6.2 percent will still pay an additional \$1,000

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<sup>51</sup> Willingness to pay for outdoor water use is based on the analysis provided in Zhang, 2005. Ecology used this willingness to pay value, because replacement costs for services such as trucking in water and water storage for outdoor use were higher, and households would only purchase these replacement services if their willingness to pay

per household in mitigation costs. We use an estimate of \$1,000 for mitigation costs because it is the likely minimum cost for mitigation, and households that rely on indoor domestic use reservations would only be able to rely on the minimum use (15 gpd).<sup>52</sup>

The final present value, then, of the “low” costs of mitigation (where available) or foregoing outdoor water use (where necessary) has a total cost, over 20 years, of \$2.9 million – \$9.9 million to new permit-exempt use households.

Ecology also estimated the range of 20-year present value costs using “high” estimates of mitigation costs will be \$2.8 – \$26.6 million if all of these households had mitigation available. Ecology estimated, however, that about 93.8 percent of households will be able to mitigate, while the rest (6.2 percent) will have to rely on the indoor domestic use reservation, and forego outdoor water use at a cost of \$1,000 per household.<sup>53</sup> This 6.2 percent will still pay an additional \$1,000 per household in mitigation costs. We use an estimate of \$1,000 for mitigation costs because it is the likely minimum cost for mitigation, and households that rely on indoor domestic use reservations would only be able to rely on the minimum use (15 gpd).

The final present value, then, of “high” costs of mitigation (where available) or foregoing outdoor water use (where necessary) has a total cost, over 20 years, of \$2.9 million – \$25.5 million to new permit-exempt use households.

**Table 8: New Permit Exempt Use Mitigation Costs (using alternate mitigation costs)**

	<b>“Low” mitigation costs</b>	<b>“High” mitigation costs</b>
<b>Building-Permit Growth Scenario</b>	\$2,938,195.84	\$2,938,195.84
<b>Population Growth Scenario</b>	\$9,926,013.85	\$25,448,575.99

## Increase in existing permit-exempt use

Ecology estimated the costs associated with existing permit-exempt users increasing their permit-exempt use (and therefore creating a new use) in the future. This could result from

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exceeded the costs. As a result, Ecology performed calculations based on households without mitigation foregoing purchasing replacement water.

<sup>52</sup> Willingness to pay for outdoor water use is based on the analysis provided in Zhang, 2005. Ecology used this willingness to pay value, because replacement costs for services such as trucking in water and water storage for outdoor use were higher, and households would only purchase these replacement services if their willingness to pay exceeded the costs. As a result, Ecology performed calculations based on households without mitigation foregoing purchasing replacement water.

<sup>53</sup> Willingness to pay for outdoor water use is based on the analysis provided in Zhang, 2005. Ecology used this willingness to pay value, because replacement costs for services such as trucking in water and water storage for outdoor use were higher, and households would only purchase these replacement services if their willingness to pay exceeded the costs. As a result, Ecology performed calculations based on households without mitigation foregoing purchasing replacement water.

additions to existing homes, building a home on a property currently using a mobile home, or subdividing a property to house multiple families (e.g., forming a duplex).

In this section, for increasing existing permit-exempt uses, Ecology again also estimated the costs of mitigation using the range of “low” estimates of cost per AF (\$700 – \$8,800) and the range of “high” estimates of cost per AF (\$600 – \$23,300), for projects rated with “high or “very high” effectiveness in mitigation. These estimates are from an analysis done by the Local Leaders Water Management Work Group of prospective mitigation types.<sup>54</sup> We constrain the lower bound to \$1,000 however, because of estimates from The Dungeness Water, which predicts \$1,000 as the least expensive mitigation package Plan. The range we use to estimate costs is therefore \$1,000 – \$8,800 and \$1,000 – \$23,300 per household.

Ecology estimated the lowest number of existing users that would increase permit-exempt water use in the future as zero. This is based on the fact that one of the estimates of future household growth is based on population growth, and therefore already reflects growth in water use among existing users. (Population growth already includes growth among existing users because it reflects both people moving to the area, who move into duplexes or second residences on a property, and families getting larger and requiring larger houses and more water).

For permit-exempt water users, Ecology also estimated the number of those uses that are likely to significantly increase. For purposes of the analysis Ecology needed a way to estimate additional water use beyond what a household is currently using. To do this Ecology used residentially zoned properties with existing mobile homes to estimate this use.

