

Appendix A: DSO Letter re: Eightmile Dam



STATE OF WASHINGTON
DEPARTMENT OF ECOLOGY

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March 23, 2018

Anthony D. Jantzer
Icicle & Peshastin Irrigation District
5594 Westcott
PO Box 371
Cashmere, WA 98815-0371

Re: Eightmile Lake Dam DSO File: No. CH45-0228

Dear Mr. Jantzer:

Thank you for your continued coordination with the Department of Ecology's Dam Safety Office (DSO) regarding Eightmile Lake Dam. Given the Icicle & Peshastin Irrigation District's (District) March 13, 2018, declaration of an emergency at the dam, Ecology submits this letter containing directives regarding further actions that need to be taken by the District in response.

As you are aware, the 90-year-old dam is in deteriorating condition and the August 2017 Jack Creek Fire has created additional concerns of increased peak runoff into Eightmile Lake. To assist in addressing this situation, the District must submit a written incident report to the Dam Safety Office no later than April 6, 2018.

The report should identify the District's efforts to safely manage this situation and include, at a minimum, the information and requirements in the following five areas:

1. Drawdown: The District has currently removed all the stop logs that leave the lake at an elevation of 4661 feet. This provides some capacity to manage rain and snow runoff. The DSO supports the District's decision to further increase the lake's capacity to accommodate additional runoff by repairing the outlet pipe. According to the District, correcting that condition will allow the lake level to be lowered an additional 12 feet to an elevation of 4649 feet. This repair work should occur as soon as the weather and site conditions allow access for staff and equipment. On behalf of the District, you indicated that this work is expected to be done in May 2018, by walking an excavator up to the site. The report should also assess the option of airlifting the excavator into place along with pumps and siphons to draw down the lake, should repair of the low-level outlet be unsuccessful. The excavator should be sized to repair the outlet, as well as perform other earth moving tasks, if needed, to allow passage of inflow such as lowering a portion of the dam crest. Please provide the DSO with 14 days advance notice of the repair work



and the opportunity to oversee the work. The lake level shall be maintained at the lowest elevation feasible until we agree otherwise.

2. Hydrology and Hydraulic Analysis: The District must retain the services of a qualified professional engineering consultant to conduct a detailed analysis of a dam breach, downstream breach hydraulics, and the design-storm watershed hydrology. The purpose will be to:
 - fully characterize and map the breach flood's downstream inundation, Persons at Risk (PAR) and inundated infrastructure,
 - calculate the Design Storm and model the watershed hydrology to produce a hydrograph of the reservoir's Inflow Design Flood (IDF),
 - determine the reservoir's minimum Design Freeboard, and,
 - determine if the current combined overflow outlet works are capable of passing the peak of the IDF, while maintaining the design freeboard.

This analysis must consider the existing, as-is dam geometry (i.e. the full hydraulic height of the embankment: minimum crest to the low-level conduit inlet invert), embankment and foundation materials, and changed conditions on the dam's watershed as a result of the Jack Creek Wildfire. This work will provide a more realistic and accurate estimate of potential impacts from a potential dam breach. DSO staff are available to assist your engineer in scoping out this analysis and identifying applicable guidance. The District must submit an engineering report summarizing the analysis and findings to the DSO on or before April 27, 2018.

3. Emergency Action Plan: The District submitted a draft Emergency Action Plan (EAP) to the DSO on March 21, 2018. The District must share the draft EAP with the U.S. Forest Service and Chelan County Emergency Management and incorporate any input received from those offices. The EAP is based, in part, on DSO's March 14, 2018, preliminary estimates of the homes that could be impacted by a potential dam breach. The District should be prepared to modify the EAP with the more detailed hydrology and hydraulics analysis required above and any further comment DSO may provide on the draft EAP.
4. Site Access and Monitoring: We understand that access is very limited, given the dam's location in the Alpine Lakes Wilderness Area, and due to the lack of roads and extreme winter weather. On behalf of the District, you communicated that your staff occasionally access the dam site via small plane flyovers, helicopter insertions, and hikes. The incident report should identify the frequency and method of monitoring the site on a regular basis to assess reservoir volume, embankment condition, debris blockage of the outlet works, and changes to the watershed (i.e. snow cover, surface soil permeability, and vegetation cover). We ask that the District inform the DSO of any future opportunities to visit and view the site with your staff. In addition to reporting emergency events as specified in the EAP, the District should immediately notify the DSO of any significant, non-emergency changes or events related to the site that could affect the timing or methods of your response to this situation.

5. Weather Tracking: The District must describe how weather patterns and forecasts will be tracked to provide maximum advance warning of weather conditions that could result in unusually large runoff into the lake. The EAP should identify how the District will respond to forecasted extreme precipitation events. The District should also evaluate the feasibility of immediately employing remote monitoring of weather at the dam site, Eightmile Lake levels and the flow in Eightmile Creek to support an advance warning.

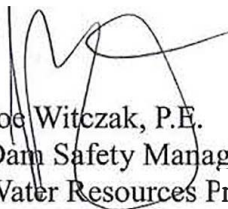
Based on the DSO's preliminary analysis of homes that could be impacted by a potential failure, the DSO has changed the hazard classification of the dam from "Low" to "High". Under the Low Hazard Classification, an EAP was not required, nor were regular inspections of the dam. The High Hazard Classification now means an EAP is required, as well as a detailed inspection every five years. The DSO will conduct the first detailed inspection this summer. We will also initiate annual billings to cover our periodic inspection costs, as provided under the Dam Safety Regulations in Chapter 173-175 Washington Administrative Code (WAC). We will coordinate that inspection with the District in advance.

District actions identified in this letter to respond to the situation are considered operation and maintenance. Therefore, the District is not required to obtain a permit from DSO, nor pay any dam permitting fees. However, this does not relieve the District from obtaining permits and approvals, if any, from other local, state and/or federal agencies for its operation and maintenance activities. Future actions to rebuild or modify the dam, and/or its appurtenant structures, will require the DSO's review and written approval through the dam safety permitting process. Those future actions may also trigger the need for the District to obtain permits and approvals required by other local, state and/or federal agencies.

If you have questions about preparing the incident report or compliance with the dam safety regulations, which are set forth in the WAC 173-175, please contact the engineer assigned to this project, Guy Hoyle-Dodson at (360) 407-6451.

Thank you for your ongoing cooperation.

Sincerely,



Joe Witczak, P.E.
Dam Safety Manager
Water Resources Program

cc: Guy Hoyle-Dodson, Ecology
Mike Williams, U.S. Forest Service
Kent Sisson, Chelan County Emergency Management

Certified: [91 7199 9991 7037 2237 8746]

Appendix B: Water Rights

APPENDIX B: WATER RIGHTS

This appendix provides additional information concerning the water rights in the study area.

Additional Explanation of Methodology

As described in Chapter 6 of the EIS, the Water Rights Tracking System (WRTS) maintained by Ecology was used to research the water rights in the area. Ecology made several searches of the study area to identify the water rights in the area.

The first search looked for surface water rights with sources listed in WRTS¹ as being 1 of the 28 various surface waterbodies in the Icicle Creek Subbasin, including Icicle Creek, Snow Creek, Eightmile Creek, Mountaineer Creek, Eightmile Lake, Snow Lakes, Colchuck Lake, among others. The records returned by this search were then sorted by Township, Range, and Section, and records with locations outside the Icicle Creek Subbasin were removed. This resulted in a total of 56 surface water rights.

A second search was also made for surface water rights; this one used a GIS search of points of diversion, as mapped in Ecology's Geographic Water Information System (GWIS),² located within the study area. Duplicates from the first search were identified and then deleted. This second search identified 14 additional rights, giving a total of 70 surface water rights records for the study area.

Two similar searches were made for groundwater rights. This resulted in 82 groundwater rights records for the study area.

Most water rights records on WRTS contain one or more scanned documents, including applications, permits, certificates, reports of examination (ROEs), supporting documents, and maps, etc. All scanned documents for the identified surface water and groundwater rights were downloaded and indexed by water right number. Additional documentation (not scanned as part of WRTS) for selected rights was made available from public records requests to Ecology.

As described in Chapter 6, some rights were removed from further consideration due to location errors, rights still in the application phase, and rights with an inactive status. This resulted in the number of records being reduced to 45 surface water rights and 39 groundwater rights.

¹ According to the WRTS database, "Water Right Data, Application Data, Claim Data, and Document Images released from the Department of Ecology are provided on an 'AS IS' basis, without warranty of any kind. The data and/or image(s) may not be accurate, complete, legible, or otherwise reliable. Ecology disclaims any and all warranties, whether express or implied, including (without limitation) any implied warranties or fitness for a particular purpose. In no event will Ecology be liable to you or to any third party for any direct, indirect, incidental, consequential, special or exemplary damages or loss resulting from any use or misuse of these data and/or images. The user of this information assumes the entire risk that the data and/or images may be inaccurate, incomplete, illegible, or otherwise unreliable."

² According to the GWIS database, "the Data is provided 'as is' without warranty of any kind. The entire risk as to the results and performance of the Data is assumed by you. Should the Data prove defective, you assume the entire cost of all necessary servicing, repair, or correction. Further, the Washington State Department of Ecology does not warrant, guarantee, or make any representations regarding the use of, or results from the use of the Data in terms of correctness, accuracy, reliability, currentness, or otherwise; and you rely on the Data and results solely at your own risk."

The water right quantities reported in this document do not represent a determination of the validity and extent of any of the rights in the basin. The estimation of total annual quantities and other parameters of water rights in the study area were based on the review and analysis of the EIS team and their subcontractors and do not represent determinations or estimations of water right quantities by Ecology. Ecology reviewed estimated quantities to the general extent necessary to be able to identify and understand potential effects of the proposal on water rights in the basin and identify any potential for impacts to basin water rights. Additional information detailing the EIS team's review of basin water rights is presented herein and in Chapter 6, including methodologies and assumptions used. Final determinations of water right quantities can only be made by the legal determination of a court through an adjudication process.

Additional Discussion of Regulatory Context

Though frequently and informally known as water right applications, for a new water right, the proper name is Application for a New Water Right Permit, and for the change of a water right, the proper name is Application for a Change/Transfer of a Water Right. As described in Chapter 6, during the processing of a new water right application, Ecology applies a four-part test to determine if the water right can be legally permitted. When processing the application, Ecology will prepare an ROE, which describes how the four-part test applies to the proposed right. If the four-part test is satisfied, Ecology approves the application and issues a water right permit.

Water right permits specify how much water can be used, the place of use, the point of diversion (for surface water) or withdrawal (for groundwater), the specific type(s) of beneficial use allowed (such as irrigation, fish propagation, domestic use, etc.), and the period of use. Permits also typically contain a number of provisions that must be followed when putting the water to use. Examples of provisions include requirements to meter and report water usage, maintenance of an efficient water delivery system, and operation of a plan to prevent or mitigate impairment to senior water rights holders or instream flows. The permit sets a development schedule, setting the date by which the water project must be started and completed, and the date by which the water use is to be fully perfected (put to beneficial use).

Once a permittee puts their water to beneficial use and the project associated with the water right is fully developed, the project is reviewed to confirm the amount of beneficial use and Ecology issues a certificate for the water right. Following certification, the allocated quantity of the water right must be fully utilized at least once every 5 years (unless it qualifies for one of a limited number of special exceptions, including the exemption for water rights that qualify as being for "municipal water supply purposes") to remain fully valid.

Change applications are processed in a similar manner to new applications with one additional step. When preparing the ROE for a change application, Ecology must investigate the history of beneficial water use resulting from the underlying permit or certificate to determine if any portion or all of the originally authorized instantaneous or annual quantity (Q_i or Q_a) has been relinquished or abandoned due to nonuse without sufficient cause. Relinquishment and abandonment have specific definitions within water law as described below.

RCW 90.14.130 – .180 governs the relinquishment of water rights, and Ecology's Policy 1060, *The Relinquishment, Rescission, and Abandonment of Water Rights*, defines water right relinquishment, abandonment, and rescission. The policy gives the following definitions:

- *“Abandonment” is nonuse of a water right combined with an intent to abandon the water right. This is based on a common law doctrine for extinguishment of water rights that are unused, rather than a doctrine that was created by statute.*
- *“Relinquishment” occurs when a water right has reverted to the state because of nonuse for five or more successive years after 1967 without sufficient cause that excuses the nonuse. There can be full or partial relinquishment of a water right. The law relating to relinquishment was created by statute.*
- *“Rescission” is an administrative procedure to revoke a certificate of a water right or change certificate, where the quantity of water that was perfected through actual beneficial use of water is not in agreement with the maximum quantity specified in the state-issued certificate of water right.*

In a footnote to Policy 1060, it also notes that abandonment was defined by the courts in *Cornelius v. Washington Department of Ecology* as “abandonment is the intentional relinquishment of a water right.”

Certificates and claims are subject to relinquishment, but not permits, although permits may be subject to cancellation if their development schedules are not met without an authorized extension. Permits are not subject to relinquishment because the total water right allocation is not set until the right is perfected. That is, the quantity provided for in a permit may need to be reduced to the amount actually put to beneficial use once the right undergoes final certification. Policy 1060 states *“rights documented by permits become subject to relinquishment on the date they are certificated; meaning that five years of consecutive nonuse without sufficient cause through an exception ... may be evaluated starting on the date that the certificate is issued.”*

As noted in the definition for relinquishment, certain sufficient causes excuse the nonuse of a water right. These are listed in RCW 90.14.140 and described in Policy 1060. The statute was originally enacted in 1967, but over the years since then, the legislature has added additional sufficient cause exceptions. Ecology interprets that these additional causes became valid from the date the amended statute became effective; therefore, the new causes are not retroactively applied.

Sufficient causes, with their effective year, to preclude relinquishment include, but are not limited to:

- Water unavailability due to drought or other causes, 1967.
- Various irrigation issues, including temporary reductions due to weather conditions and reductions due to crop rotation, 2001.
- Waiting for a final determination of a change application if the water user is unable to legally use the water without the approval of the change application, 2012.
- Standby or reserve water rights, for example, water rights used only in times of drought, 1967.
- Municipal water rights, 1967.
- Trust water rights, 2001.

Involuntary relinquishment of a water right can only occur in three ways: through an administrative relinquishment order issued by Ecology, through a decision on a water right change application, and through a general water rights adjudication. RCW 90.14.130 authorizes Ecology to issue relinquishment orders, which involve a multi-step process of documenting non-use and allowing the water right holder to prove that water was actually used or show cause for the non-use

by demonstrating qualification for a relinquishment exception, as described in Policy 1060. When a court conducts a water right adjudication, it makes determinations of extent and validity for all water rights involved in the adjudication.

In processing change applications, Ecology or a conservancy board investigates the historical use of the water right and makes a tentative determination of the extent and validity of the right. If they find that all or a portion of the right has been relinquished for non-use, that portion of the right is not eligible for the change and is deemed to be invalid.

“Tentative determination of extent and validity” is defined by Ecology Policy 1120, Water Resources Program Policy for Conducting Tentative Determinations of Water Rights. It is defined as “a determination of the extent and validity of an existing water right established pursuant to either chapter 90.03 RCW or 90.44 RCW, or claimed pursuant to chapter 90.14 RCW. Such determinations are tentative, as final determinations of the extent and validity of existing water rights can only be made by Superior Court through a general adjudication of water rights.” The policy further describes it as *“a water conservancy board’s or the department of Ecology’s finding of the amount of water perfected and beneficially used under a water right that has not been abandoned or relinquished due to non-use. In a proposal to change or transfer a water use, a tentative determination may include a decision as to the portion of the water right that is eligible for change, for instance, in some cases only consumptively used water may be eligible for change. A tentative determination is conducted for all uses associated with the entire certificate, permit,³ or claim. In situations where forfeiture of water is not an issue, a simplified tentative determination may be needed.”*

Policy 1120 lists both when a tentative determination should be made and when it is not warranted. Tentative determinations are made as part of Ecology’s or a water conservancy board’s permitting activities. According to Policy 1120, they are required:

- When evaluating uses of an existing surface water or groundwater right that is the subject of an application for change or transfer.
- When evaluating water use appurtenant to existing and proposed places of use under a new or change application.
- When evaluating water uses that are potentially impaired under a new or change application.
- When evaluating existing water uses associated with water rights pursuant to RCW 90.14.130 or other regulatory statutes that results in a departmental order.

There are several instances where tentative determinations are not warranted according to Policy 1120, including when a water right is donated to the Trust Water Rights Program (Trust) and when a right is acquired as a result of a water conservation project pursuant to Chapter 90.42 RCW. However, RCW 90.42 does contain other requirements for determining the extent and validity of trust water right acquisitions.

³ While a permit is eligible for a determination of extent and validity, it is not eligible for relinquishment per RCW 90.14.150 and RCW 90.14.180.

Additional Discussion of Other Alpine Lakes Water Rights

There are four other water rights on lakes within the Alpine Lakes Wilderness Area that are also within the study area. These are on Snow, Nada, and Colchuck Lakes. The most senior of these is the IID storage right on Colchuck Lake that is also a Class 5 right in the 1929 adjudication. Like its Eightmile Lake right, the IID applied for this right in 1926. The application was for 50 cfs and 2,500 acre-feet per year (afy), and those amounts were confirmed, but determined to be inchoate, in the adjudication. The right was certificated on August 21, 1939 for 50 cfs; no Qa is listed.

The IID has two other rights in the wilderness area, both of which were applied for in 1929. Consequently, these rights were not part of the adjudication. One application was for using water from Snow Creek, although the application states there will be no diversion from the stream, rather water will be stored in Snow Lakes for supplementing Snow Creek flow during the summer. The other application is a reservoir application to store water in Snow Lakes.⁴ Rather than completing the construction of the dam themselves, the IID entered into a contract with Reclamation stipulating that Reclamation would build a tunnel between Nada Lake and Upper and Lower Snow Lakes and control works at Upper and Lower Snow Lakes. In return, IID would grant Reclamation the right to use 250 acre-feet of its permitted 1,000 acre-feet of storage in Snow Lakes, with the remaining 750 acre-feet to be used only after the water in the District's other reservoirs has been tapped. According to records in the water right file for IID's Snow Lakes rights, Reclamation completed its development work at Snow Lakes in 1939. Subsequently, during the irrigation season in 1940, the IID used water from Snow Creek including some water stored in Snow Lakes. In 1941, they filed a Notice of Completion of Construction, and the two rights were certificated later that year.

In 1942, Reclamation applied for storage of 16,000 acre-feet in Nada and Upper and Lower Snow Lakes for the purpose of fish propagation at the Leavenworth National Fish Hatchery (LNFH; at the time called the Leavenworth Hatchery Station). This right was certificated that same year. The Reclamation-IID contract states that the storage volume of Upper and Lower Snow Lakes is 12,000 acre-feet, of which 750 acre-feet is dedicated to the IID. Based on that document, it is questionable whether 16,000 acre-feet of storage provided in the Reclamation water right was ever fully developed. The Proof of Appropriation document, which might answer this question for the Reclamation right, is missing from the water rights file in WRTS. The right is used to ensure an adequate flow of cool water in Icicle Creek to meet required LNFH flows under the USFWS diversionary right on Icicle Creek (USFWS 2009).

Additional Discussion of City of Leavenworth Diversionary Water Rights

The City of Leavenworth has diversionary rights that authorize an estimated combined total annual quantity of 1,465 afy. However, this figure is the subject of ongoing litigation.

The City conducted a water rights assessment in 2008. According to the City's current Water System Plan (Varela & Associates, Inc. 2018), this assessment identified alleged errors in Ecology's previous assessments of the City's water rights. The WSP states:

⁴ The application actually asks to dam Snow Creek, but later documents in the water right file indicate the proposed dam is on Snow Lakes.

“The City sought to clarify the scope and quantity of its water rights in the 2008 Amendment of the 2002 Water System Plan. That amendment was neither accepted nor rejected by DOH due a to [sic] disagreement between the City and Ecology. The City filed a declaratory judgment lawsuit to resolve those errors and determine [the] existing quantity of the City’s water rights, City of Leavenworth v. Dep’t of Ecology, Chelan County Superior Court cause number 09-2-00748-3. On July 19, 2012, Chelan County Superior Court Judge Lesley A. Allan entered a final Order on Parties’ Cross-Motions (final order), which contained the superior court’s rulings in the case...