Based on Clallam County residential property sales records (2005-2012), 457 of the mobile homes in the area are affected by the rule. These homes may, in the future, choose to additionally develop their property, and thereby require more water use. Ecology could not determine how many of these homes currently use a permit- exempt well, or how many would use one if they increased water use. Ecology looked at mobile homes to approximate the number of people who would increase permit-exempt water use from current (non-zero) use levels. Mobile homes are sometimes used on residential land while building homes on site.

Not all mobile homes would necessarily build new homes on site (mobile homes may be permanent residences as well). As a conservatively high estimate Ecology assumed all of these mobile homes (457) will additionally develop their property (build a new home or expand an existing) in the next five years , and thereby would require more water use and incur mitigation costs.<sup>55</sup>

Ecology multiplied the number of existing permit-exempt users likely to increase permit-exempt water use in the future (up to 457; recalling that the low-end estimate is zero; see above) by the range of per-household costs, and discounted this value over time, at a

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<sup>54</sup> Aylward, B and C Cronin (2011). The Dungeness Water Exchange and the Exchange Mitigation Strategy.

<sup>55</sup> If fewer homes increase their water use, then we would expect fewer mitigation costs in the affected areas.

discount rate of 1.58 percent. The range of 20-year present value costs using “low” estimates of mitigation costs are \$0.0 – \$1.1 million if all of these households had mitigation available. Ecology estimated, however, that about 93.8 percent of households will be able to mitigate, while the rest (6.2 percent) will have to rely on the indoor domestic use reservation, and forego outdoor water use at a cost of \$1,000 per household.<sup>56</sup> This 6.2 percent will still pay an additional \$1,000 per household in mitigation costs. We use an estimate of \$1,000 for mitigation costs because it is the likely minimum cost for mitigation, and households that rely on indoor domestic use reservations would only be able to rely on the minimum use (15 gpd).

The final present value, then, of “low” costs of mitigation (where available) or foregoing outdoor water use (where necessary) yields a total cost, over 20 years, of \$0.0 million – \$1.1 million to new permit-exempt use households.

Ecology also estimated the range of 20-year present value costs using “high” estimates of mitigation costs are \$0.0 – \$2.9 million if all of these households had mitigation available. Ecology estimated, however, that about 93.8 percent of households will be able to mitigate, while the rest (6.2 percent) will have to rely on the indoor domestic use reservation, and forego outdoor water use at a cost of \$1,000 per household.<sup>57</sup> This 6.2 percent will still pay an additional \$1,000 per household in mitigation costs. We use an estimate of \$1,000 for mitigation costs because it is the likely minimum cost for mitigation, and households that rely on indoor domestic use reservations would only be able to rely on the minimum use (15 gpd).

The final present value, then, of “high” costs of mitigation (where available) or foregoing outdoor water use (where necessary) has a total cost, over 20 years, of \$0.0 million – \$2.7 million to new permit-exempt use households.

**Table 9: Increasing Permit-Exempt Use Mitigation Costs (using alternate mitigation costs)**

<b>“Low” mitigation costs</b>	Up to \$1,062,034.54
<b>“High” mitigation costs</b>	Up to \$2,722,872.14

<sup>56</sup> Willingness to pay for outdoor water use is based on the analysis provided in Zhang, 2005. Ecology used this willingness to pay value, because replacement costs for services such as trucking in water and water storage for outdoor use were higher, and households would only purchase these replacement services if their willingness to pay exceeded the costs. As a result, Ecology performed calculations based on households without mitigation foregoing purchasing replacement water.

<sup>57</sup> Willingness to pay for outdoor water use is based on the analysis provided in Zhang, 2005. Ecology used this willingness to pay value, because replacement costs for services such as trucking in water and water storage for outdoor use were higher, and households would only purchase these replacement services if their willingness to pay exceeded the costs. As a result, Ecology performed calculations based on households without mitigation foregoing purchasing replacement water.

# Appendix D: List of Assumptions

## Discount Rate

A discount rate of 1.58 percent.

## Growth in the basin

	<b>Building-Permit Growth Scenario: Number of new building permits per year</b>	<b>Population Growth Scenario: Number of new domestic uses per year</b>
Bagley Creek Subbasin	11.91	16.74
Bell Creek Subbasin	13.41	111.59
Cassalery Creek Subbasin	18.43	25.91
Dungeness River and Matriotti Creek Subbasins	69.43	97.59
Gierin Creek Subbasin	11.70	97.41
McDonald Creek Subbasin	17.59	24.72
Siebert Creek Subbasin	19.95	28.05

Building-Permit Growth Scenario: 457 mobile homes may in the future choose to additionally develop their property (expand or build a new home),, and thereby require more water use.

## Metering new permit-exempt uses

\$500 per meter.