The City appealed the final order to the Washington Court of Appeals, Division III, (Case No. 312364). The appeal is currently subject to a March 11, 2013 Order Staying Further Proceedings, to allow the City and Ecology time to settle the appeal through replacement of the disputed water rights from another source in the Icicle Creek basin. The City and Ecology are actively participating in efforts with the Icicle Working Group to identify and fund projects that will result in water savings that can be transferred to the City for this purpose.⁵ Until a final resolution of the appeal, the City’s water right dispute with Ecology is unresolved. The City has not revised its water right self-assessment pending resolution of the appeal, but is voluntarily complying with the conditions contained in the final order until the appeal is resolved.”

As discussed in Chapter 6, the City asserts the Qa assigned to surface water certificate 8105 (S4-*16124CWRIS), which does not include a Qa figure, is 1,085 afy, while Ecology asserts the correct Qa is 275 afy. Currently, pending further appeal of the City’s lawsuit involving the right, the Qa for this water right officially is 275 afy, which means that the estimated combined total Qa for the City’s water rights is 1,465 afy, and not 2,275 as has been asserted by the City.

The City also has two rejected surface water applications and two active change applications. Change application CS4-ADJ35P4 seeks to correct the point of diversion for right S4-*35004JWRIS, which is incorrectly listed. The other is a seasonal change application (CS4-35004J@1) which seeks to temporarily change the POD for S4-*35004JWRIS from the existing diversion on Icicle Creek to the City’s wellfield near the Wenatchee River during construction of a new fish screening structure.

Additional Discussion of Icicle Creek Water Use

Water diverted by the City of Leavenworth, IPID, and COIC is used consumptively for either irrigation or municipal uses (which includes domestic, commercial, and irrigation uses), with specific purposes of use authorized described on respective water rights held by these entities. According to the PEIS (Ecology 2019), the three water purveyors serve approximately 3,250 parcels. Generally speaking, the City serves smaller parcels, most less than half an acre, and the irrigation districts serve larger parcels, most larger than 1 acre (Table B-1).

⁵ The proposed Trust donation of part of the Eightmile Lake water right will only be for instream flow benefits and will not be used to provide additional water to the City.

Table B-1. Number and Size of Parcels Served by Water Purveyors

Parcel Size	Number of Parcels Served		
	City of Leavenworth	IPID	COIC
0.00 - 0.10	108	0	0
0.11 - 0.25	552	128	0
0.26 - 0.50	270	234	12
0.51 - 1.00	150	361	65
1.01 - 2.00	122	353	118
2.01 - 3.50	36	135	19
>3.50	41	508	41
Total	1,279	1,719	255

Data from PEIS (Ecology 2019)

Additional Discussion of Other Surface Water Rights

Within the study area, Ecology records show 22 surface water rights for diversions from Icicle Creek or its tributaries (see Table B-2). For some of the rights, the Qa is not listed on the right's certificate. In those cases, the Qa listed on WRTS was used for Table B-2, or if the Qa was also blank on WRTS, the value was estimated as described in the table notes. In several cases the Qa is estimated based on the water duty calculation from the Referee's Report of the Icicle Creek Decree (Superior Court of the State of Washington 1929). The Referee's report calculates a water duty for a 5-month irrigation season as 1 acre-foot for each irrigated acre except for irrigated lands in with Cascade Orchard Tracts for which the duty is 1.2 acre-feet per irrigated acre.

Table B-2. Icicle and Snow Creek Water Rights

Water Right No.	Person or Organization	Priority Date	Purpose of Use	Additive		Source Name
				Qi (cfs)	Qa (afy) ^a	
S4-*35001JWRIS	Cascade Orchards Inc	1905 (Class 1)	Irrigation	11.9 ^b	2,064.5 ^c	Icicle Creek
S4-CV1P170	Cascade Orchard Inc	1905 (Class 1)	Irrigation, fish propagation, domestic multiple ^d	0.203 ^d	0	Icicle Creek
S4-*35002ABBJWRIS	Icicle Irrigation District	04/01/1910 (Class 2)	Irrigation	81.5775 ^e	25,000 ^f	Icicle Creek
S4-CV1P224	Icicle Irrigation District	04/01/1910 (Class 2)	Irrigation	1.7525 ^e	0	Icicle Creek
S4-*35003ABBJWRIS	Snow Creek Water Users Inc	10/14/1910 (Class 3)	Irrigation	4.0	450 ^g	Snow Creek
S4-*35005JWRIS	Fromm, S J	1912 (Class 4)	Irrigation	0.1	30 ^h	Mountain Home Creek
S4-*35006AWJWRIS	Fromm, S J	1912 (Class 4)	Irrigation	0.17 ⁱ	50 ^{i, j}	Mountain Home and Turner Creeks
S4-*35004JWRIS	City of Leavenworth	1912 (Class 4)	Municipal	1.52	1,100 ^k	Icicle Creek
S4-*00329CWRIS	Peshastin Irrigation District	10/27/1919 (Class 5)	Irrigation	34.38	10,315 ^l	Icicle Creek
S4-CV1P18 ^m	Snow Creek Water Company	01/03/1922 ^m	Irrigation	--	--	Snow Creek
S4-*35007JWRIS	Simons, R E	Class 6 (10/28/1929) ⁿ	Irrigation	0.17	50 ⁱ	Icicle Creek
S4-*35008JWRIS	Briskey, O	Class 6 (10/28/1929) ⁿ	Irrigation	1.0	300 ^o	Icicle Creek
S4-*35009JWRIS	Fromm, S J	Class 6 (10/28/1929) ⁿ	Irrigation	0.08	25 ^p	Icicle Creek
S4-*35010JWRIS	Fromm, S J	Class 6 (10/28/1929) ⁿ	Irrigation	1.0	300 ^o	Icicle Creek
CS4-01824C@2	USFWS Leavenworth Fisheries Complex	03/26/1942 ^q	Fish Propagation	42.0	27,482 ^q	Icicle Creek
S4-*16124CWRIS	City of Leavenworth	06/20/1960	Municipal	1.5	275 ^r	Icicle Creek
S3+20357CWRIS	Beemer, T A	07/25/1972	Irrigation	-- ^s	-- ^s	Icicle Creek
S3+20593CWRIS	Elmore, H C	10/31/1972	Domestic Multiple	0.02	2	Icicle Creek
S4-24376CWRIS	Falzon, D	08/03/1976	Irrigation	0.05	10	Icicle Creek
S4-28122	City of Leavenworth	01/28/1983 ^t	Municipal	3.18	90 ^t	Icicle Creek
S4-31676 ^u	Johnson, Robert	1/29/1993	Fish Propagation, Irrigation, Domestic Multiple, Fire Protection	1.0	357.3 ^v	Mountain Home Creek
S4-33068(A) ^u	City of Leavenworth	06/08/2012	Municipal	-- ^w	-- ^w	Icicle Creek

^a Quantities in *italics* are estimates; see other table notes for details.

^b Qi set by adjudication as 12.0 cfs in Icicle Creek Decree; certificate confirms 12.0 cfs; however, WRTS lists as 11.9 cfs reflecting change certificate S4-CV1P170.

^c Qa not listed on decree, nor on certificate. WRTS lists Qa as 2,064.5 afy. It is unclear how this quantity was derived as it does not meet the formula established by the Referee's Report (600 acres for 5 months with 1.2 acre-feet per month, or 3,600 acre-feet total), and the quantity listed on the WTRs may be incorrect.

- ^d In 1939 LNFH and COIC entered into an agreement concerning the use of the point of diversion, associated infrastructure, and shared water use through exercise of COIC's water right S4-*35001JWRIS. Following the 1939 agreement between COIC and LNFH, Certificate of Change S4-CV1P170 was issued in 1940 to formalize the 1939 Agreement. S4-CV1P170 changed the purpose and place of use for a total of 0.203 cfs of water from S4-*35001JWRIS. The purpose of use for 0.1 cfs was changed to fish propagation and domestic use on LNFH land. The place of use for the remaining 0.103 cfs was adjusted for COIC irrigation use within their service area. This reduced the water available for COIC irrigation from 12 cfs to 11.9 cfs. Additionally, the surplus water used by LNFH each year was formalized by Ecology in a permit in 1940, that was issued to authorize the changes to the water right that were approved. The permit authorized changes to the place and purpose of use for the surplus water for an indefinite time period. While this permit does not have an identifier or permit number, it is included within the file in WRTS under S4-CV1P170 and Ecology interprets it as part of the same record and authorization as S4-CV1P170. S4-006167CL is a statement of claim filed by COIC in 1971 for 5.627 cfs of water for the irrigation of 422 acres of COIC land (see Table 6-5 in Chapter 6). This claim specifies the shared point of diversion between LNFH and COIC. The details of this claim are redundant to adjudicated water right S4-*35001JWRIS, and the claim is not additive to S4-*35001JWRIS.
- ^e Qi set by adjudication as 83.33 cfs in Icicle Creek Decree; certificate confirms 83.33 cfs; however, WRTS lists as 81.5775 cfs reflecting Qi moved by change certificate S4-CV1P224.
- ^f Icicle Creek Decree and certificate do not list a Qa. The amount listed on WRTS was apparently derived by application of the water duty calculations in the Referee's Report (5,000 acres for 5 months with 1 acre-foot per month, 25,000 acre-feet in total).
- ^g Icicle Creek Decree and certificate do not list a Qa. The amount listed on WRTS was apparently derived by application of the water duty calculations in the Referee's Report (90 acres for 5 months with 1 acre-foot per month, 450 acre-feet in total).
- ^h Icicle Creek Decree and certificate do not list a Qa. The amount listed on WRTS was apparently derived by application of the water duty calculations in the Referee's Report (6 acres for 5 months with 1 acre-foot per month, 30 acre-feet in total).
- ⁱ Icicle Creek Decree and certificate do not list a Qa. The amount listed on WRTS was apparently derived by application of the water duty calculations in the Referee's Report (10 acres for 5 months with 1 acre-foot per month, 50 acre-feet in total).
- ^j WRTS lists the Qi and Qa as "supplemental" (non-additive) for this right, but that is not reflected on the certificate and no other documents are available from WRTS. Based on the certificate, we assume it is additive and WRTS is incorrect.
- ^k Qa is not listed on either the Icicle Creek Decree nor the certificate. If one presumes Qa is equal to constant application of Qi, the Qa would be 1,101 afy. The City's water system plan (Varela & Associates, Inc. 2018) lists the annual quantity for this right as 1,100 afy.
- ^l Qa is not listed on either the Icicle Creek Decree, the certificate, nor WRTS. The Qa listed here is an estimate based on applying the water duty calculations in the Referee's Report. The amount listed here was derived by application of the water duty calculations in the Referee's Report (2063 acres for 5 months with 1 acre-foot per month, 10,315 acre-feet in total).
- ^m No documents are available on WRTS for this right, which is listed as a Certificate of Change without a Qi or Qa. As a change certificate, it likely is a change in point of diversion or place of use for S4-*35003ABBJWRIS, so any Qi or Qa would be non-additive to that right. The priority date is listed in WRTS as 1/3/1922. However, it is a change from S4-*35003ABBJWRIS, the priority date potentially should be 10/14/1910, the same as S4-*35003ABBJWRIS.
- ⁿ The Icicle Creek Decree lists the lands pertinent to these rights as being in Class 6 but does not establish a priority date. The certificates for the rights list the priority date as "not given." WRTS lists the priority dates as 01/01/1901. However, we learned that January 1, 1901 is typically the default date added to WRTS when the priority date field is left blank (pers. comm., Ingrid Ekstrom, Washington Department of Ecology). As Class 6, their priority dates should be after the Class 5 rights. Consequently, we estimate the priority dates for the rights is the date of the Icicle Creek Decree.
- ^o Icicle Creek Decree and certificate do not list a Qa. The amount listed on WRTS was apparently derived by application of the water duty calculations in the Referee's Report (60 acres for 5 months with 1 acre-foot per month, 300 acre-feet in total).

- ^p Icicle Creek Decree and certificate do not list a Qa. The amount listed on WRTS was apparently derived by application of the water duty calculations in the Referee’s Report (5 acres for 5 months with 1 acre-foot per month, 25 acre-feet in total).
- ^q This water right change allowed an additional point of withdrawal for right S4-*05671CWRIS. No Qa was listed on the certificate for S4-*05671CWRIS. Qa was assigned as part of the processing of the water right change.
- ^r The estimated Qa is based on the application requesting 1,085.95 afy; the certificate not listing a Qa, but only a Qi of 1.5 cfs, which if applied continuously is 1,086.7 afy; and the City’s water system plan which argues for a Qa equal to the full instantaneous quantity. However, in a later water rights action, Ecology assigned a Qa of 275 afy on this right. The matter is being litigated. The litigation is currently on hold, but the official Qa for now is 275 afy (see Chapter 6).
- ^s The Qi, 0.075 cfs, and Qa, 29.4 afy, were originally additive. However, the right was changed in 1995 to change the point of diversion from Icicle Creek to a well adjacent to the Creek under Change authorization no. CS3-20357C and the Qi and Qa for that groundwater right are additive, leaving the surface water right as non-additive. It is listed on WRTS as “supplemental” (non-additive).
- ^t While the priority date for this right is earlier than the priority date for the Icicle Creek instream flow rule, the right is interruptible when the flow rule is not met due to a provision on the right’s permit and the ROE was issued following the effective date of the instream flow rule. Additionally, the permit for this right allocates a Qa of 636 afy, of which 546 afy is non-additive. Further, the primary/additive 90 afy is not in addition to any primary/additive 90 afy granted by the permit for groundwater right G4-29958. This right is the subject of the on-going litigation discussed above and the quantities may change subject to the final results of that litigation.
- ^u WRTS lists this right as being in permit stage, but the permit document is not available online. Qi and Qa amounts are from the ROE.
- ^v According to the ROE, the total Qa is 381 afy, of which the amount for multiple domestic, 23.7 afy, is an alternative non-additive source to G4-32057.
- ^w The ROE approves non-additive Qa of 702 afy and non-additive Qi of 1.17 cfs, of which, 0.070 cfs is debited to the Icicle Subbasin Reserve. The non-additive quantities are non-additive to groundwater quantities from the City’s wellfield near the Wenatchee River, outside of the Icicle Creek subbasin.

There are five other surface water rights in the study area with sources other than Icicle Creek and its tributaries. These rights are all for various unnamed springs, as listed below.

Table B-3. Other Surface Water Rights

Water Right No.	Person or Organization	Priority Date	Purpose of Use	Additive		Source Name
				Qi (cfs)	Qa (afy)	
S4-*18738CWRIS	Easterly, G L	10/7/1964	Domestic Single, Irrigation	0.05 ^a	10.0 ^a	unnamed spring
S4-*20463CWRIS	Knaake, E J	8/23/1967	Domestic Single	0.01	2.0	unnamed spring
S4-01193CWRIS	Hendrickson, R L	5/17/1971	Stock Water, Irrigation	0.15	28.5	unnamed spring
S3-+22417CWRIS	Dempsey, L C	1/24/1974	Domestic Multiple	0.007	3.6	unnamed spring
S4-25612GWRIS	Ritter, D W	11/16/1977	Stock Water, Irrigation	0.06	16.6 ^b	unnamed spring

^a These are the values given on WRTS and are the same as in the permit. However, the certificate is written for a Qi of 0.02 cfs and a Qa of 5 afy. It is unclear why the permit values are used in WRTS.

^b The certificate lists the total Qa as 16.4 afy while the WRTS lists 16.6 afy. However, the total given on the certificate is possibly an error, as the certificate also states there should be 0.2 afy for stock water and 16.4 afy for irrigation.

Additional Discussion of Groundwater Rights

Groundwater Certificates and Permits

The 12 water rights have a total allowed instantaneous withdrawal (Qi) of 5,402.1 gpm and a total annual quantity (Qa) of 6,592.6 acre-feet. However, the vast majority of this is used non-consumptively for fish propagation by the LNFH. The USFWS has rights to 5,100 gpm and 6,377 afy of non-consumptive use. The groundwater rights are summarized on Table 4.7.

Table B-4. Groundwater Water Rights

Water Right No.	Person or Organization	Priority Date	Purpose of Use	Additive	
				Qi (gpm)	Qa (afy)
G4-*03818CWRIS	Wilson, W D	12/14/1954	Irrigation	50	33.0
G4-*04716CWRIS	USFWS	10/16/1957	Fish Propagation	1,200	1,120.0
G4-*08640CWRIS	Conwell, B L	04/04/1967	Irrigation	44	28.0
G3-+00062CWRIS	Coffman, K E	07/06/1971	Domestic Single, Irrigation	27	17.0
CS3-20357C	Beemer, W A	07/25/1972 ^a	Irrigation	33.6	29.4
G4-25294CWRIS	Blanchard, H	06/03/1977	Domestic Single, Irrigation	40	18.0
G4-27115ALCWRIS	USFWS	10/20/1980	Fish Propagation	3,900	5,257.0
G4-27336GWRIS	Dahlgreen, A E	02/26/1981	Domestic Single, Irrigation	12.5	12.6
G4-28322	Adams, S	10/24/1983	Domestic Single, Irrigation	25	24.1
G4-30213	Jensen, B	03/19/1990	Domestic Single, Irrigation, Frost Protection	10	1.0
G4-30243	Nelson, CW	04/23/1990	Domestic Single	10	1.0
G4-32057	Johnson, R K	04/22/1994	Domestic Multiple, Irrigation	50 ^a	51.5 ^b

^a This right is a change on S3-+20357CWRIS from a diversion on Icicle Creek to a well. WTRS lists the priority date as July 5, 1994, which is the date the change application was made. However, the priority date for the surface water right is July 25, 1972.

^b The permit indicates 50 gpm additive for multiple domestic and 50 gpm non-additive for irrigation, but the combined withdrawal for domestic and irrigation uses cannot exceed 50 gpm. Also consumptive multiple domestic use shall not exceed 0.01 cfs (7.24 acre-feet) in September. Multiple domestic authorization is primary to an alternate, non-additive source under S4-31676. Quantities authorized for irrigation are subject to interruption when instream flows are not met.

USFWS Groundwater Rights

The LNFH has two groundwater rights (Table B-4) and two water right claims (Table B-5). The rights total 5,100 gpm and 6,377 afy, while the claims add 1,600 gpm and 1,300 afy. Groundwater is used to supplement water quantities and modify temperatures of the hatchery's surface water supply. Reportedly, the hatchery requires between 1,060 and 6,590 gpm of groundwater, with the highest needs in June and December, to supplement their surface water source (Reclamation 2010). However, recently the LNFH has been limited to a peak production of about 3,200 gpm and 2,600 afy due to well inefficiencies, drawdown interference, and low water levels (Aspect 2016). The hatchery produces groundwater from a wellfield consisting of seven production wells scattered across their property.

Table B-5. Groundwater Water Claims

Water Right No.	Person or Organization	Claimed Date of First Use	Purpose of Use	Qi	Qa (afy)
G4-129299CL	Stroup, R H	05/1939	Domestic General	3 gpm	2.0
G4-012008CL	USFWS	08/1939	Fish Propagation	700 gpm	570.0
G4-020982CL	Nigbor, E V	01/1940	Stockwater, Irrigation	0.07 cfs	4.0
G4-012009CL	USFWS	06/1940	Fish Propagation	900 gpm	730.0
G4-115923CL	Gregory, H L	05/15/1944	Domestic General	nl	nl
G4-016911CL	King, V R	03/15/1948	Domestic General, Irrigation	160 gpm	62.0
G4-063300CL	Marson, K M	08/1954	Domestic General	100 gpm	nl
G4-100738CL	Holcombe, A M	02/1955	Domestic General	3 gpm	2.0
G4-099272CL	Titus, D	04/1968	Domestic General	3 gpm	2.0
G4-082534CL	Horton, VL	05/01/1973	Domestic General	10 gpm	2.0
G4-081569CL	Fliegel Jr, J J	09/1973	Domestic General	10 gpm	2.0
G4-129298CL	Stroup, R R	10/1973	Domestic General	3 gpm	2.0
G4-081260CL	Wicks, G	04/1974	Domestic General	10 gpm	1.0
G4-145057CL	Gibb, L	05/01/1975	Irrigation, Domestic General	310 gpm	124.0
G4-034939CL	Chamberlin, B M	nl	Domestic General	nl	nl
G4-053022CL	Ranahan, H J	nl	Domestic General	nl	nl
G4-058173CL	Woods, E A	nl	Domestic General	nl	nl
G4-067862CL	Silhavy, C F	nl	Domestic General	nl	nl
G4-070629CL	Norris, B	nl	Domestic General, Stockwater	nl	nl
G4-078108CL	Foster, C M	nl	Domestic General	nl	nl
G4-085190CL	Marson, K G Sr	nl	Domestic General	nl	nl
G4-089900CL	Parish, J W	nl	Domestic General, Irrigation	nl	nl
G4-129097CL	Weinhold, M R	nl	Domestic General	nl	nl
G4-130028CL	Smith, R L Jr	nl	Domestic General, Stockwater, Irrigation	nl	nl
G4-132630CL	Carlson, A N	nl	Domestic General, Irrigation	nl	nl
G4-132631CL	Carlson, A N	nl	Irrigation, Domestic General	nl	nl
G4-152358CL	Dempsey, L C	nl	Stockwater, Irrigation, Domestic General	nl	nl

nl - not listed on claim form

Permit-exempt Wells

Permit-exempt wells are exempt from the requirement to obtain water right permits, but they still have water rights and are subject to water law principles, including interruption of use when interfering with senior rights, including previously established instream flow rules. It is difficult to determine the number of permit-exempt wells in the Icicle Creek Subbasin. However, based on a review of well logs in Ecology's online well log database conducted by the EIS team in 2021, there appear to be about 38 permit-exempt wells within the study area above the LNFH diversion on Icicle Creek and about 255 permit-exempt wells below. Most of these wells support single-domestic usage, but many likely support Group B water systems, which can have up to six Equivalent Residential Units (ERUs). A review of the Washington State Department of Health Source Water Assessment Program online mapping application indicates there are 17 Group B systems in the study area.