## Fish losses in some areas

- Loss of 6 – 10 spawning fish over 20 years under rule.
- 6.2 percent will likely rely on the reserve for the 15 gpd consumptive amount for indoor domestic use.
- A 20-year value of a returning spawning salmon of \$5,000.
- 751 – 1,369 spawning fish saved over 20 years under rule.

## New and existing permit-exempt users

- Mitigation costs of \$1,500 – \$16,500 per acre-foot (AF). A typical household uses 250 gpd. Mitigation will likely require a purchase of 0.28 AF per household, or a cost of \$420 – \$4,620 per household. We constrain the lower bound to \$1,000 however, because of

estimates from The Dungeness Water Exchange Mitigation Plan, which predicts \$1,000 as the least expensive mitigation package. The range we use to estimate costs is therefore \$1,000 – \$4,620 per household.

- Forego outdoor water use at a cost of \$1,000 per household.
- Account for new population that will likely use Sequim’s existing water right by subtracting 15 years of 209-person growth from population-based growth in the Gierin and Bell subbasins.

### **Administering a water exchange market**

- Requires two full-time-equivalent (FTE) Environmental Specialist 4 (ES4) positions for the first two years, and one thereafter. These would likely be Ecology FTEs.
- The equivalent of 0.5 FTE Environmental Planner 1 (EP1). These would likely be county-level FTEs.
- \$121,358 annually for an ES4.
- \$83,684 annually for an EP1.

### **Development and Construction**

- The entire burden of the mitigation cost falls on developers (including property owners that are developing their own property).
- A point estimate of -0.642 as the price elasticity of demand.
- The price elasticity of supply is perfectly elastic.
- Adjustment is instantaneous.

### **Increased certainty in development**

Litigation results in development ban for 20 years, not curtailment.

Please also see Appendix B.

### **Avoided legal costs**

14.1 – 27.7 percent reduction in the likelihood of such a suit.

Prospective costs of a large-long-term suit of \$20 million (\$1 million per year).

### **Protecting existing restoration**

Fish protection is not just a function of water (as is assumed in the fish estimates in this analysis; it is also a function of various habitat quality attributes (woody debris, water temperatures, streambank vegetation, contamination, etc.). When the effectiveness of these individual attributes in creating good habitat also depends on water, the reduction in instream flows that would occur under the baseline would BOTH directly impact fish stocks through water quantity, and indirectly impact fish stocks by reducing the effectiveness of other habitat quality variables. In the past 20 years, Washington State has made \$6.0 million in investments in habitat restoration in the Dungeness. To the extent that the rule reduces instream flow losses directly affecting fish, and indirectly affecting fish through reduced habitat function, it saves a loss in that \$6.0 million of created value. The assertion is with the instream flows proposed, the investments in habitat restoration create value worth \$6.0 million. They create none without the proposed flows.

# Appendix E: Sensitivity of Results to Discount Rate

## Cost estimation

Under alternate assumptions of higher discount rates – three and seven percent – Ecology estimated costs likely to result from the rule, associated with:

- Metering new permit-exempt uses.
- Fish losses in some areas.
- Increasing existing permit-exempt use.
- New permit-exempt users.
- Administering a water exchange market.

### Metering new permit-exempt uses

Ecology estimated the costs associated with metering new permit-exempt users. Ecology used an estimate of \$500 per meter. This cost is not likely to vary by subbasin. Using the two projections of growth in the area affected by the rule (see Table 3), Ecology estimated nominal costs of \$1.6 million – \$2.5 million, over 20 years. This will be the range if 20 years worth of new users installed meters today. Ecology then discounted this cost range, based on the flow of new permit-exempt users each year, over 20 years, at a discount rate of 3 percent, and at 7 percent.

This gave Ecology a range of present-value costs, over 20 years, of \$1.2 million – \$1.8 million at 3 percent. This range fell to \$0.9 million – \$1.3 million at 7 percent discount rate.

### Fish losses in some areas

Ecology estimated the costs associated with the rule in areas where it is likely to result in lower quantities of water available to fish, and result in fish losses. While the rule sets instream flows that are largely protective of salmon (see Chapter 4 for a discussion of this benefit), Ecology acknowledges that some areas of the affected subbasins are not likely to have sufficient and appropriate mitigation available under the rule for new uses,<sup>58</sup> and will likely rely on the reserve for the 15 gpd consumptive amount for indoor domestic use. As compared to a baseline in which households developing in these areas will use 250 gpd of water, this is still an improvement, but the 15 gpd use for these households will still likely result in minor fish losses.