The wells in the upper portion of the basin and on the hillsides above the valley in the lower basin are mostly completed in bedrock, while those on the valley floor in the lower portion of the basin are completed in unconsolidated sediments. The amount of water produced by permit-exempt wells in the Icicle Creek subbasin is unknown. However, an estimate can be made based on projected water demand per ERU from the City of Leavenworth's water system plan. The water system plan projects annual demand per ERU at 98,250 gallons (Varela & Associates, Inc. 2018), which is equivalent to about 0.3 acre-feet. Assuming each Group B system has a single well, the Group B systems average 4 ERUs, and the non-Group B wells each represent a single ERU, the estimated 288 permit-exempt well logs in the study area represent about 340 ERUs. Further, assuming the water demand for ERUs on permit-exempt wells is approximately equal to the water demand in the City of Leavenworth, the total annual water production from the permit-exempt wells in the study area is about 102 acre-feet.

Groundwater Claims

Groundwater claims are an official statement claiming a water right for water use that predates the State's Groundwater Code of 1945. Validity of claims can only be determined and confirmed through a legal adjudication by the court. However, any groundwater claim with a date of first use after 1945 is probably not valid. WRTS lists 27 groundwater claims in the study area (Table B-5).

As described above, claims can only be filed during certain open periods allowed by the legislature, and the form used depends on the particular open period. Long forms requested the claimant report the date of first water use (although not all claimants using the form filled in the date), while short forms did not ask for the first date of use or the amount being used. Therefore, many claims do not list a claimed quantity or date of first use.

Active Groundwater Right Applications

There are seven active groundwater right applications within the study area. These include five change applications and two new applications.

One of the new applications is for a current permit-exempt well where, according to a note in the documentation on WRTS, the applicant understands they do not need a permit but wants to obtain one anyway.

The other new application is for a property that currently has a surface water right, S3-+22417CWRIS. The same applicant also has one of the change applications, which seeks to move the authorized quantity to the same well as the new application.

The four other change applications all belong to the USFWS. The USFWS change application seeks to add additional points of withdrawal for the LNFH's existing groundwater rights.

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Appendix C: Plant Survey Memo



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memorandum

date November 24, 2021

project Eightmile Dam Rebuild and Restoration Project

to Brigitte Ranne, U.S. Forest Service

from Sierra McComas, Environmental Science Associates

subject Vegetation Survey for the Eightmile Dam Staging Area and FS Road 7601-116

INTRODUCTION

On behalf of the U.S. Forest Service (FS), Environmental Science Associates (ESA) conducted a survey of habitat conditions, rare, threatened, and endangered (RTE) vascular plant species, and undesirable plant species for the Eightmile Dam Rebuild and Restoration Project (Project). The survey focused on two study area locations in Chelan County, including the Eightmile Dam Staging Area and a portion of FS Road 7601-116 to be improved as part of project operations (**Appendix A, Figure 1**). The Staging Area is located in Township 24 North, Range 16 East, Section 34 and the segment of FS Road 7601-116 spans Township 24 North, Range 16 East, Sections 26 and 27.

ESA Environmental Scientists, Sierra McComas and Hannah Smiley, surveyed the Staging Area and the defined segment of FS Road 7601-116 on September 30, 2021. The weather on the day of the survey included intermittent rain, wind, and partially cloudy skies. The Fish Lake weather station is located approximately 10 miles east of Eightmile Lake at a similar elevation as the study areas. On September 30, the station recorded a maximum temperature of 50 degrees, a minimum temperature of 37 degrees Fahrenheit, average temperature of 43.5 degrees, and 0.70 inch of precipitation. No snow was reported nor had accumulated on the ground at the time of the survey.

SURVEY METHODS

ESA field staff recorded vegetation types and surveyed for populations of target RTE and undesirable plant species within the study areas determined by the planned extent of the Eightmile Dam Staging Area and roadbed of the FS Road 7601-116 segment. All surveys were conducted simultaneously.

Because of the time constraints concerning construction and permitting, the study areas were surveyed outside of the peak bloom period for many of the target species. As a result, the ESA field surveyors identified potentially suitable habitat for target species that may be present but not in bloom. Additionally, in the absence of diagnostic blooming features, remaining senesced inflorescence and vegetation were utilized to identify species found on site.

The survey methodology consisted of the following steps: (1) determine survey locations; (2) gather preliminary habitat data and develop target lists of plant species reasonably likely to occur in the Project vicinity; (3) conduct

field surveys; and (4) compile mapping and data for reporting. These steps are described in further detail in subsequent discussion.

Study Areas

The extents of the two study areas were determined based on communications between the Icicle and Peshastin Irrigation Districts (IPID), FS, and ESA concerning access to Eightmile Dam (Jantzer 2021a, 2021b). From these communications, the following two study areas were derived:

Staging Area Study Area

- The entirety of the proposed 0.14 acre Staging Area (**Appendix A, Figure 2**) and a 10-foot buffer surrounding the area.

FS Road 7601-116 Segment Study Area

- The full 24-foot width of the roadbed for the first 4,280 feet of FS Road 7601-116 (which will be cleared for a 10-foot width roadbed) (**Appendix A, Figure 3**) extending north from the intersection of FS Road 7601 with the following additional areas:
 - The last 100 feet (to be cleared the full 24 feet for parking) was surveyed 10 feet on both sides of the 24-foot wide roadbed.
 - The last 30 feet (to be widened to 30 feet for a turnaround) was surveyed 15 feet from the roadbed edge on both sides of the road.
 - The entirety of the debris pile at the end of the road (that will be used to widen the road) was surveyed.

Pre-field Data Collection and Development of Plant Species Lists

Preliminary habitat data and lists of RTE and undesirable vascular plant species with potential to occur in the study areas were gathered prior to fieldwork as part of the survey methodology and are described below.

Staging Area Preliminary Habitat Data

- Elevation: Approximately 5,150 feet above mean sea level (MSL).
- Natural Resources Conservation Service (NRCS) soil type: soda very bouldery sandy loam, 30 to 60 percent slopes (NRCS 2021).
 - Ecological site: east mountain slopes forest subalpine fir.
 - Vegetative classification: subalpine fir/Cascade azalea.
- U.S. Environmental Protection Agency (EPA) Ecoregion 77c: The North Cascades Subalpine/Alpine ecoregion is characterized by high mountain peaks, bare rock, glaciers, many tarns, plentiful precipitation, and sediment-laden glacial meltwater streams (EPA n.d.). Subalpine meadows occur around the taller peaks; their flora and fauna are adapted to the prevailing subarctic climate (EPA n.d.).
- Located within the Alpine Lakes Wilderness Area.

FS Road 7601-116 Segment Preliminary Habitat Data

- Elevation: Begins at approximately 3,250 feet above MSL and extends to approximately 3,800 feet above MSL.
- NRCS soil and vegetation types:
 - Icicle very bouldery sandy loam, 3 to 30 percent slopes.
 - Icicle very bouldery sandy loam, 30 to 75 percent slopes.
 - Icicle-chumstick-rock outcrop complex, 45 to 90 percent slopes.
 - Vegetative classification: grand fir/cascade Oregon grape/pinegrass.

- Ecological site: cool frigid xeric ashy slopes (grand fir cool dry grass).
- EPA Ecoregion 77g: The glaciated Wenatchee/Chelan Highlands ecoregion is characterized by mountains and ridges, tarns, U-shaped valleys, and dissected high-gradient streams. Leeward climatic conditions prevail (EPA n.d). Douglas-fir, grand fir, and subalpine fir are common; lodgepole pine and Engelmann spruce also occur (EPA n.d.).
- Located 0.31 mile northeast of the nearest portion of the Alpine Lakes Wilderness Area.

RTE Plant Target Species List

The target list of RTE plant species included vascular plant species that are federally threatened or endangered under the Endangered Species Act and rare plant species identified by the Washington Natural Heritage Program (WNHP). A target list of 17 species was generated from the following sources:

- WNHP records of rare plant species documented as occurring within 10 miles of the study areas (**Table 2**) (WDNR 2021b).
- 2019 Forest Service Region 6 Regional Forester Special Status Species: Okanogan-Wenatchee National Forest Federally Threatened, Endangered, or Proposed Species (**Table 2**) (**Appendix B**) (Forest Service 2019).

Undesirable Plant Target Species List

The target list of noxious weed species was generated from the following sources:

- 2021 Chelan County Noxious Weed List (**Appendix C**) (Chelan County 2021).
- 2021 Washington State Noxious Weed List (**Appendix D**) (Washington State Noxious Weed Control Board 2021).
- 2010 Forest Service Region 6 Invasive Plant List (**Appendix E**) (Forest Service 2010).

Prior to the start of surveys, the field team reviewed data relating to the plant species identified on the RTE and undesirable plant species target lists. For RTE species, the Burke Herbarium Image Collection (Burke Herbarium 2021) and the Online Field Guide to the Rare Plants of Washington (WNHP 2021) were reviewed to gain familiarity with seasonal morphological characteristics of target RTE plant species and the habitat requirements of each. Geographic information system (GIS) data regarding the location of RTE plant populations within the study area, provided by WNHP, was also reviewed. For undesirable species, the Washington State Noxious Weed Control Board invasive species plant profiles were reviewed prior to field work commencing.

Methods for Habitat Conditions Survey

While simultaneously conducting walking surveys for RTE and undesirable plants, ESA field staff mapped and recorded habitat conditions observed within and directly adjacent to the study areas. Field staff also photo-documented habitats and related species. Indicators used to identify habitat types included:

- Dominant species
- Soils
- Vegetative structure
- Geomorphology

Field staff used navigation system software (GNSS) Bluetooth receivers paired with tablet computers to record any relevant habitat data in real time and at resource-grade accuracy.

Methods for RTE Plant Survey

ESA field staff conducted meandering walking surveys of the study areas to determine RTE plant presence and/or the presence of potentially suitable habitat. Indicators used to identify potential habitat for sensitive plants included:

- The area is relatively undisturbed with <20 percent cover of non-native/invasive species.
- At least three associated species are present.
- Vegetative characteristics of the possible target plant indicate a likely match.
- Soil, geomorphology, and aspect meet the requirements of identified sensitive plant habitats.

Field staff used GNSS Bluetooth receivers paired with tablet computers to record any relevant sensitive species data in real time and at resource-grade accuracy.

Methods for Undesirable Plant Survey




ESA field staff conducted meandering walking surveys of the study areas to identify undesirable plant species. Where undesirable plants were observed, field staff estimated the extent of the population and used GNSS Bluetooth receivers paired with tablet computers to record noxious weed data in real time and at resource-grade accuracy. Field staff also photographed representative populations of target species. As ecological integrity is important in and around Wilderness Areas, other incidental observations of non-native species whose vegetation or inflorescence had not yet fully senesced were also recorded when observed.

HABITAT CONDITIONS SURVEY RESULTS

Based on the results of the surveys, there are similarities in the botanical species observed within both study areas. However, differences in elevation, soil type, geomorphic conditions, and aspect have created unique vegetation communities within these areas. In 2012, both study areas were scorched in the Cashmere wildfire (WDNR 2021a). The wildfire contributed to the landscape composition by creating gaps in the canopy, removing vegetation and altering soil compositions, thus allowing new communities of trees, shrubs, and forbs to grow in the newly created open areas. The physical characteristics differentiating the two study areas are described in the following discussion.

The Staging Area covers a relatively small patch of habitat and consists of one subalpine vegetation community. However, the FS Road 7601-116 study area stretches approximately 0.85 mile with an elevation change of approximately 550 feet. Within this range, the vegetation communities vary slightly with a less drought-tolerant, more dense habitat occurring at the lower elevations, and a sparser, drier habitat occurring at the higher elevations. Both the Staging Area and lower segment of FS Road 7601-116 occur in or near a topographical basin or drainage. The upper portion of FS Road 7601-116 is located on a south-facing slope. The plant communities and habitat types of the study areas are summarized in **Table 1**.

Table 1. Vegetation Communities Surrounding the Study Areas

Vegetation Community	Associated Species	Observed Conditions and Species	Photograph
Staging Area			
Subalpine habitat with subalpine fir forest associations	Subalpine fir forests in this region are associated with the following species seen in the vicinity of the study area: subalpine fir (<i>A. lasiocarpa</i>), Pacific silver fir (<i>Abies amabilis</i>), Engelmann spruce (<i>Picea engelmannii</i>), mountain hemlock (<i>Tsuga mertensiana</i>), lodgepole pine (<i>Pinus contorta</i>), Douglas-fir (<i>Pseudotsuga menziesii</i>), grand fir (<i>Abies grandis</i>), quaking aspen (<i>Populus tremuloides</i>), common juniper (<i>Juniperus communis</i>), serviceberry (<i>Amelanchier alnifolia</i>), thimbleberry (<i>Rubus parviflorus</i>), white hawkweed (<i>Hieracium albiflorum</i>), aster (<i>Aster</i> spp.), and common yarrow (<i>Achillea millefolium</i>).	The Staging Area was set back from the lakeshore via distance and elevation. Fir trees with lower story vegetation were present. Species observed within and surrounding the area included: Douglas-fir, subalpine fir, silver fir, Engelmann spruce, mountain hemlock, black cottonwood (<i>Populus balsamifera</i>), quaking aspen, common juniper, Oregon boxwood (<i>Paxistima myrsinites</i>), currant (<i>Ribes</i> sp.), elderberry (<i>Sambucus</i> sp.), thimbleberry, mullein (<i>Verbascum thapsus</i>), milk vetch (<i>Astragalus</i> sp.), white hawkweed, common yarrow, aster, various clumping and non-clumping grasses, yellow salsify (<i>Tragopogon dubius</i>), red sand spurrey (<i>Spergularia rubra</i>), and blackcap raspberry (<i>Rubus leucodermis</i>).	
Upper Elevation Portion of FS Road 7601-116 Segment			
Montane highland habitat with grand fir forest associations	Highland forested habitat is found at lower elevations than subalpine communities. Some species commonly associated with grand fir forest zones in the eastern Cascades included: grand fir, western hemlock (<i>Tsuga heterophylla</i>), mountain hemlock, Douglas-fir, ponderosa pine (<i>Pinus ponderosa</i>), lodgepole pine, Oregon boxwood, willow (<i>Salix</i> spp.), rose (<i>Rosa</i> spp.), common snowberry (<i>Symphoricarpos albus</i>), snowbrush (<i>Ceanothus velutinus</i>), serviceberry, blue elderberry (<i>Sambucus cerulea</i>), fragrant bedstraw (<i>Galium triflorum</i>), white hawkweed, and lupine (<i>Lupinus</i> spp.). In some areas, western hemlock and western red cedar (<i>Thuja plicata</i>) are also present.	This segment of road was open with a mat of pine needles in most areas. Slopes below and above the study area were mostly vegetated, with some boulder outcrops. Species observed within and surrounding the area included: lodgepole pine, ponderosa pine, grand fir, black cottonwood, willow spp., snowbrush, manzanita (<i>Arctostaphylos</i> spp.), ocean spray (<i>Holodiscus discolor</i>), blue elderberry, Oregon grape (<i>Berberis aquifolium</i>), Oregon boxwood, serviceberry, Wood's rose (<i>Rosa woodsii</i>), blackcap raspberry, thimbleberry, common yarrow, fireweed (<i>Chamaenerion angustifolium</i>), aster spp., bracken fern (<i>Pteridium aquilinum</i>), diffuse knapweed (<i>Centaurea diffusa</i>), clumping and non-clumping grasses, spreading dogbane (<i>Apocynum androsaemifolium</i>), broadleaf lupine (<i>Lupinus latifolius</i>), and pearly everlasting (<i>Anaphalis margaritacea</i>).	
Lower Elevation Portion of FS Road 7601-116 Segment			
Montane highland habitat with grand fir forest associations and low elevation subalpine fir forest species present	In addition to the grand fir forest associations listed above, this area also included species associated with lower elevation subalpine fir forests located in ravines and more moist habitats. Some species associated with this type of habitat include: Rocky Mountain maple (<i>Acer glabrum</i>), white hawkweed, serviceberry, aster spp., red baneberry (<i>Actaea rubra</i>), thimbleberry, and fragrant bedstraw.	This area was characterized by an adjacent seasonal drainage, a higher density of cedar and alder trees, and a lower density of pine trees than the upper portion of FS Road 7601-116. Species observed within and surrounding the area included: Douglas-fir, lodgepole pine, grand fir, western red cedar, black cottonwood, willow spp., alder spp., Rocky Mountain maple, snowbrush, blue elderberry, ocean spray, Oregon grape, serviceberry, thimbleberry, orange honeysuckle (<i>Lonicera ciliosa</i>), various grasses, spreading dogbane, common yarrow, fragrant bedstraw, fireweed, broadleaf lupine, bracken fern, pearly everlasting, horsetail (<i>Equisetum</i> sp.), and red baneberry.	

Sources: EPA (2021), Franklin and Dyrness (1973).

RTE PLANT SURVEY RESULTS

Neither of the study areas provide quality potential habitat for any known rare, sensitive, or Endangered Species Act-listed botanical species. Both study areas occupy disturbed sites, which diminishes the suitability of the habitats to support such RTE species. The FS Road 7601-116 segment has been previously excavated and used for transportation and access, while the Staging Area is in a location that receives disturbance from recreational use of the area by hikers and previous repairs to the Eightmile Dam.

Table 2 lists all WDNR Natural Heritage Program rare species mapped within 10 miles of the study areas, as well as Endangered Species Act-listed species with known occurrences in the Okanagan-Wenatchee National Forest, the associated habitats in which these RTE species are found, and the presence of the species in relation to the study areas. Rare species mapped by the WDNR Natural Heritage Program in the immediate vicinities of the study areas include Seely's catchfly (*Silene seelyi*) near the Staging Area and Thompson's pincushion (*Chaenactis thompsonii*) near FS Road 7601-116. Neither of these species, or quality habitat for any other RTE species, was observed within the study areas during the field surveys.

Table 2. Target List of RTE Plant Species and Observed Likelihood of Occurrence

Common Name	Scientific Name	Listing Status*	Associated Habitat Characteristics	Likelihood of Occurrence in Study Areas
Endangered Species Act-Listed Species				
Showy stickseed	<i>Hackelia venusta</i>	FE G1 N1	Found in dry, loose granitic sand and crevices in granite or talus between elevations 1,500 and 7,400 feet above MSL. This species is restricted to sites with low vegetative cover from unstable slopes (ranging between 25 and 70 degree slopes) and periodic fires.	No occurrence. No unstable slopes of granite and/or talus occur within either of the study areas.
Ute ladies'-tresses	<i>Spiranthes diluvialis</i>	FT G2G3 N2	Grows in a variety of habitats but is usually associated with moist environments, including alkaline wetlands, moist meadows, floodplains, flooded river terraces, sub-irrigated or spring-fed abandoned stream channels and valleys, lakeshores, irrigation canals, berms, levees, or irrigated meadows. It is found in elevation ranges between 720 and 1,830 feet above MSL.	No occurrence. The study areas are above the elevational range of this species.
Wenatchee Mountains checker-mallow	<i>Sidalcea oregana</i> var. <i>calva</i>	FE G5 N1	Grows in moist meadows with surface water or saturated soil into early summer. It also grows in open Douglas-fir or ponderosa pine coniferous stands and along edges of shrub and hardwood thickets. Associated species include: quaking aspen, snowberry, serviceberry, and Wenatchee larkspur. Fire historically played a role in maintaining habitat for this species, and it is generally found in elevations between 1,900 and 3,200 feet above MSL.	No occurrence. While there are some areas with moist soils and associated species along the FS Road segment, the study area is above the identified elevation range of this species.
Rare Species				
Brewer's cliffbrake	<i>Pallaea breweri</i>	G5 S2	Grows in open, rocky alpine habitats in crevices, ledges, and bases of cliffs, rock outcrops and rocky slides at elevations between 4,700 and 6,700 feet above MSL. Associated species include: Brandegee's desert-parsely (<i>Lomatium brandegei</i>), Columbian lewisia (<i>Lewisia columbiana</i>), spreading phlox (<i>Phlox diffusa</i>), cliff beardtongue (<i>Penstemon rupicola</i>), saxifrage (<i>Saxifrage bronchialis</i>), and Leiberg's fleabane (<i>Erigeron leibergii</i>).	No occurrence. While Brandegee's desert-parsely and a rockslide area occur within the FS Road segment, the entirety of the road segment is well below the elevation range this species is found within.
Canadian single-spike sedge	<i>Carex scirpoidea</i>	G5T5 S2	Found in moist alpine meadows, stream banks, and open rocky slopes above timberlines at elevations of 4,800 to 7,600 feet above MSL. It prefers moist habitats with thin, rocky soils, rock outcrops, and talus slopes.	No occurrence. The Staging Area is within the elevational range that this species is found. However, the Staging Area is below the timberline, is not moist, and no sedges were observed within the vicinity.

Common Name	Scientific Name	Listing Status*	Associated Habitat Characteristics	Likelihood of Occurrence in Study Areas
False mountain willow	<i>Salix pseudomonticola</i>	G4G5 S1	Habitats include wet meadows, stream banks, lake edges, hummocks in calcareous peat fens, thickets, and floodplains in montane to subalpine sites at elevations between 2,950 and 5,500 feet above MSL. Associated species include subalpine fir (<i>Abies lasiocarpa</i>), Engelmann spruce (<i>Picea engelmannii</i>), resin birch (<i>Betula glandulosa</i>), Maccall's willow (<i>Salix maccalliana</i>), alderleaf buckthorn (<i>Rhamnus alnifolia</i>), sedges (<i>Carex lasiocarpa</i> , <i>C. cusickii</i> , <i>C. utricularia</i>), cotton-grass (<i>Eriophorum</i> spp.), and mosses (<i>Sphagnum</i> spp.).	Unlikely to occur. This species was not observed within either of the study areas, and no perennial streams occur within either study area. The Staging Area is set back enough from the lake shore that the habitat would not support this species.
Mountain lousewort	<i>Pedicularis pulchella</i>	G3 S3	Uncommonly found in Washington and grows in gravel fields and slopes at or above timberline.	No occurrence. The study areas are below the timberline.
Rone's biscuitroot	<i>Lomatium roneorum</i>	G1 S1	Endemic to Chelan County where it grows on open, rocky, steep slopes (45% slope recorded for population in Chelan County) in ponderosa pine forest openings.	No occurrence. There are no steep slopes within either study area.
Ross' avens	<i>Geum rossii</i> var. <i>depressum</i>	G5T1 S1	Found in high-elevation rocky areas, including talus slopes, cliffs, and rock crevices at elevations between 6,700 and 8,400 feet above MSL.	No occurrence. The study areas are below the elevational range of this species.
Salish fleabane	<i>Erigeron salishii</i>	G3 S2	Habitat includes dry, rocky, or scree slopes and ridgetops with granite, rock, talus, sand, and loess soils in alpine zones at elevations between 6,600 and 9,000 feet above MSL.	No occurrence. The study areas are below the elevational range of this species.
Seely's catchfly	<i>Silene seelyi</i>	G2G3 S2S3	Grows in shaded crevices in ultramafic, granitic, or basaltic cliffs and rock outcrops and occasionally among boulders in talus at elevations between 1,120 and 6,300 feet above MSL. It prefers a canopy cover typically less than 30% and a slope of 15–20%. Associated species included: alumroot (<i>Heuchera cylindrica</i>), Chelan penstemon (<i>Penstemon pruinosus</i>), field chickweed (<i>Cerastium arvense</i>), northern hollyfern (<i>Polystichum lonchitis</i>), and Wallace's selaginella (<i>Selaginella wallacei</i>).	Unlikely to occur. Potential habitat occurs upslope and downslope of some portions of the FS Road segment. Alumroot was observed on several rocky outcrops outside of the roadbed. No associated species were observed at the Staging Area and rocky areas were disturbed.
Smoky Mountain sedge	<i>Carex proposita</i>	G4 S2	Often grows on talus or granite near or above the timberline at elevations between 4,500 and 7,700 feet above MSL. Found on open, dry, rocky slopes and ridges and in dry meadows near lakes and streams. Associated species include subalpine fir (<i>Abies lasiocarpa</i>), subalpine larch (<i>Larix lyallii</i>), whitebark pine (<i>Pinus albicaulis</i>), sedges (<i>Carex nardina</i> , <i>C. breweri</i> , <i>C. phaeocephala</i>), alpine pussy-toes (<i>Antennaria alpina</i>), spreading phlox (<i>Phlox diffusa</i>), black crowberry (<i>Empetrum nigrum</i>), and alpine fescue (<i>Festuca brachyphylla</i> spp. <i>brachyphylla</i>).	No occurrence. The Staging Area falls within the known elevation range of this species, but is below the timberline and contains no talus or granite open habitat.
Strawberry saxifrage	<i>Saxifragopsis fragariodes</i>	G3 S1	Habitat includes cracks and crevices on cliffs and rock outcrops at elevations between 1,440 and 4,300 feet above MSL. Associated species include: ponderosa pine (<i>Pinus ponderosa</i>), Douglas-fir (<i>Pseudotsuga menziesii</i>), oceanspray (<i>Holodiscus discolor</i>), mock orange (<i>Philadelphus lewisii</i>), snowbrush ceanothus (<i>Ceanothus velutinus</i>), serviceberry (<i>Amelanchier alnifolia</i>), bitterbrush (<i>Purshia tridentata</i>), snowberry (<i>Symphoricarpos albus</i>), field chickweed (<i>Cerastium arvense</i>), Tweedy's Lewisia (<i>Lewisia tweedyi</i>), beardtongue (<i>Penstemon</i> spp.), and balsamroot (<i>Balsamorhiza sagittata</i>).	No occurrence. While some of the species associated with this plant are present within and surrounding the FS Road segment, and it falls within the appropriate elevation zone, there are no cliffs or rock outcrops within the boundaries of either study area.
Taylor's stickseed	<i>Hackelia taylorii</i>	G2 G2	Found on steep, unstable, sparsely vegetated subalpine to alpine sandy-gravelly talus slopes derived from Mount Stuart batholith.	No occurrence. There are no steep, unstable slopes or soils derived from Mount Stuart batholith within either study area.
Thompson's chaenactis	<i>Chaenactis thompsonii</i>	G2G3 S2S3	Grows on dry, rocky slopes and ridges at elevations between 2,900 and 7,000 feet above MSL. It typically grows in serpentine soils high in magnesium and low in	Unlikely to occur. Yarrow and lupine were found in moderate

Common Name	Scientific Name	Listing Status*	Associated Habitat Characteristics	Likelihood of Occurrence in Study Areas
			calium along moderate to steep slopes with variable aspects. Surrounding vegetation is generally sparse and xerophytic, and associated species include: bluegrass (<i>Poa</i> spp.), wheatgrass (<i>Agropyron</i> spp.), buckwheat (<i>Erigonum</i> spp.), snow-dwarf primrose (<i>Douglasia nivalis</i>), yarrow (<i>Achillea millefolium</i>), and lupine (<i>Lupinus</i> spp.).	densities throughout the roadbed. The lack of rocky outcrops and steep slopes in the roadbed indicates the plant will not likely be found in the study area, but may be found just upslope or downslope.
Wenatchee larkspur	<i>Delphinium viridescens</i>	G2 S2	Found in moist meadows, seasonally wet openings in aspen groves and hardwood thickets, springs, seeps, and riparian areas between the elevations of 1,240 and 5,700 feet above MSL. All habitats include surface water or saturated upper soil profiles into early summer and silt loam or clay loam soils.	No occurrence. There are no areas within either study area that appear to be saturated into the summer. Culverts divert seasonal water flows under and away from the study areas.
Whited's fuzzytongue penstemon	<i>Penstemon eriantherus</i> var. <i>whitedii</i>	G4T2 S2	Habitat includes west-facing slopes of small canyons, ridgetops, and dry rocky places in the foothills of the Cascades and in the Columbia Basin between the elevations of 500 and 4,000 feet above MSL. Associated species include antelope bitterbrush (<i>Purshia tridentata</i>), rabbitbrush (<i>Ericameria nauseosa</i>), big sagebrush (<i>Artemisia tridentata</i>), purple sage (<i>Salvia dorrii</i>), bluebunch wheatgrass (<i>Pseudoroegneria spicata</i>), and cheatgrass (<i>Bromus tectorum</i>).	No occurrence. None of the associated species were observed in either study area, and both study areas are located above the foothills of the greater region.

Sources: Forest Service (2019), Burke Museum (2021), NatureServe (2021), WNHP (2021), and WDNR (2021b)

* Conservation Status Rank Categories: Global (G) Conservation Status Rankings: Intraspecific Taxon Rank (T); National (N); Subnational (S)

Conservation Status Rank Levels: 1 = Critically Imperiled; 2 = Imperiled; 3 = Vulnerable; 4 = Apparently Secure; 5 = Secure

Endangered Species Act Listings: FE = Federally Endangered, FT = Federally Threatened

UNDESIREABLE PLANT SURVEY RESULTS

Washington State and Chelan County classify weeds on a ranked scale from A to C. No Class A weeds were identified within the study areas; however, several Class B and C species were mapped within the study areas. Class B weeds are species that are widespread in some parts of Washington State but are limited or absent in other areas. Some populations of Class B weeds require control, depending on whether the species is a local priority. Class C weeds are often widespread species that are not required for control. However, Chelan County does require landowners to control certain Class C weeds due to their threat to agriculture and/or natural resources (Chelan County 2021).

During the survey, the locations of Washington State and Chelan County classified weeds were recorded and mapped using geographic information system (GIS) software. Non-classified weeds were mapped only if the occurrence of the species was small or concentrated in one particular area. Unclassified non-native and invasive species that were widespread throughout the study areas were not mapped in GIS and covered one percent or less of the total surveyed areas. See **Appendix A, Figures 2 and 3** for mapped locations of undesirable plant species.

Previous surveys completed by FS botanists have identified Canada thistle (*Cirsium arvense*), bull thistle (*Cirsium vulgare*), and mullein (*Verbascum thapsus*) near the Staging Area and Eightmile Dam (Furr 2021). Common tansy (*Tanacetum vulgare*) has also been identified in the vicinity of the study areas (Furr 2021). The identified populations of common tansy and Canada thistle have been treated previously with herbicide (Furr 2021). Of these populations, only mullein was observed during the September 30, 2021 survey. All undesirable species observed are listed in **Table 3**.

Table 3. Undesirable Plant Species Identified

Common Name	Scientific Name	Chelan County Noxious Weed Classification	Washington State Noxious Weed Classification	FS Region 6 Invasive Plant List
FS Road 7601-116 Segment				
Bird's-foot trefoil	<i>Lotus corniculatus</i>			✓
Bull thistle	<i>Cirsium vulgare</i>		C	✓
Dandelion spp.	Genus <i>Taraxacum</i>			
Diffuse knapweed	<i>Centaurea diffusa</i>	B (non-designate selected for control)	B	✓
Orchard grass	<i>Dactylis glomerata</i>			✓
Oxeye daisy	<i>Leucanthemum vulgare</i>	C (selected for control)	Class C	✓
Red clover	<i>Trifolium pratense</i>			
Ribwort plantain	<i>Plantago lanceolata</i>			✓
Timothy grass	<i>Phleum pratense</i>			
Scentless mayweed	<i>Tripleurospermum inodorum</i>		Class C	✓
White clover	<i>Trifolium repens</i>			
Yellow salsify	<i>Tragopogon dubius</i>			
Eightmile Dam Staging Area				
Mullein	<i>Verbascum thapsus</i>			✓
Orchard grass	<i>Dactylis glomerata</i>			✓
Red sand spurrey	<i>Spergularia rubra</i>			
Yellow salsify	<i>Tragopogon dubius</i>			

Sources: Chelan County (2021), Washington State Noxious Weed Control Board (2021), Forest Service (2010).

CONCLUSIONS

Although the study areas are disturbed by historic fire and human use, the Eightmile Dam Staging Area and the surveyed portion of FS Road 7601-116 both host botanical species that are representative of the larger ecoregions they fall within. The Staging Area is located in North Cascades subalpine habitat, while the FS Road 7601-116 segment is located in Wenatchee/Chelan Highlands montane forest habitat. Additionally, the FS Road 7601-116 segment has experienced greater human disturbance than the Staging Area, which is reflected in the variety of non-native species present.

Neither study area presents suitable habitat for rare or listed botanical species. While no sensitive or rare species were observed within the study areas during the survey, there is the possibility that such species could be present in locations outside of or adjacent to the study areas. Future work within the study areas should emphasize the importance of maintaining distance from bordering rock outcrops, wet areas where water flows through culverts, and the drainage/seasonal stream at the end of the FS Road 7601-116 segment.

Both study areas are occupied by various non-native and invasive weedy species. Diffuse knapweed and oxeye daisy are two newly identified classified weeds within the FS Road 7601-116 segment that require removal as mandated by Chelan County. Various other previously unrecorded non-native and invasive species were

identified within the study areas as well. The ecological integrity of the landscapes may benefit from future actions to contain or remove the presence of such species.

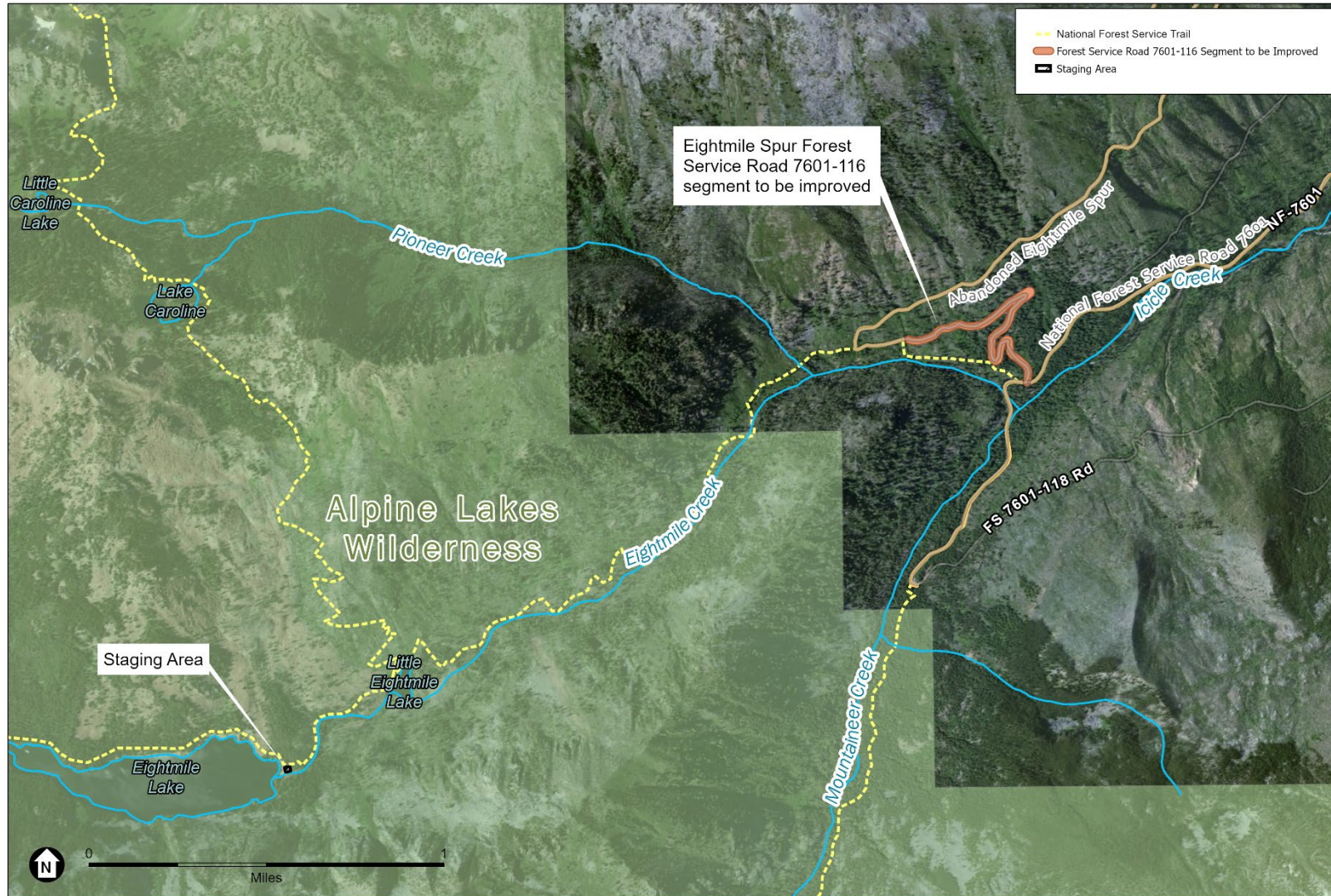
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Appendix A

Study Area Figures





SOURCE: Imagery: ESRI; Parcels: Chelan County; Trail: USGS; Creek: WA DNR

Eightmile Dam Rebuild and Restoration Project

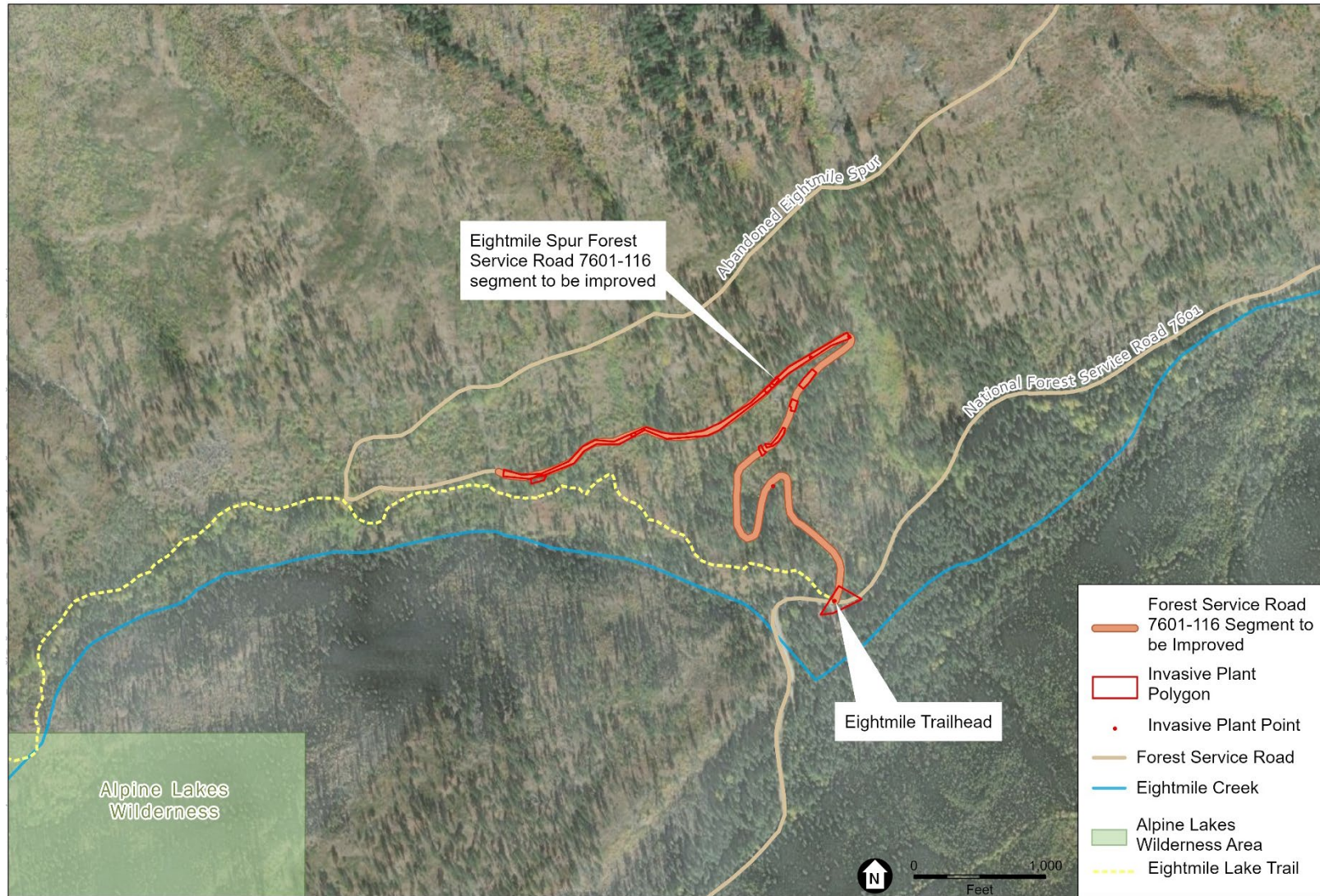
Figure 1
Study Area Context Map



SOURCE: Imagery: ESRI; Parcels: Chelan County; Trail: USGS; Creek: WA DNR

Eightmile Dam Rebuild and Restoration Project

Figure 2
Staging Area



SOURCE: Imagery: ESRI; Parcels: Chelan County; Trail: USGS; Creek: WA DNR

Eightmile Dam Rebuild and Restoration Project

Figure 3
Forest Service Road 7601-116 Segment to be Improved

Appendix B
2019 U.S. Forest Service Region
6 Regional Forester Special
Status Species: Okanogan-
Wenatchee National Forest
Federally Threatened,
Endangered or Proposed
Species



FINAL Region 6 Regional Forester Special Status Species List, February 25, 2019
This worksheet includes Federally Threatened, Endangered or Proposed Species.