Based on projected growth in each subbasin (Table 3), the groundwater model (relating groundwater and surface water across the subbasins), and salmon habitat needs, Ecology

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<sup>58</sup> Upstream areas of Bagley, Siebert, McDonald, Matriotti, Dungeness, and Bell subbasins.

estimated the rule will result in the loss of 6 – 10 spawning fish over 20 years.<sup>59</sup> Ecology uses a 20-year value of a returning spawning salmon of \$5,000.<sup>60</sup> Ecology calculated the total cost of salmon losses under the rule is \$30 thousand – \$50 thousand.

## Increasing existing permit-exempt use

Ecology estimated the costs associated with existing permit-exempt users increasing their permit-exempt use (and therefore creating a new use) in the future. This might result from additions to existing homes, building a home on a property currently using a mobile home, or subdividing a property to house multiple families (e.g., forming a duplex).

Ecology estimated the lowest number of existing users increasing permit-exempt water use in the future as zero. This is based on the fact that one of the estimates of future household growth is based on population growth, and therefore already reflects growth in water use among existing users. (Population growth reflects both people moving to the area, who move into duplexes or second residences on a property, and families getting larger and requiring larger houses and more water.)

For permit-exempt water users, Ecology also estimated the number of those uses that are likely to significantly increase. For purposes of the analysis Ecology needed a way to estimate additional water use beyond what a household is currently using. To do this Ecology used residentially zoned properties with existing mobile homes to estimate this use.

Based on Clallam County residential property sales records (2005-2012), there are 457 mobile homes in the area affected by the rule. These homes may, in the future, choose to additionally develop their property, and thereby require more water use. Ecology could not determine how many of these homes currently use a permit-exempt well, or how many would use one if they increased water use. Ecology looked at mobile homes to approximate the number of people who would increase permit-exempt water use from current (non-zero) use levels. Mobile homes are sometimes used on residential land while building homes on site.

Not all mobile homes would necessarily build new homes on site (mobile homes may be permanent residences as well). As a conservatively high estimate Ecology assumed all of these mobile homes (457) will additionally develop their property (build a new home or expand an existing) in the next five years, and thereby would require more water use and incur mitigation costs.<sup>61</sup>

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<sup>59</sup> The calculations of fish losses are included in the rule file for this rule making.

<sup>60</sup> Based on a University of Washington study (Layton, *et al.* 1999), the 20-year average between high and low status quo salmon populations give us \$300 as the annual value for each adult spawner. Columbia River Initiative gave us existence values of \$268 (Huppert, 2004). Bonneville Power Administration gave us restoration values of \$400 per adult fish. From these reports 16 year values for fish would range from \$4,288 to \$6,400. Ecology has chosen to use a 20-year real estimated value of \$5,000 for an adult returning spawner.

<sup>61</sup> If fewer homes increase their water use, then we would expect fewer mitigation costs in the affected areas.

From an analysis done by the Local Leaders Water Management Work Group (LLWG), of prospective project types, Ecology used a range of \$1,500 – \$16,500 per acre-foot (AF). This is the full range of “middle” estimates of cost per acre-foot, for projects rated with “high” or “very high” effectiveness in mitigation. Assuming a typical household will use 250 gpd, this means mitigation will likely require a purchase of 0.28 AF per household, or a cost of \$420 – \$4,620 per household. We constrain the lower bound to \$1,000 however, because of estimates from The Dungeness Water Exchange Mitigation Plan, which predicts \$1,000 as the least expensive mitigation package. The range we use to estimate costs is therefore \$1,000 – \$4,620 per household.

This estimate is likely an overestimate of actual costs, because:

- Not all existing households increasing water use in the future will be likely to increase by the full water use of a typical household, as they will have an already established a permit-exempt water use level.
- Mitigation will be required for only consumptive use, which will be some subset of the 250 gpd total water use in a household.

Because Ecology could not determine the degree to which households might consume less than 250 gpd, Ecology chose to use the conservatively high cost.

Ecology multiplied the number of existing permit exempt users likely to increase permit-exempt water use in the future (up to 457, recalling that the low-end estimate is zero, see above) by the range of per-household costs, and discounted this value over time, at a discount rate of 3 and 7 percent. The range of 20-year present value costs will be \$0 – \$1.9 million at 3 percent discount (\$0 – \$1.7 million at 7 percent discount) if all of these households had mitigation available. Ecology estimated, however, that about 93.8 percent of households will be able to mitigate, while the rest (6.2 percent) will have to rely on the indoor domestic use reservation, and forego outdoor water use at a cost of \$1,000 per household.<sup>62</sup> This 6.2 percent will still pay an additional \$1,000 per household in mitigation costs. We use an estimate of \$1,000 for mitigation costs because it is the likely minimum cost for mitigation, and households that rely on indoor domestic use reservations would only be able to rely on the minimum use (15 gpd).<sup>63</sup>

The final present value, then, of mitigation (where available) or foregoing outdoor water use (where necessary) is a total cost, over 20 years, of \$0 – \$1.8 million at a 3 percent discount (\$0 – \$1.7 million at 7 percent discount) to existing permit-exempt households.