Name and ESU/DPS		T&E INFORMATION				RANK AND STATUS INFORMATION						
Scientific Name	Common Name	Federal Status	Date Listed	Critical Habitat	Recovery Plan	Global Rank	National Rank	Sub-species Rank	ORBIC State Rank	ORBIC List	WNHP State Status	WNHP State Rank
Hackelia venusta	Showy stickseed	FE	2002	None	Final 2007; draft amendment 2019	G1	N1				SE	S1
Howellia aquatilis	Water howellia	FT	1994	None	Draft 1996	G3	N3		S1	1	ST	S2
Sidalcea oregana var. calva	Wenatchee Mountains checker-mallow	FE	1999	Designated 2001	Final 2004	G5	N1	T1			SE	S1?
Spiranthes diluvialis	Ute ladies'-tresses	FT	1992	None	Draft 1995	G2G3	N2				SE	S1

Appendix C
**2021 Chelan County Noxious
Weed List with Present Species
Highlighted**



2021 Chelan County Noxious Weed List

The following noxious weeds have been adopted from the Washington State Noxious Weed List contained in chapter 16-750 WAC for 2021

Class A Weeds: Non-native species whose distribution in Washington is still limited. Preventing new infestations and eradicating existing infestations are the highest priority. **Eradication of all Class A weeds is required by law.**

Class A - Eradication Required

Common Name	Scientific Name
common crupina	<i>Crupina vulgaris</i>
cordgrass, common	<i>Spartina anglica</i>
cordgrass, dense-flowered	<i>Spartina densiflora</i>
cordgrass, saltmeadow	<i>Spartina patens</i>
cordgrass, smooth	<i>Spartina alterniflora</i>
dyer's woad	<i>Isatis tinctoria</i>
eggleaf spurge	<i>Euphorbia oblongata</i>
false brome	<i>Brachypodium sylvaticum</i>
floating primrose-willow	<i>Ludwigia peploides</i>
flowering rush	<i>Butomus umbellatus</i>
French broom	<i>Genista monspessulana</i>
garlic mustard	<i>Alliaria petiolata</i>
giant hogweed	<i>Heracleum mantegazzianum</i>
goatsrue	<i>Galega officinalis</i>
hydrilla	<i>Hydrilla verticillata</i>
Johnsongrass	<i>Sorghum halepense</i>
knapweed, bighead	<i>Centaurea macrocephala</i>
knapweed, Vochin	<i>Centaurea nigrescens</i>
kudzu	<i>Pueraria montana var. lobata</i>
meadow clary	<i>Salvia pratensis</i>
oriental clematis	<i>Clematis orientalis</i>
purple starthistle	<i>Centaurea calcitrapa</i>
reed sweetgrass	<i>Glyceria maxima</i>
ricefield bulrush	<i>Schoenoplectus mucronatus</i>
sage, clary	<i>Salvia sclarea</i>
sage, Mediterranean	<i>Salvia aethiopsis</i>
silverleaf nightshade	<i>Solanum elaeagnifolium</i>
small-flowered jewelweed	<i>Impatiens parviflora</i>
South American spongeplant	<i>Limnobium laevigatum</i>
Spanish broom	<i>Spartium junceum</i>
Syrian beancaper	<i>Zygophyllum fabago</i>
Texas blueweed	<i>Helianthus ciliaris</i>
thistle, Italian	<i>Carduus pycnocephalus</i>
thistle, milk	<i>Silybum marianum</i>
thistle, Turkish	<i>Carduus cinereus</i>
thistle, slenderflower	<i>Carduus tenuiflorus</i>
variable-leaf milfoil	<i>Myriophyllum heterophyllum</i>

wild four-o'clock	<i>Mirabilis nyctaginea</i>
Class B Designated - Control Required for Chelan County	
blueweed	<i>Echium vulgare</i>
Brazilian elodea	<i>Egeria densa</i>
bugloss, annual	<i>Lycopsis arvensis</i>
bugloss, common	<i>Anchusa officinalis</i>
camelthorn	<i>Alhagi maurorum</i>
common fennel, (except bulbing fennel)	<i>Foeniculum vulgare (except F. vulgare var. azoricum)</i>
common reed (nonnative genotypes only)	<i>Phragmites australis</i>
Eurasian watermilfoil	<i>Myriophyllum spicatum</i>
European coltsfoot	<i>Tussilago farfara</i>
fanwort	<i>Cabomba caroliniana</i>
gorse	<i>Ulex europaeus</i>
grass-leaved arrowhead	<i>Sagittaria graminea</i>
hairy willowherb	<i>Epilobium hirsutum</i>
hawkweed oxtongue	<i>Picris hieracioides</i>
hawkweed, orange	<i>Hieracium aurantiacum</i>
hawkweeds: All nonnative species and hybrids of the meadow subgenus	<i>Hieracium, subgenus Pilosella</i>
hawkweeds: All nonnative species and hybrids of the wall subgenus	<i>Hieracium, subgenus Hieracium</i>
herb-Robert	<i>Geranium robertianum</i>
hoary alyssum	<i>Berteroa incana</i>
houndstongue	<i>Cynoglossum officinale</i>
indigobush	<i>Amorpha fruticosa</i>
knapweed, black	<i>Centaurea nigra</i>
knapweed, brown	<i>Centaurea jacea</i>
knapweed, meadow	<i>Centaurea × gerstlaueri</i>
knotweed, Bohemian	<i>Fallopia × bohémica</i>
knotweed, giant	<i>Fallopia sachalinensis</i>
knotweed, Himalayan	<i>Persicaria wallichii</i>
knotweed, Japanese	<i>Fallopia japonica</i>
lesser celandine	<i>Ficaria verna</i>
loosestrife, garden	<i>Lysimachia vulgaris</i>
loosestrife, purple	<i>Lythrum salicaria</i>
loosestrife, wand	<i>Lythrum virgatum</i>
Malta starthistle	<i>Centaurea melitensis</i>
parrotfeather	<i>Myriophyllum aquaticum</i>
perennial pepperweed	<i>Lepidium latifolium</i>
poison hemlock	<i>Conium maculatum</i>
policeman's helmet	<i>Impatiens glandulifera</i>
Ravenna grass	<i>Tripsidium ravennae</i>
rush skeletonweed	<i>Chondrilla juncea</i>
saltcedar	<i>Tamarix ramosissima</i>
Scotch broom	<i>Cytisus scoparius</i>
shiny geranium	<i>Geranium lucidum</i>
spurge flax	<i>Thymelaea passerina</i>
spurge laurel	<i>Daphne laureola</i>

spurge, leafy	<i>Euphorbia virgata</i>
spurge, myrtle	<i>Euphorbia myrsinites</i>
tansy ragwort	<i>Jacobaea vulgaris</i>
thistle, musk	<i>Carduus nutans</i>
thistle, plumeless	<i>Carduus acanthoides</i>
thistle, Scotch	<i>Onopordum acanthium</i>
velvetleaf	<i>Abutilon theophrasti</i>
water primrose	<i>Ludwigia hexapetala</i>
white bryony	<i>Bryonia alba</i>
wild chervil	<i>Anthriscus sylvestris</i>
yellow archangel	<i>Lamium galeobdolon</i>
yellow floatingheart	<i>Nymphoides peltata</i>
yellow nutsedge	<i>Cyperus esculentus</i>
yellow starthistle	<i>Centaurea solstitialis</i>

Class B and C Selected - Control Required for Chelan County

*Class B non-designate selected for control in Chelan County

**Class C selected for control in Chelan County

Babysbreath**	<i>Gypsophila paniculata</i>
Canada thistle**	<i>Cirsium arvense</i>
Common St. Johnswort **	<i>Hypericum perforatum</i>
Dalmation toadflax*	<i>Linaria dalmatica</i>
Kochia*	<i>Bassia scoparia++</i>
Oxeye daisy**	<i>Leucanthemum vulgare</i>
Medusahead grass**	<i>Taeniatherum caput-medusae</i>
Puncturevine*	<i>Tribulus terrestris</i>
Russian knapweed*	<i>Rhaponticum repens++</i>
Spotted knapweed*	<i>Centaurea stoebe</i>
Ventenata grass**	<i>Ventenata dubia</i>
knapweed, diffuse*	<i>Centaurea diffusa</i>
hoary cress**	<i>Lepidium draba</i>

Appendix D
**2021 Washington State Noxious
Weed List with Present Species
Highlighted**



Class C Weeds

absinth wormwood	<i>Artemisia absinthium</i>
Austrian fieldcress	<i>Rorippa austriaca</i>
babysbreath	<i>Gypsophila paniculata</i>
black henbane	<i>Hyoscyamus niger</i>
blackgrass	<i>Alopecurus myosuroides</i>
buffalobur	<i>Solanum rostratum</i>
cereal rye	<i>Secale cereale</i>
common barberry	<i>Berberis vulgaris</i>
common catsear	<i>Hypochaeris radicata</i>
common groundsel	<i>Senecio vulgaris</i>
common St. Johnswort	<i>Hypericum perforatum</i>
common tansy	<i>Tanacetum vulgare</i>
common teasel	<i>Dipsacus fullonum</i>
curlyleaf pondweed	<i>Potamogeton crispus</i>
English hawthorn	<i>Crataegus monogyna</i>
English ivy - four cultivars only	<i>Hedera helix</i> 'Baltica', 'Pittsburgh', and 'Star', and <i>H. hibernica</i> 'Hibernica'
Eurasian watermilfoil hybrid	<i>Myriophyllum spicatum</i> x <i>Myriophyllum sibiricum</i>
evergreen blackberry	<i>Rubus laciniatus</i>
field bindweed	<i>Convolvulus arvensis</i>
fragrant waterlily	<i>Nymphaea odorata</i>
hairy whitetop	<i>Lepidium appelianum</i>
Himalayan blackberry	<i>Rubus bifrons</i> (<i>Rubus armeniacus</i>)
hoary cress	<i>Lepidium draba</i>
Italian arum	<i>Arum italicum</i>
Japanese eelgrass	<i>Nanozostera japonica</i>
jubata grass	<i>Cortaderia jubata</i>
jointed goatgrass	<i>Aegilops cylindrica</i>
lawnweed	<i>Soliva sessilis</i>
longspine sandbur	<i>Cenchrus longispinus</i>
medusahead	<i>Taeniatherum caput-medusae</i>
nonnative cattail species and hybrids (reminder, does not include the native common cattail, <i>Typha latifolia</i>)	<i>Typha</i> species
old man's beard	<i>Clematis vitalba</i>
oxeye daisy	<i>Leucanthemum vulgare</i>
Pampas grass	<i>Cortaderia selloana</i>
perennial sowthistle	<i>Sonchus arvensis</i>
reed canarygrass	<i>Phalaris arundinacea</i>

Class C Weeds continued

Russian olive	<i>Elaeagnus angustifolia</i>
scentless mayweed	<i>Tripleurospermum inodorum</i>
smoothseed alfalfa dodder	<i>Cuscuta approximata</i>
spikeweed	<i>Centromadia pungens</i>
spiny cocklebur	<i>Xanthium spinosum</i>
spotted jewelweed	<i>Impatiens capensis</i>
Swainsonpea	<i>Sphaerophysa salsula</i>
thistle, bull	<i>Cirsium vulgare</i>
thistle, Canada	<i>Cirsium arvense</i>
tree-of-heaven	<i>Ailanthus altissima</i>
ventenata	<i>Ventenata dubia</i>
white cockle	<i>Silene latifolia</i>
wild carrot (except where commercially grown)	<i>Daucus carota</i>
yellow flag iris	<i>Iris pseudacorus</i>
yellow toadflax	<i>Linaria vulgaris</i>

To learn more about noxious weeds and noxious weed control in Washington State, please contact:

WA State Noxious Weed Control Board
 P.O. Box 42560
 Olympia, WA 98504-2560
 (360) 725-5764

Email: noxiousweeds@agr.wa.gov
 Website: <http://www.nwcb.wa.gov>

Or

WA State Department of Agriculture
 (509) 249-6973

Or

Your County Noxious Weed Control Board

Please help protect Washington's economy and environment from noxious weeds!

Cover photo of Turkish thistle by Mark Porter, Oregon Department of Agriculture

2021 Washington State Noxious Weed List



Turkish thistle, *Carduus cinereus*, is a new Class A noxious weed for 2021. This annual thistle is found close to Washington in northeastern Oregon and the adjacent area in Idaho. Eradication is required of Turkish thistle when found in Washington.

List arranged alphabetically by:
COMMON NAME



Class A Weeds: Non-native species whose distribution in Washington is still limited. Preventing new infestations and eradicating existing infestations are the highest priority.
Eradication of all Class A plants is required by law.

Class B Weeds: Non-native species presently limited to portions of the State. Species are **designated** for required control in regions where they are not yet widespread. Preventing new infestations in these areas is a high priority. In regions where a Class B species is already abundant, control is decided at the local level, with containment as the primary goal. Please contact your County Noxious Weed Control Board to learn which species are designated for control in your area.

Class C Weeds: Noxious weeds that are typically widespread in WA or are of special interest to the state's agricultural industry. The Class C status allows county weed boards to require control if locally desired, or they may choose to provide education or technical consultation.

**Class A Weeds
 Eradication is required**

common crupina	<i>Crupina vulgaris</i>
cordgrass, common	<i>Spartina anglica</i>
cordgrass, dense-flowered	<i>Spartina densiflora</i>
cordgrass, saltmeadow	<i>Spartina patens</i>
cordgrass, smooth	<i>Spartina alterniflora</i>
dyer's woad	<i>Isatis tinctoria</i>
eggleaf spurge	<i>Euphorbia oblongata</i>
false brome	<i>Brachypodium sylvaticum</i>
floating primrose-willow	<i>Ludwigia peploides</i>
flowering rush	<i>Butomus umbellatus</i>
French broom	<i>Genista monspessulana</i>
garlic mustard	<i>Alliaria petiolata</i>
giant hogweed	<i>Heracleum mantegazzianum</i>
goatsrue	<i>Galega officinalis</i>
hydrilla	<i>Hydrilla verticillata</i>
Johnsongrass	<i>Sorghum halepense</i>
knawweed, bighead	<i>Centaurea macrocephala</i>
knawweed, Vochin	<i>Centaurea nigrescens</i>
kudzu	<i>Pueraria montana</i> var. <i>lobata</i>
meadow clary	<i>Salvia pratensis</i>
oriental clematis	<i>Clematis orientalis</i>
purple starthistle	<i>Centaurea calcitrapa</i>
reed sweetgrass	<i>Glyceria maxima</i>

ricefield bulrush	<i>Schoenoplectus mucronatus</i>
sage, clary	<i>Salvia sclarea</i>
sage, Mediterranean	<i>Salvia aethiops</i>
silverleaf nightshade	<i>Solanum elaeagnifolium</i>
small-flowered jewelweed	<i>Impatiens parviflora</i>
South American spongeplant	<i>Limnium laevigatum</i>
Spanish broom	<i>Spartium junceum</i>
Syrian beancaper	<i>Zygophyllum fabago</i>
Texas blueweed	<i>Helianthus ciliaris</i>
thistle, Italian	<i>Carduus pycnocephalus</i>
thistle, milk	<i>Silybum marianum</i>
thistle, slenderflower	<i>Carduus tenuiflorus</i>
thistle, Turkish	<i>Carduus cinereus</i>
variable-leaf milfoil	<i>Myriophyllum heterophyllum</i>
wild four-o'clock	<i>Mirabilis nyctaginea</i>

Class B Weeds

blueweed	<i>Echium vulgare</i>
Brazilian elodea	<i>Egeria densa</i>
bugloss, annual	<i>Lycopsis arvensis</i>
bugloss, common	<i>Anchusa officinalis</i>
butterfly bush	<i>Buddleja davidii</i>
camelthorn	<i>Alhagi maurorum</i>
common fennel, (except bulbous fennel)	<i>Foeniculum vulgare</i> except <i>F. vulgare</i> var. <i>azoricum</i>
common reed (nonnative genotypes only)	<i>Phragmites australis</i>
Dalmatian toadflax	<i>Linaria dalmatica</i> ssp. <i>dalmatica</i>
Eurasian watermilfoil	<i>Myriophyllum spicatum</i>
European coltsfoot	<i>Tussilago farfara</i>
fanwort	<i>Cabomba caroliniana</i>
gorse	<i>Ulex europaeus</i>
grass-leaved arrowhead	<i>Sagittaria graminea</i>
hairy willowherb	<i>Epilobium hirsutum</i>
hawkweed oxtongue	<i>Picris hieracioides</i>
hawkweed, orange	<i>Hieracium aurantiacum</i>
hawkweeds: All nonnative species and hybrids of the meadow subgenus	<i>Hieracium</i> , subgenus <i>Pilosella</i>
hawkweeds: All nonnative species and hybrids of the wall subgenus	<i>Hieracium</i> , subgenus <i>Hieracium</i>
herb-Robert	<i>Geranium robertianum</i>

hoary alyssum	<i>Berteroa incana</i>
houndstongue	<i>Cynoglossum officinale</i>
indigobush	<i>Amorpha fruticosa</i>
knawweed, black	<i>Centaurea nigra</i>
knawweed, brown	<i>Centaurea jacea</i>
knawweed, diffuse	<i>Centaurea diffusa</i>
knawweed, meadow	<i>Centaurea x gerstlaueri</i>
knawweed, Russian	<i>Rhaponticum repens</i>
knawweed, spotted	<i>Centaurea stoebe</i>
knotweed, Bohemian	<i>Fallopia x bohémica</i>
knotweed, giant	<i>Fallopia sachalinensis</i>
knotweed, Himalayan	<i>Persicaria wallichii</i>
knotweed, Japanese	<i>Fallopia japonica</i>
kochia	<i>Bassia scoparia</i>
lesser celandine	<i>Ficaria verna</i>
loosestrife, garden	<i>Lysimachia vulgaris</i>
loosestrife, purple	<i>Lythrum salicaria</i>
loosestrife, wand	<i>Lythrum virgatum</i>
Malta starthistle	<i>Centaurea melitensis</i>
parrotfeather	<i>Myriophyllum aquaticum</i>
perennial pepperweed	<i>Lepidium latifolium</i>
poison hemlock	<i>Conium maculatum</i>
policeman's helmet	<i>Impatiens glandulifera</i>
puncturevine	<i>Tribulus terrestris</i>
Ravenna grass	<i>Tripsidium ravennae</i>
rush skeletonweed	<i>Chondrilla juncea</i>
saltcedar	<i>Tamarix ramosissima</i>
Scotch broom	<i>Cytisus scoparius</i>
shiny geranium	<i>Geranium lucidum</i>
spurge flax	<i>Thymelaea passerina</i>
spurge laurel	<i>Daphne laureola</i>
spurge, leafy	<i>Euphorbia virgata</i>
spurge, myrtle	<i>Euphorbia myrsinites</i>
sulfur cinquefoil	<i>Potentilla recta</i>
tansy ragwort	<i>Jacobaea vulgaris</i>
thistle, musk	<i>Carduus nutans</i>
thistle, plumeless	<i>Carduus acanthoides</i>
thistle, Scotch	<i>Onopordum acanthium</i>
velvetleaf	<i>Abutilon theophrasti</i>
water primrose	<i>Ludwigia hexapetala</i>
white bryony	<i>Bryonia alba</i>
wild chervil	<i>Anthriscus sylvestris</i>
yellow archangel	<i>Lamium galeobdolon</i>
yellow floating heart	<i>Nymphoides peltata</i>
yellow nutsedge	<i>Cyperus esculentus</i>
yellow starthistle	<i>Centaurea solstitialis</i>