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<sup>62</sup> Willingness to pay for outdoor water use is based on the analysis provided in Zhang, 2005. Ecology used this willingness to pay value, because replacement costs for services such as trucking in water and water storage for outdoor use were higher, and households would only purchase these replacement services if their willingness to pay exceeded the costs. As a result, Ecology performed calculations based on households without mitigation foregoing purchasing replacement water.

<sup>63</sup> Willingness to pay for outdoor water use is based on the analysis provided in Zhang, 2005. Ecology used this willingness to pay value, because replacement costs for services such as trucking in water and water storage for outdoor use were higher, and households would only purchase these replacement services if their willingness to pay exceeded the costs. As a result, Ecology performed calculations based on households without mitigation foregoing purchasing replacement water.

## New permit-exempt users

Ecology estimated the costs associated with new permit-exempt users in the area affected by the rule in the future. This might result from population growth in the area, as well as people moving into the area.

Ecology used the projected range of growth in permit-exempt users (households) discussed in this document (see Table 3). Ecology accounted for new population that will likely use Sequim's existing water right by subtracting 15 years of 209-person growth from population-based growth in the Gierin and Bell subbasins from the projections in Table 3. The rule will require people with access to such a system to connect to it, rather than rely on a permit-exempt well.

After the Sequim water right is fully in use, however, these new households may use permit-exempt wells. This adjustment resulted in the Gierin and Bell subbasins effectively experiencing zero growth in permit-exempt uses for the first 15 years under the rule, under the population-based growth projection.<sup>64</sup>

New permit-exempt water uses will be required to mitigate use under the rule. From an analysis done by the Local Leaders Water Management Work Group, of prospective mitigation project types, Ecology used a range of \$1,500 – \$16,500 per acre-foot (AF). This is the full range of “middle” estimates of cost per AF, for projects rated with “high” or “very high” effectiveness in mitigation. Assuming a typical household will use 250 gpd, this means mitigation will likely require a purchase of 0.28 AF per household, or a cost of \$420 – \$4,620 per household. We constrain the lower bound to \$1,000 however, because of estimates from The Dungeness Water Exchange Mitigation Plan, which predicts \$1,000 as the least expensive mitigation package. The range we use to estimate costs is therefore \$1,000 – \$4,620 per household.

This estimate is likely an overestimate of actual costs, because mitigation will be required for only consumptive use, which will be some subset of the 250 gpd total water use in a household. Because Ecology could not determine the degree to which households might consume less than 250 gpd, Ecology chose to use the conservatively high cost.

Ecology multiplied the number of new permit-exempt users in each year, by the range of per-household costs, and discounted the value over time, at a discount rate of 1.58 percent. Ecology estimated, however, that about 93.8 percent of households will be able to mitigate, while the rest will have to rely on the indoor domestic use reservations, and forego outdoor water use at a cost of \$1,000 per household.<sup>65</sup> This 6.2 percent will still

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<sup>64</sup> This affected the present-value calculation, as these subbasins were not expected to experience costs resulting from this particular impact of the rule until 2028, when a typical new household can no longer rely on Sequim's existing water right.

<sup>65</sup> Willingness to pay for outdoor water use is based on the analysis provided in Zhang, 2005. Ecology used this willingness to pay value, because replacement costs for services such as trucking in water and water storage for outdoor use were higher, and households would only purchase these replacement services if their willingness to pay exceeded the costs. As a result, Ecology performed calculations based on households without mitigation foregoing purchasing replacement water.

pay an additional \$1,000 per household in mitigation costs. We use an estimate of \$1,000 for mitigation costs because it is the likely minimum cost for mitigation, and households that rely on indoor domestic use reservations would only be able to rely on the minimum use (15 gpd).

The final present value, then, of mitigation (where available) or foregoing outdoor water use (where necessary) is a total cost, over 20 years, of \$2.4 million – \$15.3 million at a 3 percent discount rate (\$1.7 million – \$10.4 million at 7 percent discount) to new permit-exempt use households.