Appendix E
**2010 U.S. Forest Service Region
6 Invasive Plant List with
Present Species Highlighted**



R6 Invasive Plant List 2010

NAME	ACC SCIENTIFIC NAME	COMMON NAME	FAMILY
R6 Invasive Plant Species	<i>Acaena novae-zelandiae</i>	biddy-biddy	Rosaceae
R6 Invasive Plant Species	<i>Centaurea diffusa</i>	diffuse knapweed	Asteraceae
R6 Invasive Plant Species	<i>Centaurea stoebe</i> ssp. <i>micranthos</i>	spotted knapweed	Asteraceae
R6 Invasive Plant Species	<i>Acaena novae-zelandiae</i>	biddy-biddy	Rosaceae
R6 Invasive Plant Species	<i>Acaena novae-zelandiae</i>	biddy-biddy	Rosaceae
R6 Invasive Plant Species	<i>Acer platanoides</i>	Norway maple	Aceraceae
R6 Invasive Plant Species	<i>Acer platanoides</i>	Norway maple	Aceraceae
R6 Invasive Plant Species	<i>Polygonum polystachyum</i>	cultivated knotweed	Polygonaceae
R6 Invasive Plant Species	<i>Acroptilon repens</i>	hardheads	Asteraceae
R6 Invasive Plant Species	<i>Acaena novae-zelandiae</i>	biddy-biddy	Rosaceae
R6 Invasive Plant Species	<i>Aegilops cylindrica</i>	jointed goatgrass	Poaceae
R6 Invasive Plant Species	<i>Aegilops cylindrica</i>	jointed goatgrass	Poaceae
R6 Invasive Plant Species	<i>Aegopodium podagraria</i>	bishop's goutweed	Apiaceae
R6 Invasive Plant Species	<i>Aegopodium podagraria</i>	bishop's goutweed	Apiaceae
R6 Invasive Plant Species	<i>Aegilops triuncialis</i>	barbed goatgrass	Poaceae
R6 Invasive Plant Species	<i>Aegilops cylindrica</i>	jointed goatgrass	Poaceae
R6 Invasive Plant Species	<i>Aegilops triuncialis</i>	barbed goatgrass	Poaceae
R6 Invasive Plant Species	<i>Elymus repens</i>	quackgrass	Poaceae
R6 Invasive Plant Species	<i>Elymus repens</i>	quackgrass	Poaceae
R6 Invasive Plant Species	<i>Ailanthus altissima</i>	tree of heaven	Simaroubaceae
R6 Invasive Plant Species	<i>Ailanthus altissima</i>	tree of heaven	Simaroubaceae
R6 Invasive Plant Species	<i>Alopecurus myosuroides</i>	slender meadow foxtail	Poaceae
R6 Invasive Plant Species	<i>Alliaria petiolata</i>	garlic mustard	Brassicaceae
R6 Invasive Plant Species	<i>Alyssum murale</i>	yellowtuft	Brassicaceae
R6 Invasive Plant Species	<i>Alopecurus myosuroides</i>	slender meadow foxtail	Poaceae
R6 Invasive Plant Species	<i>Alliaria petiolata</i>	garlic mustard	Brassicaceae
R6 Invasive Plant Species	<i>Alliaria petiolata</i>	garlic mustard	Brassicaceae
R6 Invasive Plant Species	<i>Ammophila arenaria</i>	European beachgrass	Poaceae
R6 Invasive Plant Species	<i>Anchusa arvensis</i>	small bugloss	Boraginaceae
R6 Invasive Plant Species	<i>Anthemis cotula</i>	stinking chamomile	Asteraceae
R6 Invasive Plant Species	<i>Egeria densa</i>	Brazilian waterweed	Hydrocharitaceae
R6 Invasive Plant Species	<i>Bromus matritensis</i>	compact brome	Poaceae
R6 Invasive Plant Species	<i>Bromus matritensis</i>	compact brome	Poaceae
R6 Invasive Plant Species	<i>Anchusa officinalis</i>	common bugloss	Boraginaceae
R6 Invasive Plant Species	<i>Anchusa officinalis</i>	common bugloss	Boraginaceae
R6 Invasive Plant Species	<i>Bromus diandrus</i> ssp. <i>rigidus</i>	ripgut brome	Poaceae
R6 Invasive Plant Species	<i>Bromus tectorum</i>	cheatgrass	Poaceae
R6 Invasive Plant Species	<i>Artemisia absinthium</i>	absinthium	Asteraceae
R6 Invasive Plant Species	<i>Artemisia absinthium</i>	absinthium	Asteraceae
R6 Invasive Plant Species	<i>Arundo donax</i>	giant reed	Poaceae
R6 Invasive Plant Species	<i>Arctium minus</i>	lesser burdock	Asteraceae
R6 Invasive Plant Species	<i>Ventenata dubia</i>	North Africa grass	Poaceae
R6 Invasive Plant Species	<i>Bassia scoparia</i>	burningbush	Chenopodiaceae
R6 Invasive Plant Species	<i>Bassia scoparia</i>	burningbush	Chenopodiaceae
R6 Invasive Plant Species	<i>Borago officinalis</i>	common borage	Boraginaceae
R6 Invasive Plant Species	<i>Cirsium arvense</i>	Canada thistle	Asteraceae
R6 Invasive Plant Species	<i>Bromus diandrus</i> ssp. <i>rigidus</i>	ripgut brome	Poaceae
R6 Invasive Plant Species	<i>Bromus diandrus</i> ssp. <i>rigidus</i>	ripgut brome	Poaceae
R6 Invasive Plant Species	<i>Bromus hordeaceus</i>	soft brome	Poaceae
R6 Invasive Plant Species	<i>Cirsium arvense</i>	Canada thistle	Asteraceae
R6 Invasive Plant Species	<i>Bromus matritensis</i>	compact brome	Poaceae

R6 Invasive Plant Species	<i>Bromus matritensis</i>	compact brome	Poaceae
R6 Invasive Plant Species	<i>Bromus diandrus</i> ssp. <i>rigidus</i>	ripgut brome	Poaceae
R6 Invasive Plant Species	<i>Bromus matritensis</i>	compact brome	Poaceae
R6 Invasive Plant Species	<i>Brassica rapa</i>	field mustard	Brassicaceae
R6 Invasive Plant Species	<i>Bromus diandrus</i> ssp. <i>rigidus</i>	ripgut brome	Poaceae
R6 Invasive Plant Species	<i>Brachypodium sylvaticum</i>	slender false brome	Poaceae
R6 Invasive Plant Species	<i>Bromus tectorum</i>	cheatgrass	Poaceae
R6 Invasive Plant Species	<i>Bromus tectorum</i>	cheatgrass	Poaceae
R6 Invasive Plant Species	<i>Bromus tectorum</i>	cheatgrass	Poaceae
R6 Invasive Plant Species	<i>Bromus tectorum</i>	cheatgrass	Poaceae
R6 Invasive Plant Species	<i>Bromus diandrus</i> ssp. <i>rigidus</i>	ripgut brome	Poaceae
R6 Invasive Plant Species	<i>Buddleja davidii</i>	orange eye butterflybush	Buddlejaceae
R6 Invasive Plant Species	<i>Carduus acanthoides</i>	spiny plumeless thistle	Asteraceae
R6 Invasive Plant Species	<i>Cirsium arvense</i>	Canada thistle	Asteraceae
R6 Invasive Plant Species	<i>Cardaria draba</i>	whitetop	Brassicaceae
R6 Invasive Plant Species	<i>Cirsium vulgare</i>	bull thistle	Asteraceae
R6 Invasive Plant Species	<i>Lepidium latifolium</i>	broadleaved pepperweed	Brassicaceae
R6 Invasive Plant Species	<i>Carduus nutans</i>	nodding plumeless thistle	Asteraceae
R6 Invasive Plant Species	<i>Carduus nutans</i>	nodding plumeless thistle	Asteraceae
R6 Invasive Plant Species	<i>Carduus nutans</i>	nodding plumeless thistle	Asteraceae
R6 Invasive Plant Species	<i>Carduus nutans</i>	nodding plumeless thistle	Asteraceae
R6 Invasive Plant Species	<i>Carduus nutans</i>	nodding plumeless thistle	Asteraceae
R6 Invasive Plant Species	<i>Carduus nutans</i>	nodding plumeless thistle	Asteraceae
R6 Invasive Plant Species	<i>Carduus nutans</i>	nodding plumeless thistle	Asteraceae
R6 Invasive Plant Species	<i>Carduus nutans</i>	nodding plumeless thistle	Asteraceae
R6 Invasive Plant Species	<i>Carduus nutans</i>	nodding plumeless thistle	Asteraceae
R6 Invasive Plant Species	<i>Carduus nutans</i>	nodding plumeless thistle	Asteraceae
R6 Invasive Plant Species	<i>Cardaria pubescens</i>	hairy whitetop	Brassicaceae
R6 Invasive Plant Species	<i>Cardaria pubescens</i>	hairy whitetop	Brassicaceae
R6 Invasive Plant Species	<i>Carduus pycnocephalus</i>	Italian plumeless thistle	Asteraceae
R6 Invasive Plant Species	<i>Carduus tenuiflorus</i>	winged plumeless thistle	Asteraceae
R6 Invasive Plant Species	<i>Cirsium vulgare</i>	bull thistle	Asteraceae
R6 Invasive Plant Species	<i>Centaurea stoebe</i> ssp. <i>micranthos</i>	spotted knapweed	Asteraceae
R6 Invasive Plant Species	<i>Centaurea cyanus</i>	garden cornflower	Asteraceae
R6 Invasive Plant Species	<i>Centaurea debeauxii</i>	meadow knapweed	Asteraceae
R6 Invasive Plant Species	<i>Centaurea diffusa</i>	diffuse knapweed	Asteraceae
R6 Invasive Plant Species	<i>Centaurea jacea</i>	brownray knapweed	Asteraceae
R6 Invasive Plant Species	<i>Prunus laurocerasus</i>	cherry laurel	Rosaceae
R6 Invasive Plant Species	<i>Centaurea stoebe</i> ssp. <i>micranthos</i>	spotted knapweed	Asteraceae
R6 Invasive Plant Species	<i>Centaurea melitensis</i>	Maltese star-thistle	Asteraceae
R6 Invasive Plant Species	<i>Centaurea moncktonii</i>	meadow knapweed	Asteraceae
R6 Invasive Plant Species	<i>Acroptilon repens</i>	hardheads	Asteraceae
R6 Invasive Plant Species	<i>Centaurea nigrescens</i>	Tyrol knapweed	Asteraceae
R6 Invasive Plant Species	<i>Acroptilon repens</i>	hardheads	Asteraceae
R6 Invasive Plant Species	<i>Centaurea solstitialis</i>	yellow star-thistle	Asteraceae
R6 Invasive Plant Species	<i>Centaurea virgata</i> ssp. <i>squarrosa</i>	squarrose knapweed	Asteraceae
R6 Invasive Plant Species	<i>Centaurea stoebe</i> ssp. <i>micranthos</i>	spotted knapweed	Asteraceae
R6 Invasive Plant Species	<i>Centaurea virgata</i> ssp. <i>squarrosa</i>	squarrose knapweed	Asteraceae
R6 Invasive Plant Species	<i>Centaurea virgata</i> ssp. <i>squarrosa</i>	squarrose knapweed	Asteraceae
R6 Invasive Plant Species	<i>Centaurea virgata</i> ssp. <i>squarrosa</i>	squarrose knapweed	Asteraceae
R6 Invasive Plant Species	<i>Centaurea virgata</i> ssp. <i>squarrosa</i>	squarrose knapweed	Asteraceae
R6 Invasive Plant Species	<i>Tripleurospermum perforata</i>	scentless false mayweed	Asteraceae
R6 Invasive Plant Species	<i>Chondrilla juncea</i>	rush skeletonweed	Asteraceae
R6 Invasive Plant Species	<i>Leucanthemum vulgare</i>	oxeye daisy	Asteraceae
R6 Invasive Plant Species	<i>Leucanthemum vulgare</i>	oxeye daisy	Asteraceae

R6 Invasive Plant Species	<i>Leucanthemum vulgare</i>	oxeye daisy	Asteraceae
R6 Invasive Plant Species	<i>Tanacetum parthenium</i>	feverfew	Asteraceae
R6 Invasive Plant Species	<i>Tanacetum vulgare</i>	common tansy	Asteraceae
R6 Invasive Plant Species	<i>Cirsium arvense</i>	Canada thistle	Asteraceae
R6 Invasive Plant Species	<i>Cirsium arvense</i>	Canada thistle	Asteraceae
R6 Invasive Plant Species	<i>Cirsium arvense</i>	Canada thistle	Asteraceae
R6 Invasive Plant Species	<i>Cirsium arvense</i>	Canada thistle	Asteraceae
R6 Invasive Plant Species	<i>Cirsium arvense</i>	Canada thistle	Asteraceae
R6 Invasive Plant Species	<i>Cirsium arvense</i>	Canada thistle	Asteraceae
R6 Invasive Plant Species	<i>Cichorium intybus</i>	chicory	Asteraceae
R6 Invasive Plant Species	<i>Cirsium arvense</i>	Canada thistle	Asteraceae
R6 Invasive Plant Species	<i>Cichorium intybus</i>	chicory	Asteraceae
R6 Invasive Plant Species	<i>Cichorium intybus</i>	chicory	Asteraceae
R6 Invasive Plant Species	<i>Cirsium vulgare</i>	bull thistle	Asteraceae
R6 Invasive Plant Species	<i>Cirsium vulgare</i>	bull thistle	Asteraceae
R6 Invasive Plant Species	<i>Cirsium ochrocentrum</i>	yellowspine thistle	Asteraceae
R6 Invasive Plant Species	<i>Cirsium arvense</i>	Canada thistle	Asteraceae
R6 Invasive Plant Species	<i>Cirsium undulatum</i>	wavyleaf thistle	Asteraceae
R6 Invasive Plant Species	<i>Cirsium vulgare</i>	bull thistle	Asteraceae
R6 Invasive Plant Species	<i>Clematis vitalba</i>	evergreen clematis	Ranunculaceae
R6 Invasive Plant Species	<i>Convolvulus arvensis</i>	field bindweed	Convolvulaceae
R6 Invasive Plant Species	<i>Convolvulus arvensis</i>	field bindweed	Convolvulaceae
R6 Invasive Plant Species	<i>Convolvulus arvensis</i>	field bindweed	Convolvulaceae
R6 Invasive Plant Species	<i>Conium maculatum</i>	poison hemlock	Apiaceae
R6 Invasive Plant Species	<i>Cortaderia</i>	pampas grass	Poaceae
R6 Invasive Plant Species	<i>Calystegia sepium</i> ssp. <i>sepium</i>	hedge false bindweed	Convolvulaceae
R6 Invasive Plant Species	<i>Crupina vulgaris</i>	common crupina	Asteraceae
R6 Invasive Plant Species	<i>Aegilops cylindrica</i>	jointed goatgrass	Poaceae
R6 Invasive Plant Species	<i>Cyperus esculentus</i>	yellow nutsedge	Cyperaceae
R6 Invasive Plant Species	<i>Genista monspessulana</i>	French broom	Fabaceae
R6 Invasive Plant Species	<i>Cynoglossum officinale</i>	gypsyflower	Boraginaceae
R6 Invasive Plant Species	<i>Cytisus scoparius</i>	Scotch broom	Fabaceae
R6 Invasive Plant Species	<i>Cytisus striatus</i>	striated broom	Fabaceae
R6 Invasive Plant Species	<i>Daucus carota</i>	Queen Anne's lace	Apiaceae
R6 Invasive Plant Species	<i>Dactylis glomerata</i>	orchardgrass	Poaceae
R6 Invasive Plant Species	<i>Daphne laureola</i>	spurgelaurel	Thymelaeaceae
R6 Invasive Plant Species	<i>Dianthus armeria</i>	Deptford pink	Caryophyllaceae
R6 Invasive Plant Species	<i>Dianthus armeria</i>	Deptford pink	Caryophyllaceae
R6 Invasive Plant Species	<i>Dipsacus fullonum</i>	Fuller's teasel	Dipsacaceae
R6 Invasive Plant Species	<i>Dipsacus fullonum</i>	Fuller's teasel	Dipsacaceae
R6 Invasive Plant Species	<i>Dipsacus fullonum</i>	Fuller's teasel	Dipsacaceae
R6 Invasive Plant Species	<i>Dipsacus laciniatus</i>	cutleaf teasel	Dipsacaceae
R6 Invasive Plant Species	<i>Digitalis purpurea</i>	purple foxglove	Scrophulariaceae
R6 Invasive Plant Species	<i>Digitalis purpurea</i>	purple foxglove	Scrophulariaceae
R6 Invasive Plant Species	<i>Dipsacus fullonum</i>	Fuller's teasel	Dipsacaceae
R6 Invasive Plant Species	<i>Echium vulgare</i>	common viper's bugloss	Boraginaceae
R6 Invasive Plant Species	<i>Egeria densa</i>	Brazilian waterweed	Hydrocharitaceae
R6 Invasive Plant Species	<i>Taeniatherum caput-medusae</i>	medusahead	Poaceae
R6 Invasive Plant Species	<i>Elaphoglossum decoratum</i>	showy tonguefern	Dryopteridaceae
R6 Invasive Plant Species	<i>Egeria densa</i>	Brazilian waterweed	Hydrocharitaceae
R6 Invasive Plant Species	<i>Elymus repens</i>	quackgrass	Poaceae
R6 Invasive Plant Species	<i>Elymus repens</i>	quackgrass	Poaceae
R6 Invasive Plant Species	<i>Elymus repens</i>	quackgrass	Poaceae
R6 Invasive Plant Species	<i>Elymus repens</i>	quackgrass	Poaceae
R6 Invasive Plant Species	<i>Myriophyllum aquaticum</i>	parrot feather watermilfoil	Haloragaceae