## **Administering a water exchange market**

Ecology estimated the costs associated with administering a water exchange market to facilitate mitigation of new water uses and processing water rights. This cost will be borne by Ecology and by Clallam County. Ecology estimated that administering the market will require:

- Ecology: Two full-time-equivalent (FTE) Environmental Specialist 4 (ES4) for the first two years, and one thereafter.
- Clallam County: The equivalent of 0.5 FTE Environmental Planner 1 (EP1)

Ecology based salary assumptions on the salary schedules of represented employees:

- Top-step annual salary of \$64,428 for an ES4.
- Top-step annual salary of \$43,368 for an EP1.

Ecology calculated additional overhead costs for each FTE employee based on the Standard Cost Assumptions for fiscal note preparation created by the Washington State Office of Financial Management. (These are the cost assumptions recommended for calculating costs presented to the state Legislature.) Overhead costs included:

- Benefits
- Goods and services
- Travel
- Indirect costs of rents, utilities, executive and administrative support, employee services, communications, budget and accounting, and central services.

Including overhead costs and salary in the cost calculation, Ecology used the following costs associated with each FTE administering the water exchange.

- \$121,358 annually for an ES4.
- \$83,684 annually for an EP1.

Discounting these costs over time, and accounting for the number and type of FTE required to administer the water exchange, Ecology calculated total present-value costs over 20 years of \$2.7 million at a 3 percent discount rate (\$2.1 million at 7 percent discount).

## Property Values

Costs to increasing existing permit-exempt users and new permit-exempt users comprise our estimates for decreases in property values. As currently constructed above, the burden of the rule falls entirely on the developer of the land (the one who pays the mitigation cost at the time of development).

We can think of the mitigation cost as a tax however, where the burden will likely instead be shared between the property owner and the developer who buys the property to build on (or similarly, if the owner is also the developer, the owner sells the property to themselves – they forgo the opportunity of selling the undeveloped property to someone else).

For a moment, instead assume the entire burden falls on the owner of the property (as opposed to the developer who purchases the property). Imagine two identical properties (in both attributes and location), except one property has an established water right and the other does not – by assuming the entire burden falls on the property owner we are assuming the difference in property value will be the expected cost of mitigation.<sup>66</sup> Again, as mentioned above, the difference in value instead will likely be somewhere in between zero and the expected mitigation cost.

In this example, when the entire burden falls on the owner of the property, the developer is indifferent between the two states of the world with and without the rule. They must pay an additional mitigation fee in order to develop, but they are able to purchase the property for less, by the amount of the mitigation fee. The owner of the property is worse off by the cost of mitigation at the transaction date. The loss in value to the original property owners will be a function of the estimated new and increased development over 20 years, and is identical to the estimates for when the burden falls entirely on the developer instead.

The above holds true for any allocation of incidence between the property owner and developer – they will share the costs of mitigation.

## Total expected costs

Ecology calculated total expected costs associated with the rule, in present value, over 20 years as shown in the Table 10 below.

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<sup>66</sup> The difference in value is at most the cost of mitigation to satisfy a no-arbitrage condition – this condition illustrates that if the property value decreased by more than the cost of mitigation, one might buy the property, pay the cost of mitigation, and be better off equal to the difference. For example, imagine again two identical properties (in both attributes and location), except there is an established water right on one property and not on the other. Assume the property with an established water right is valued at \$200,000, the cost of mitigation is \$10,000, and the property without a water right is valued at \$170,000. Given that these properties are otherwise identical, we could buy the property with no water right, pay the cost of mitigation, and be \$20,000 better off.

**Table 10: Total Costs of the Rule (20-year present values)**

Cost	At 3 Percent Discount Rate		At 7 Percent Discount Rate	
	Based on Building-Permit Growth Projection	Based on Population-Based Growth Projection	Based on Building-Permit Growth Projection	Based on Population-Based Growth Projection
Metering new permit-exempt uses	\$1.21	\$1.82	\$0.86	\$1.30
Fish losses in some areas	\$0.03	\$0.05	\$0.03	\$0.05
Increasing existing permit-exempt use	\$1.84	\$15.32*	\$1.65	\$10.35*
New permit-exempt users	\$2.42		\$1.72	
Administering a water exchange market	\$2.74	\$2.74	\$2.08	\$2.08
<b>TOTAL</b>	<b>\$8.24</b>	<b>\$19.93</b>	<b>\$6.34</b>	<b>\$13.78</b>

\*This value accounts for population-based growth projections including increases to existing use and new uses.

## Benefits estimation

Ecology estimated benefits likely to result from the rule, at alternate 3 percent and 7 percent discount rates, associated with:

- Avoided fish losses.
- Increased certainty in development.
- Avoided legal costs.
- Protecting existing restoration.
- Beneficial storage projects.

### Avoided fish losses

By setting instream flows, the rule is likely to provide more salmon habitat and therefore prevent fish loss. Ecology estimated the benefits associated with the rule’s protection of salmon. Ecology compared the rule’s mitigation and reservations allowing for up to 15 gpd of domestic use, to the baseline of 250 gpd of unmitigated use for each new permit-exempt water use projected in the affected area. Ecology used the growth projection range for each subbasin (Table 5), the groundwater model (relating groundwater and surface water across the subbasins), and salmon habitat needs, to estimate that the rule will result in 751 – 1,369 spawning fish saved over 20 years. Ecology uses a 20-year

value of a returning spawning salmon of \$5,000.<sup>67</sup> Ecology calculated the total benefit of avoided salmon losses under the rule of \$3.8 million – \$6.9 million.

## **Increased certainty in development**

Under the baseline, future development in the Dungeness basin is at risk for lack of water availability, causing impairments, and lawsuits. As more development occurs across the subbasins, there is more risk of a permit-exempt use impairing a senior water right, but also there is risk that a larger (basin-wide) lawsuit will be brought by a tribe or at the federal level (e.g., because of salmon loss and tribal claims to instream flow to support the treaty right to take fish), halting future development in the basin. By requiring mitigation of new water uses, and therefore maintaining more water instream, the rule reduces the likelihood of a lawsuit or a successful lawsuit.

### ***Curtailment***

While, under the baseline, junior water rights (including established permit-exempt rights) are subject to curtailment, Ecology has not curtailed permit-exempt water use in the Dungeness. Since it could not, therefore, confidently estimate the degree to which curtailment will occur under the baseline, Ecology did not quantify the most likely value of increased certainty in avoiding water use limitations (curtailment in low-water years). This value, however, to each new user will be the percentage reduction in the likelihood of curtailment, multiplied by the net value of improving a property using additional water.

The average value of residential improvements minus the costs of construction in the Dungeness is nearly \$33 thousand.<sup>68</sup>

### ***Development ban***

Ecology estimated the value of increased certainty in development arising from reduced likelihood that a large lawsuit will limit or ban future development in the basin. This large suit might be filed based on infringement on time immemorial tribal water rights, or federal protection of salmon and their watersheds. Under the baseline, such a lawsuit (and its success) becomes increasingly likely over time, as the forecast growth in households using permit-exempt wells (see Table 5) reduces streamflows without any required mitigation. The rule reduces this likelihood by setting protective instream flows, and requiring mitigation of new water uses. While new water users will have to pay for mitigation, they will gain the benefits of development (property value and use of the improvement).

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<sup>67</sup> Based on a University of Washington study (Layton, *et al.* 1999), the 20-year average between high and low status quo salmon populations give us \$300 as the annual value for each adult spawner. Columbia River Initiative gave us existence values of \$268 (Huppert 2003). Bonneville Power Administration gave us restoration values of

\$400 per adult fish. From these reports 16 year values for fish would range from \$4,288 to \$6,400. Ecology has chosen to use a 20-year real estimated value of \$5,000 for an adult returning spawner.

<sup>68</sup> Ecology started with the average value of a residential improvement in the affected areas, and subtracted the average cost of construction as a percentage of housing value (National Association of Home Builders, 2011).

Ecology estimated the reduced likelihood of a large lawsuit based on a behavioral model of the decision whether to litigate. The model compared the costs associated with a lawsuit (less the benefit of avoiding fish losses in some upstream areas; see Chapter 3 for details), to the benefits of salmon saved by a ban on development. Ecology estimated that the baseline risk of a lawsuit is 14.1 – 27.7 percent.<sup>69</sup>

Ecology accounted for new population that will likely use Sequim’s existing water right by subtracting 15 years of 209-person growth from population-based growth in the Gierin and Bell subbasins from the projections in Table 4. The rule will require people with access to such a system to connect to it, rather than rely on a permit-exempt well. After the Sequim water right is fully in use, however, these new households can use permit-exempt wells. Ecology made this adjustment to maintain overall conservative estimates of net benefits (these growth values are used in both cost and benefit calculations). This adjustment resulted in the Gierin and Bell subbasins effectively experiencing zero growth in permit-exempt uses for the first 15 years under the rule, under the population-based growth projection.<sup>70</sup>

For each of the next 20 years, Ecology multiplied the reduction in the likelihood of banning development, by the projected number of new households, and the value of being able to develop. The average value of residential improvements minus the costs of construction in the Dungeness is nearly \$33 thousand.<sup>71</sup> Just having water does not alone create a property improvement, but gives the developer the ability to spend money on construction inputs to create that improvement; the value of being able to improve, therefore is the difference between the value of the improvement and what it cost to build the improvement.