R6 Invasive Plant Species	<i>Alliaria petiolata</i>	garlic mustard	Brassicaceae
R6 Invasive Plant Species	<i>Sisymbrium officinale</i>	hedgemustard	Brassicaceae
R6 Invasive Plant Species	<i>Euphrasia nemorosa</i>	common eyebright	Scrophulariaceae
R6 Invasive Plant Species	<i>Euphrasia nemorosa</i>	common eyebright	Scrophulariaceae
R6 Invasive Plant Species	<i>Euphrasia nemorosa</i>	common eyebright	Scrophulariaceae
R6 Invasive Plant Species	<i>Euphrasia nemorosa</i>	common eyebright	Scrophulariaceae
R6 Invasive Plant Species	<i>Euphrasia nemorosa</i>	common eyebright	Scrophulariaceae
R6 Invasive Plant Species	<i>Euphorbia esula</i>	leafy spurge	Euphorbiaceae
R6 Invasive Plant Species	<i>Euphrasia nemorosa</i>	common eyebright	Scrophulariaceae
R6 Invasive Plant Species	<i>Euphrasia nemorosa</i>	common eyebright	Scrophulariaceae
R6 Invasive Plant Species	<i>Euphrasia stricta</i>	drug eyebright	Scrophulariaceae
R6 Invasive Plant Species	<i>Euphrasia nemorosa</i>	common eyebright	Scrophulariaceae
R6 Invasive Plant Species	<i>Euphrasia stricta</i>	drug eyebright	Scrophulariaceae
R6 Invasive Plant Species	<i>Euphrasia nemorosa</i>	common eyebright	Scrophulariaceae
R6 Invasive Plant Species	<i>Polygonum cuspidatum</i>	Japanese knotweed	Polygonaceae
R6 Invasive Plant Species	<i>Polygonum sachalinense</i>	giant knotweed	Polygonaceae
R6 Invasive Plant Species	<i>Vulpia myuros</i>	rat-tail fescue	Poaceae
R6 Invasive Plant Species	<i>Vulpia myuros</i>	rat-tail fescue	Poaceae
R6 Invasive Plant Species	<i>Vulpia myuros</i>	rat-tail fescue	Poaceae
R6 Invasive Plant Species	<i>Brachypodium sylvaticum</i>	slender false brome	Poaceae
R6 Invasive Plant Species	<i>Foeniculum vulgare</i>	sweet fennel	Apiaceae
R6 Invasive Plant Species	<i>Foeniculum vulgare</i>	sweet fennel	Apiaceae
R6 Invasive Plant Species	<i>Geranium columbinum</i>	longstalk cranesbill	Geraniaceae
R6 Invasive Plant Species	<i>Genista monspessulana</i>	French broom	Fabaceae
R6 Invasive Plant Species	<i>Geranium robertianum</i>	Robert geranium	Geraniaceae
R6 Invasive Plant Species	<i>Gypsophila paniculata</i>	baby's breath	Caryophyllaceae
R6 Invasive Plant Species	<i>Gypsophila paniculata</i>	baby's breath	Caryophyllaceae
R6 Invasive Plant Species	<i>Hedera helix</i>	English ivy	Araliaceae
R6 Invasive Plant Species	<i>Hedera hibernica</i>	Atlantic Ivy	Araliaceae
R6 Invasive Plant Species	<i>Hedera hibernica</i>	Atlantic Ivy	Araliaceae
R6 Invasive Plant Species	<i>Heracleum mantegazzianum</i>	giant hogweed	Apiaceae
R6 Invasive Plant Species	<i>Hieracium lachenalii</i>	common hawkweed	Asteraceae
R6 Invasive Plant Species	<i>Hieracium laevigatum</i>	smooth hawkweed	Asteraceae
R6 Invasive Plant Species	<i>Hieracium laevigatum</i>	smooth hawkweed	Asteraceae
R6 Invasive Plant Species	<i>Hieracium aurantiacum</i>	orange hawkweed	Asteraceae
R6 Invasive Plant Species	<i>Hieracium caespitosum</i>	meadow hawkweed	Asteraceae
R6 Invasive Plant Species	<i>Hieracium laevigatum</i>	smooth hawkweed	Asteraceae
R6 Invasive Plant Species	<i>Hieracium laevigatum</i>	smooth hawkweed	Asteraceae
R6 Invasive Plant Species	<i>Hieracium laevigatum</i>	smooth hawkweed	Asteraceae
R6 Invasive Plant Species	<i>Hieracium laevigatum</i>	smooth hawkweed	Asteraceae
R6 Invasive Plant Species	<i>Hieracium lachenalii</i>	common hawkweed	Asteraceae
R6 Invasive Plant Species	<i>Hieracium laevigatum</i>	smooth hawkweed	Asteraceae
R6 Invasive Plant Species	<i>Hieracium laevigatum</i>	smooth hawkweed	Asteraceae
R6 Invasive Plant Species	<i>Hieracium pilosella</i>	mouseear hawkweed	Asteraceae
R6 Invasive Plant Species	<i>Hieracium caespitosum</i>	meadow hawkweed	Asteraceae
R6 Invasive Plant Species	<i>Hieracium laevigatum</i>	smooth hawkweed	Asteraceae
R6 Invasive Plant Species	<i>Hieracium laevigatum</i>	smooth hawkweed	Asteraceae
R6 Invasive Plant Species	<i>Hieracium laevigatum</i>	smooth hawkweed	Asteraceae
R6 Invasive Plant Species	<i>Hieracium laevigatum</i>	smooth hawkweed	Asteraceae
R6 Invasive Plant Species	<i>Hieracium sabaudum</i>	New England hawkweed	Asteraceae
R6 Invasive Plant Species	<i>Hieracium laevigatum</i>	smooth hawkweed	Asteraceae
R6 Invasive Plant Species	<i>Hieracium lachenalii</i>	common hawkweed	Asteraceae
R6 Invasive Plant Species	<i>Hyoscyamus niger</i>	black henbane	Solanaceae
R6 Invasive Plant Species	<i>Hypericum perforatum</i>	common St. Johnswort	Clusiaceae
R6 Invasive Plant Species	<i>Cardaria pubescens</i>	hairy whitetop	Brassicaceae
R6 Invasive Plant Species	<i>Hypochaeris radicata</i>	hairy catsear	Asteraceae

R6 Invasive Plant Species	Hydrilla verticillata	waterhyme	Hydrocharitaceae
R6 Invasive Plant Species	Ilex aquifolium	English holly	Aquifoliaceae
R6 Invasive Plant Species	Iris pseudacorus	paleyellow iris	Iridaceae
R6 Invasive Plant Species	Isatis tinctoria	Dyer's woad	Brassicaceae
R6 Invasive Plant Species	Bassia scoparia	burningbush	Chenopodiaceae
R6 Invasive Plant Species	Bassia scoparia	burningbush	Chenopodiaceae
R6 Invasive Plant Species	Bassia scoparia	burningbush	Chenopodiaceae
R6 Invasive Plant Species	Bassia scoparia	burningbush	Chenopodiaceae
R6 Invasive Plant Species	Bassia scoparia	burningbush	Chenopodiaceae
R6 Invasive Plant Species	Bassia scoparia	burningbush	Chenopodiaceae
R6 Invasive Plant Species	Bassia scoparia	burningbush	Chenopodiaceae
R6 Invasive Plant Species	Bassia scoparia	burningbush	Chenopodiaceae
R6 Invasive Plant Species	Bassia scoparia	burningbush	Chenopodiaceae
R6 Invasive Plant Species	Lamium galeobdolon	yellow archangel	Lamiaceae
R6 Invasive Plant Species	Lamium galeobdolon	yellow archangel	Lamiaceae
R6 Invasive Plant Species	Lathyrus latifolius	perennial pea	Fabaceae
R6 Invasive Plant Species	Lathyrus latifolius	perennial pea	Fabaceae
R6 Invasive Plant Species	Arctium minus	lesser burdock	Asteraceae
R6 Invasive Plant Species	Mycelis muralis	wall-lettuce	Asteraceae
R6 Invasive Plant Species	Prunus laurocerasus	cherry laurel	Rosaceae
R6 Invasive Plant Species	Lactuca serriola	prickly lettuce	Asteraceae
R6 Invasive Plant Species	Lactuca serriola	prickly lettuce	Asteraceae
R6 Invasive Plant Species	Lathyrus sylvestris	flat pea	Fabaceae
R6 Invasive Plant Species	Centaurea cyanus	garden cornflower	Asteraceae
R6 Invasive Plant Species	Cardaria draba	whitetop	Brassicaceae
R6 Invasive Plant Species	Cardaria draba	whitetop	Brassicaceae
R6 Invasive Plant Species	Lepidium latifolium	broadleaved pepperweed	Brassicaceae
R6 Invasive Plant Species	Leucanthemum vulgare	oxeye daisy	Asteraceae
R6 Invasive Plant Species	Centaurea solstitialis	yellow star-thistle	Asteraceae
R6 Invasive Plant Species	Leucanthemum vulgare	oxeye daisy	Asteraceae
R6 Invasive Plant Species	Leucanthemum vulgare	oxeye daisy	Asteraceae
R6 Invasive Plant Species	Linaria dalmatica	Dalmatian toadflax	Scrophulariaceae
R6 Invasive Plant Species	Linaria vulgaris	butter and eggs	Scrophulariaceae
R6 Invasive Plant Species	Ligustrum vulgare	European privet	Oleaceae
R6 Invasive Plant Species	Linaria vulgaris	butter and eggs	Scrophulariaceae
R6 Invasive Plant Species	Lotus corniculatus	bird's-foot trefoil	Fabaceae
R6 Invasive Plant Species	Lotus corniculatus	bird's-foot trefoil	Fabaceae
R6 Invasive Plant Species	Lotus pedunculatus	big trefoil	Fabaceae
R6 Invasive Plant Species	Lonicera etrusca	Etruscan honeysuckle	Caprifoliaceae
R6 Invasive Plant Species	Lotus pedunculatus	big trefoil	Fabaceae
R6 Invasive Plant Species	Lotus pedunculatus	big trefoil	Fabaceae
R6 Invasive Plant Species	Lotus pedunculatus	big trefoil	Fabaceae
R6 Invasive Plant Species	Anchusa arvensis	small bugloss	Boraginaceae
R6 Invasive Plant Species	Lythrum salicaria	purple loosestrife	Lythraceae
R6 Invasive Plant Species	Saponaria officinalis	bouncingbet	Caryophyllaceae
R6 Invasive Plant Species	Lythrum salicaria	purple loosestrife	Lythraceae
R6 Invasive Plant Species	Lythrum salicaria	purple loosestrife	Lythraceae
R6 Invasive Plant Species	Lythrum salicaria	purple loosestrife	Lythraceae
R6 Invasive Plant Species	Lysimachia vulgaris	garden yellow loosestrife	Primulaceae
R6 Invasive Plant Species	Tripleurospermum perforata	scentless false mayweed	Asteraceae
R6 Invasive Plant Species	Tripleurospermum perforata	scentless false mayweed	Asteraceae
R6 Invasive Plant Species	Tripleurospermum perforata	scentless false mayweed	Asteraceae
R6 Invasive Plant Species	Tanacetum parthenium	feverfew	Asteraceae
R6 Invasive Plant Species	Tripleurospermum perforata	scentless false mayweed	Asteraceae

R6 Invasive Plant Species	Marrubium vulgare	horehound	Lamiaceae
R6 Invasive Plant Species	Melilotus officinalis	yellow sweetclover	Fabaceae
R6 Invasive Plant Species	Melilotus officinalis	yellow sweetclover	Fabaceae
R6 Invasive Plant Species	Melilotus officinalis	yellow sweetclover	Fabaceae
R6 Invasive Plant Species	Melilotus officinalis	yellow sweetclover	Fabaceae
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R6 Invasive Plant Species	Melilotus officinalis	yellow sweetclover	Fabaceae
R6 Invasive Plant Species	Melilotus officinalis	yellow sweetclover	Fabaceae
R6 Invasive Plant Species	Myriophyllum aquaticum	parrot feather watermilfoil	Haloragaceae
R6 Invasive Plant Species	Myriophyllum aquaticum	parrot feather watermilfoil	Haloragaceae
R6 Invasive Plant Species	Mycelis muralis	wall-lettuce	Asteraceae
R6 Invasive Plant Species	Myriophyllum aquaticum	parrot feather watermilfoil	Haloragaceae
R6 Invasive Plant Species	Myriophyllum spicatum	Eurasian watermilfoil	Haloragaceae
R6 Invasive Plant Species	Onopordum acanthium	Scotch cottonthistle	Asteraceae
R6 Invasive Plant Species	Onopordum acanthium	Scotch cottonthistle	Asteraceae
R6 Invasive Plant Species	Phalaris arundinacea	reed canarygrass	Poaceae
R6 Invasive Plant Species	Phalaris arundinacea	reed canarygrass	Poaceae
R6 Invasive Plant Species	Phalaris arundinacea	reed canarygrass	Poaceae
R6 Invasive Plant Species	Phalaris arundinacea	reed canarygrass	Poaceae
R6 Invasive Plant Species	Egeria densa	Brazilian waterweed	Hydrocharitaceae
R6 Invasive Plant Species	Plantago lanceolata	narrowleaf plantain	Plantaginaceae
R6 Invasive Plant Species	Polygonum cuspidatum	Japanese knotweed	Polygonaceae
R6 Invasive Plant Species	Plantago lanceolata	narrowleaf plantain	Plantaginaceae
R6 Invasive Plant Species	Plantago lanceolata	narrowleaf plantain	Plantaginaceae
R6 Invasive Plant Species	Polygonum cuspidatum	Japanese knotweed	Polygonaceae
R6 Invasive Plant Species	Polygonum arenastrum	oval-leaf knotweed	Polygonaceae
R6 Invasive Plant Species	Polygonum arenastrum	oval-leaf knotweed	Polygonaceae
R6 Invasive Plant Species	Polygonum arenastrum	oval-leaf knotweed	Polygonaceae
R6 Invasive Plant Species	Polygonum bohemicum	Bohemian knotweed	Polygonaceae
R6 Invasive Plant Species	Polygonum cuspidatum	Japanese knotweed	Polygonaceae
R6 Invasive Plant Species	Polygonum cuspidatum	Japanese knotweed	Polygonaceae
R6 Invasive Plant Species	Polygonum arenastrum	oval-leaf knotweed	Polygonaceae
R6 Invasive Plant Species	Polygonum polystachyum	cultivated knotweed	Polygonaceae
R6 Invasive Plant Species	Potentilla recta	sulphur cinquefoil	Rosaceae
R6 Invasive Plant Species	Potentilla recta	sulphur cinquefoil	Rosaceae
R6 Invasive Plant Species	Potentilla recta	sulphur cinquefoil	Rosaceae
R6 Invasive Plant Species	Potentilla recta	sulphur cinquefoil	Rosaceae
R6 Invasive Plant Species	Polygonum sachalinense	giant knotweed	Polygonaceae
R6 Invasive Plant Species	Polygonum cuspidatum	Japanese knotweed	Polygonaceae
R6 Invasive Plant Species	Prunus laurocerasus	cherry laurel	Rosaceae
R6 Invasive Plant Species	Ranunculus repens	creeping buttercup	Ranunculaceae
R6 Invasive Plant Species	Ranunculus repens	creeping buttercup	Ranunculaceae
R6 Invasive Plant Species	Ranunculus repens	creeping buttercup	Ranunculaceae
R6 Invasive Plant Species	Ranunculus repens	creeping buttercup	Ranunculaceae
R6 Invasive Plant Species	Ranunculus repens	creeping buttercup	Ranunculaceae
R6 Invasive Plant Species	Ranunculus repens	creeping buttercup	Ranunculaceae
R6 Invasive Plant Species	Ranunculus repens	creeping buttercup	Ranunculaceae
R6 Invasive Plant Species	Ranunculus repens	creeping buttercup	Ranunculaceae
R6 Invasive Plant Species	Polygonum cuspidatum	Japanese knotweed	Polygonaceae
R6 Invasive Plant Species	Polygonum sachalinense	giant knotweed	Polygonaceae
R6 Invasive Plant Species	Robinia pseudoacacia	black locust	Fabaceae
R6 Invasive Plant Species	Rubus armeniacus	Himalayan blackberry	Rosaceae
R6 Invasive Plant Species	Rubus armeniacus	Himalayan blackberry	Rosaceae
R6 Invasive Plant Species	Rubus laciniatus	cutleaf blackberry	Rosaceae

R6 Invasive Plant Species	<i>Rubus armeniacus</i>	Himalayan blackberry	Rosaceae
R6 Invasive Plant Species	<i>Salvia aethiopis</i>	Mediterranean sage	Lamiaceae
R6 Invasive Plant Species	<i>Salsola tragus</i>	prickly Russian thistle	Chenopodiaceae
R6 Invasive Plant Species	<i>Salsola tragus</i>	prickly Russian thistle	Chenopodiaceae
R6 Invasive Plant Species	<i>Salsola kali</i>	Russian thistle	Chenopodiaceae
R6 Invasive Plant Species	<i>Salsola tragus</i>	prickly Russian thistle	Chenopodiaceae
R6 Invasive Plant Species	<i>Salsola tragus</i>	prickly Russian thistle	Chenopodiaceae
R6 Invasive Plant Species	<i>Salsola tragus</i>	prickly Russian thistle	Chenopodiaceae
R6 Invasive Plant Species	<i>Saponaria officinalis</i>	bouncingbet	Caryophyllaceae
R6 Invasive Plant Species	<i>Saponaria officinalis</i>	bouncingbet	Caryophyllaceae
R6 Invasive Plant Species	<i>Sasa palmata</i>	broadleaf bamboo	Poaceae
R6 Invasive Plant Species	<i>Salsola tragus</i>	prickly Russian thistle	Chenopodiaceae
R6 Invasive Plant Species	<i>Salsola tragus</i>	prickly Russian thistle	Chenopodiaceae
R6 Invasive Plant Species	<i>Salvia sclarea</i>	Europe sage	Lamiaceae
R6 Invasive Plant Species	<i>Cytisus scoparius</i>	Scotch broom	Fabaceae
R6 Invasive Plant Species	<i>Salvia sclarea</i>	Europe sage	Lamiaceae
R6 Invasive Plant Species	<i>Salsola tragus</i>	prickly Russian thistle	Chenopodiaceae
R6 Invasive Plant Species	<i>Schoenoplectus mucronatus</i>	bog bulrush	Cyperaceae
R6 Invasive Plant Species	<i>Cirsium arvense</i>	Canada thistle	Asteraceae
R6 Invasive Plant Species	<i>Secale cereale</i>	cereal rye	Poaceae
R6 Invasive Plant Species	<i>Senecio jacobaea</i>	stinking willie	Asteraceae
R6 Invasive Plant Species	<i>Secale cereale</i>	cereal rye	Poaceae
R6 Invasive Plant Species	<i>Secale cereale</i>	cereal rye	Poaceae
R6 Invasive Plant Species	<i>Senecio sylvaticus</i>	woodland ragwort	Asteraceae
R6 Invasive Plant Species	<i>Alliaria petiolata</i>	garlic mustard	Brassicaceae
R6 Invasive Plant Species	<i>Sisymbrium officinale</i>	hedgemustard	Brassicaceae
R6 Invasive Plant Species	<i>Sisymbrium officinale</i>	hedgemustard	Brassicaceae
R6 Invasive Plant Species	<i>Sonchus arvensis</i>	field sowthistle	Asteraceae
R6 Invasive Plant Species	<i>Sonchus asper</i>	spiny sowthistle	Asteraceae
R6 Invasive Plant Species	<i>Sonchus asper</i>	spiny sowthistle	Asteraceae
R6 Invasive Plant Species	<i>Soliva sessilis</i>	field burrweed	Asteraceae
R6 Invasive Plant Species	<i>Solanum dulcamara</i>	climbing nightshade	Solanaceae
R6 Invasive Plant Species	<i>Solanum elaeagnifolium</i>	silverleaf nightshade	Solanaceae
R6 Invasive Plant Species	<i>Soliva sessilis</i>	field burrweed	Asteraceae
R6 Invasive Plant Species	<i>Soliva sessilis</i>	field burrweed	Asteraceae
R6 Invasive Plant Species	<i>Spartium junceum</i>	Spanish broom	Fabaceae
R6 Invasive Plant Species	<i>Convolvulus arvensis</i>	field bindweed	Convolvulaceae
R6 Invasive Plant Species	<i>Symphytum officinale</i>	common comfrey	Boraginaceae
R6 Invasive Plant Species	<i>Taeniatherum caput-medusae</i>	medusahead	Poaceae
R6 Invasive Plant Species	<i>Tanacetum vulgare</i>	common tansy	Asteraceae
R6 Invasive Plant Species	<i>Taeniatherum caput-medusae</i>	medusahead	Poaceae
R6 Invasive Plant Species	<i>Taeniatherum caput-medusae</i>	medusahead	Poaceae
R6 Invasive Plant Species	<i>Tanacetum parthenium</i>	feverfew	Asteraceae
R6 Invasive Plant Species	<i>Tamarix ramosissima</i>	saltcedar	Tamaricaceae
R6 Invasive Plant Species	<i>Tanacetum vulgare</i>	common tansy	Asteraceae
R6 Invasive Plant Species	<i>Tanacetum vulgare</i>	common tansy	Asteraceae
R6 Invasive Plant Species	<i>Genista monspessulana</i>	French broom	Fabaceae
R6 Invasive Plant Species	<i>Secale cereale</i>	cereal rye	Poaceae
R6 Invasive Plant Species	<i>Aegilops cylindrica</i>	jointed goatgrass	Poaceae
R6 Invasive Plant Species	<i>Tripleurospermum perforata</i>	scentless false mayweed	Asteraceae
R6 Invasive Plant Species	<i>Tripleurospermum maritima</i>	false mayweed	Asteraceae
R6 Invasive Plant Species	<i>Tripleurospermum maritima</i> ssp. ma	false mayweed	Asteraceae
R6 Invasive Plant Species	<i>Aegilops triuncialis</i>	barbed goatgrass	Poaceae
R6 Invasive Plant Species	<i>Tripleurospermum perforata</i>	scentless false mayweed	Asteraceae
R6 Invasive Plant Species	<i>Elymus repens</i>	quackgrass	Poaceae

R6 Invasive Plant Species	<i>Tribulus terrestris</i>	puncturevine	Zygophyllaceae
R6 Invasive Plant Species	<i>Aegilops triuncialis</i>	barbed goatgrass	Poaceae
R6 Invasive Plant Species	<i>Elymus repens</i>	quackgrass	Poaceae
R6 Invasive Plant Species	<i>Ulex europaeus</i>	common gorse	Fabaceae
R6 Invasive Plant Species	<i>Urtica dioica</i>	stinging nettle	Urticaceae
R6 Invasive Plant Species	<i>Ventenata dubia</i>	North Africa grass	Poaceae
R6 Invasive Plant Species	<i>Ventenata dubia</i>	North Africa grass	Poaceae
R6 Invasive Plant Species	<i>Verbascum thapsus</i>	common mullein	Scrophulariaceae
R6 Invasive Plant Species	<i>Vinca major</i>	bigleaf periwinkle	Apocynaceae
R6 Invasive Plant Species	<i>Vinca major</i>	bigleaf periwinkle	Apocynaceae
R6 Invasive Plant Species	<i>Vinca minor</i>	common periwinkle	Apocynaceae
R6 Invasive Plant Species	<i>Vulpia myuros</i>	rat-tail fescue	Poaceae
R6 Invasive Plant Species	<i>Vulpia myuros</i>	rat-tail fescue	Poaceae
R6 Invasive Plant Species	<i>Vulpia myuros</i>	rat-tail fescue	Poaceae
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Appendix D: Environmental Justice Data

APPENDIX D: ENVIRONMENTAL JUSTICE

The U.S. Environmental Protection Agency (EPA) defines “environmental justice” as “*the fair treatment and meaningful involvement of all people regardless of race, color, national origin, or income, with respect to the development, implementation, and enforcement of environmental laws, regulations, and policies*” (EPA 2021). Building upon this definition, the Washington state law on Environmental Justice (Chapter 70A.02 RCW) defines environmental justice as:

The fair treatment and meaningful involvement of all people regardless of race, color, national origin, or income with respect to the development, implementation, and enforcement of environmental laws, rules, and policies. Environmental justice includes addressing disproportionate environmental and health impacts in all laws, rules, and policies with environmental impacts by prioritizing vulnerable populations and overburdened communities, the equitable distribution of resources and benefits, and eliminating harm.