Ecology estimated that new water users (including brand-new uses and increasing existing uses under any water source) will benefit from increased certainty in development by \$17.4 million – \$54.2 million at a 3 percent discount rate (\$12.4 million – \$38.6 million at a 7 percent rate) in present value over 20-years.

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<sup>69</sup> Ecology allowed for the suit to occur in any year in the coming 20 years, and last up to 20 years, using a Monte Carlo simulation that iterated random length and timing of a suit and counted the frequency with which a suit occurred. Ecology estimated that, based on this decision structure, a suit would occur with 14.1 – 27.7 percent likelihood. The rule would reduce these frequencies to zero by allocating instream water rights and requiring mitigation. This range depends on the number of fish lost or saved under the rule. Ecology used this range as the reduced likelihood of a large lawsuit banning development through closing the basin to new water use.

<sup>70</sup> This affected the present-value calculation, as these subbasins were not expected to experience costs resulting from this particular impact of the rule until 2028, when a typical new household can no longer rely on Sequim’s existing water right.

<sup>71</sup> Ecology started with the average value of a residential improvement in the affected areas, and subtracted the average cost of construction as a percentage of housing value.

## **Avoided legal costs**

Ecology estimated the value of avoiding legal costs of a lawsuit of the type described above. Such a large suit might be filed based on infringement on time immemorial tribal water rights, or federal protection of salmon and their watersheds. Ecology used the same

14.1 – 27.7 percent reduction in the likelihood of such a suit (see previous subsection, “Development Ban”), multiplied by the prospective costs of a large-long-term suit of \$20 million.<sup>72</sup> Based on these values, Ecology calculated that avoiding a large lawsuit over 20 years will result in \$2.1 million – \$4.1 million at a 3 percent discount rate (\$1.5 million – \$2.9 million at a 7 percent rate) in avoided legal costs in the state.

## **Protecting existing restoration**

Fish protection is not just a function of water (as is assumed in the fish estimates in this analysis; it is also a function of various habitat quality attributes (woody debris, water temperatures, streambank vegetation, contamination, etc.). When the effectiveness of these individual attributes in creating good habitat also depends on water, the reduction in instream flows that would occur under the baseline would BOTH directly impact fish stocks through water quantity, and indirectly impact fish stocks by reducing the effectiveness of other habitat quality variables. In the past 20 years, Washington State has made \$6.0 million in investments in habitat restoration in the Dungeness.

To the extent that the rule reduces instream flow losses directly affecting fish, and indirectly affecting fish through reduced habitat function, it saves a loss in that \$6.0 million of created value. The assertion is with the instream flows proposed, the investments in habitat restoration create value worth \$6.0 million. They create no value without the proposed flows.

## **Beneficial storage projects**

Ecology could not confidently determine the extent or qualities of likely future storage projects with a sufficient degree of certainty. Storage projects that benefit both instream and out-of-stream uses, however, will be possible under the rule. This benefit is included qualitatively.

## **Total expected benefits**

Ecology calculated total expected benefits associated with the rule, in present value, over 20 years as shown in Table 11 below.

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<sup>72</sup> Based on legal costs over time in Yakima averaged to \$1 million per year. *Department of Ecology v. Acquavella*, Yakima County Superior Court No. 77-2-01484-5.

**Table 11: Total Benefits of the Rule (20-year present values)**

<b>Benefit</b>	<b>At 3 Percent Discount Rate</b>		<b>At 7 Percent Discount Rate</b>	
	<b>Based on Building-Permit Growth Projection</b>	<b>Based on Population-Based Growth Projection</b>	<b>Based on Building-Permit Growth Projection</b>	<b>Based on Population-Based Growth Projection</b>
Avoided fish losses	\$3.76	\$6.85	\$3.76	\$6.85
Increased certainty in development	\$17.35	\$54.19	\$12.36	\$38.59
Avoided legal costs	\$2.10	\$4.12	\$1.49	\$2.93
Protecting existing restoration	\$6.0	\$6.0	\$6.0	\$6.0
Potential value of avoided curtailment				
Potential value of beneficial storage projects				
<b>TOTAL</b>	<b>\$29.21</b>	<b>\$71.16</b>	<b>\$23.61</b>	<b>\$54.37</b>