This appendix identifies people with low-income, people of color, and other communities that are overburdened with respect to environmental health disparities, as well as the tribal populations with unique connections to potentially affected resources, within the study area.^{1,2} Additionally, it addresses all significant anticipated impacts and evaluates the potential that identified groups may be disproportionately affected.

Methodology

The environmental justice analysis considers the extent to which people of color, low-income communities, and overburdened communities, as well as potentially affected tribal populations, may be disproportionately adversely or beneficially affected by the alternatives. The environmental justice analysis relies on the findings of the impact analyses described in the previous chapters of this EIS to identify the potential for impacts on vulnerable communities (including low-income individuals, people of color, and tribal communities), and evaluates whether impacts on the vulnerable communities are disproportionate relative to the impacts on other affected communities.

The environmental justice analysis involves the following general steps:

1. Identify and describe relative presence of people of color and low-income communities at the Census block group level across the study area. A Census block group is a subdivision of a Census tract and is the smallest geographical unit for which the Census publishes sample data.
2. Identify and describe presence of communities at the Census tract level that the state describes as having demographic and other characteristics that identify it as overburdened.³
3. Identify tribal populations with unique connections to the potentially affected resources.
4. Identify whether the impacts of the alternatives as described in the Impacts sections of the EIS may affect the communities identified in the first three steps.

¹ This analysis collectively considers race, color, and national origin under the umbrella of “communities of color.”

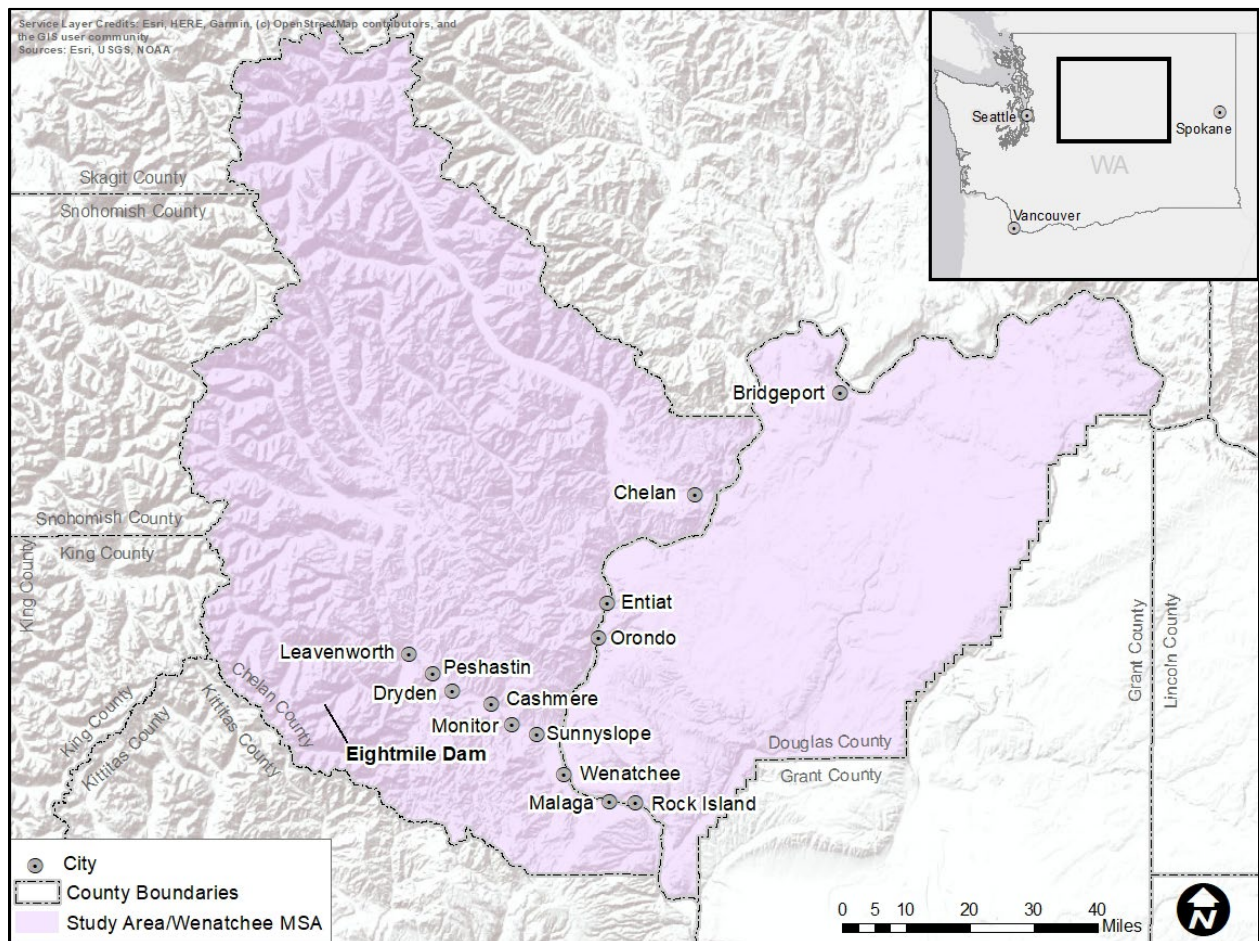
² The scope of this analysis with respect to tribal populations includes those individual tribal members that may experience impacts resulting from the alternatives due to their use of affected resources.

³ These include the communities identified in the State of Washington’s Environmental Health Disparities mapping tool as characterized by environmental health disparities. Factors considered include environmental exposures, environmental effects, sensitive populations, and socioeconomic factors (DOH 2021).

5. Evaluate the nature and relative intensity of impacts of the alternatives that would be experienced by the general population and compare with the anticipated impacts on the identified communities.
6. Identify and describe impacts that may disproportionately affect the vulnerable communities identified in this analysis.

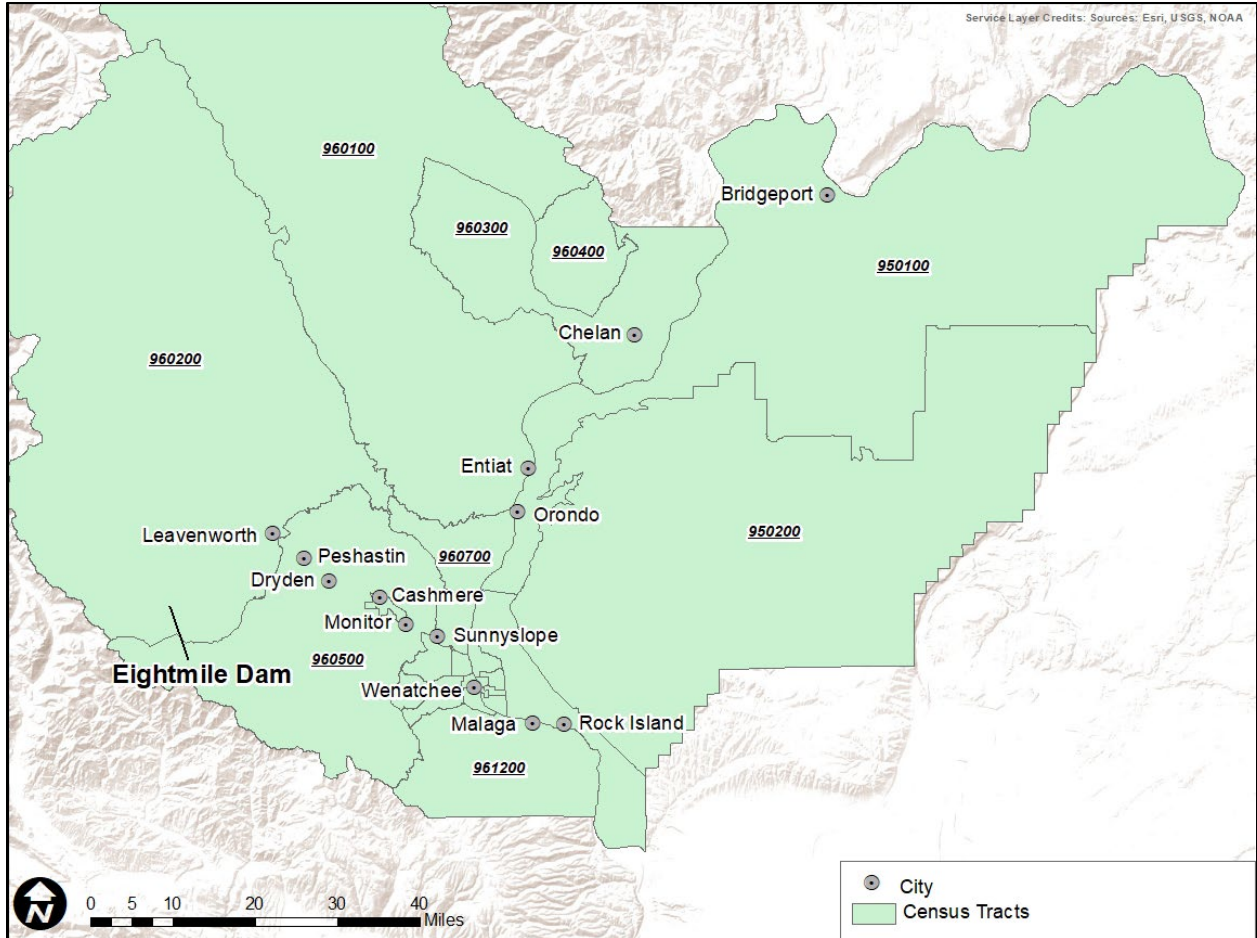
This analysis identifies communities of color, low-income communities, and overburdened communities across the Wenatchee Metropolitan Statistical Area (MSA), which includes all of Chelan and Douglas counties (**Figure D-1**). **Figure D-2** and **Figure D-3** identify the relevant census tracts for this analysis. This geographic region encompasses the area over which individuals and communities may experience the impacts to the affected activities and resources (e.g., water, fish, agriculture). For example, the affected communities may be employed in affected industries, rely upon the affected environmental resources for food or recreation, or hold cultural value for potentially affected resources. While this study area is broad and includes areas somewhat distant from the dam site, the major population centers within the MSA are relatively close to the dam site. The majority of communities that may be affected by the action are likely within Chelan County. However, the analysis includes Douglas County as a significant portion of the largest proximal population center (Wenatchee/East Wenatchee) lies in Douglas County.

Figure D-1. Study Area for Environmental Justice Analysis



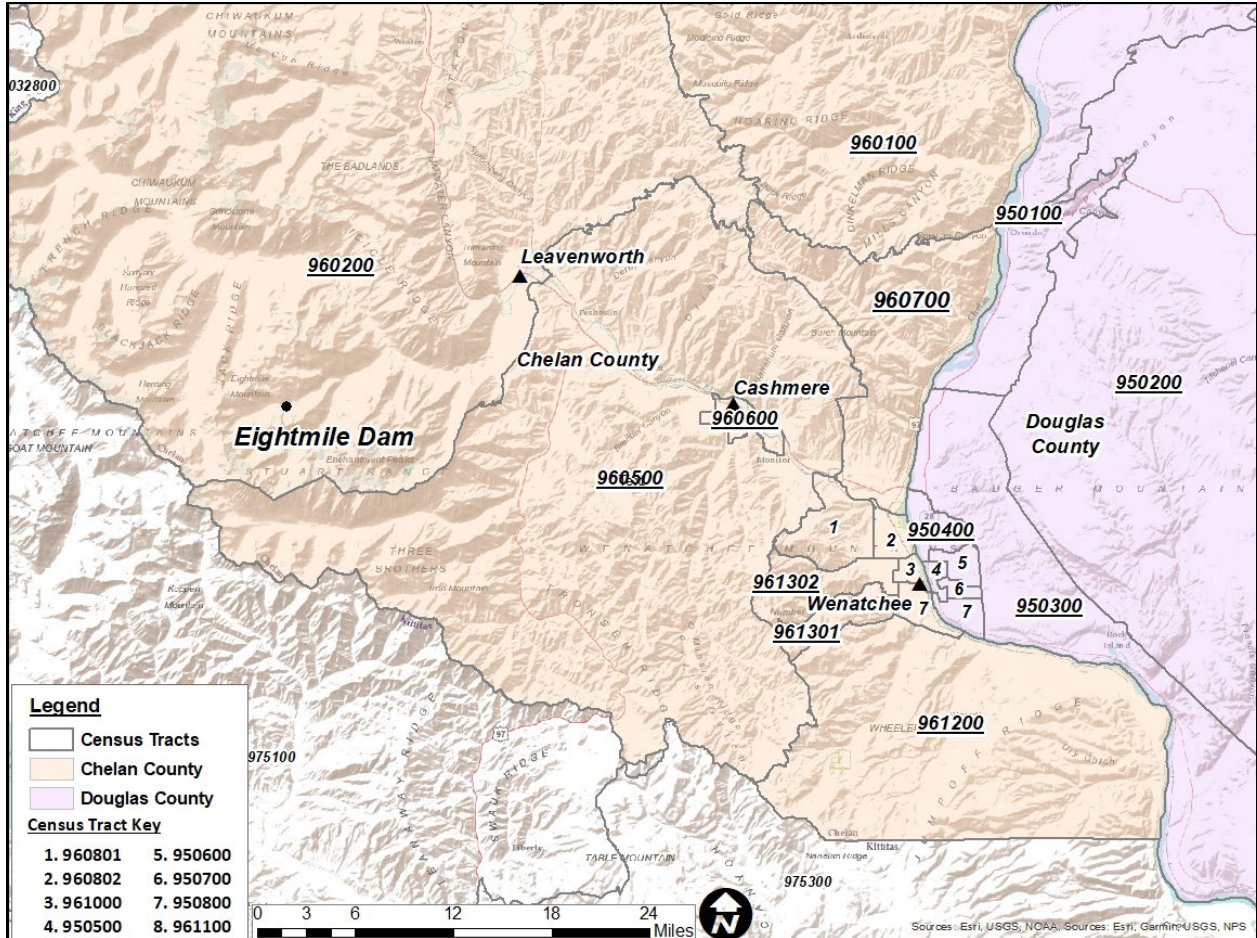
Sources: DNR 2022; United States Census 2020.

Figure D-2. Census Tracts within Study Area for Environmental Justice Analysis



Sources: DNR 2022; United States Census 2020.

Figure D-3. Census Tracts within Urban Areas of Study Area for Environmental Justice Analysis



Regulatory Context

Regulations, programs, policies, and guidance that identify methods for determining environmental justice impacts of proposed actions are described in **Table D-1**. The State of Washington does not require environmental justice analyses of significant regulatory actions until July 1, 2023 (70A.02 RCW), and the federal guidance and policies regarding environmental justice are not required for this SEPA analysis. However, absent specific existing requirements for consideration of environmental justice within SEPA, this analysis relies on these federal policies and guidelines, recent state legislation on Environmental Justice (Chapter 70A.02 RCW), as well as the State of Washington’s Environmental Justice Task Force’s report, to evaluate the potential environmental justice effects of the alternatives.

Table D-1. Regulations and Guidelines Related to Environmental Justice

Program, Plan, or Policy	Description
Executive Order 12898. Federal Actions to Address Environmental Justice in Minority Populations and Low-Income Populations (1994)	E.O. 12898 requires that federal agencies identify and address disproportionately high and adverse effects of its programs, policies, and activities on minority and low-income populations.
Council on Environmental Quality (CEQ) Environmental Justice: Guidance Under the National Environmental Policy Act (1997)	Guidance from the CEQ on how federal agencies can most effectively identify and address environmental justice concerns within National Environmental Policy Act (NEPA) analyses.
Promising Practices for EJ Methodologies in NEPA Reviews: Report of the Federal Interagency Working Group on Environmental Justice & NEPA Committee (2016)	A report of the Federal Interagency Working Group on Environmental Justice (IWGEJ), which was established to improve consideration of environmental justice issues in the NEPA process across all relevant federal agencies. This report specifically compiles methodologies and best practices used by Federal agencies relative to environmental justice within NEPA. The recommendations and methodologies presented do not reflect formal agency guidance.
Environmental Justice Task Force Recommendations for Prioritizing EJ in Washington State Government: Report to the Washington State Governor and Legislature	<p>In 2019, the Washington State Legislature, through a proviso in its 2019–2021 operating budget, created the Environmental Justice Task Force. The Task Force was charged with developing a report that included, among other charges:</p> <ul style="list-style-type: none"> • Model policies that prioritize highly impacted communities and vulnerable populations for the purpose of reducing environmental health disparities and advancing a healthy environment for all residents; and • Guidance for using the Washington Environmental Health Disparity Map to identify communities that are highly impacted by EJ issues with current demographic data (Environmental Justice Task Force 2020). <p>The Task Force published its Final Report in October 2020.</p>
Washington State Law on Environmental Justice RCW 70A.02	<p>RCW 70A.02 implements the recommendations of the Environmental Justice Task Force with the goal of reducing and eliminating the disparities in how low-income communities and communities of color experience environmental health impacts. It requires that specific state agencies:</p> <ul style="list-style-type: none"> • Incorporate environmental justice into their strategic plans. • Conduct environmental justice assessment when considering significant actions. • Develop a framework for consultation with tribal governments. • Create and adopt a community engagement plan to identify how it will facilitate participation of potentially affecting communities in agency decision-making.

Affected Environment

This section uses demographic data to identify the existence of communities of color, low-income communities, and overburdened communities within the study area. It is based on the most recent socioeconomic statistics currently available from the U.S. Census American Community Survey (ACS) 5-year estimates from 2015 to 2019, as well as data compiled in the Washington State Department of Health’s Environmental Disparities (EHD) Map (United States Census 2021; DOH 2021). In

addition to communities of color, low-income communities, and overburdened communities, this analysis also identifies tribal populations with special interest in potentially affected resources.

Communities of Color

People of color are defined in this analysis as all people who list their racial status as a race other than white alone and/or list their ethnicity as Hispanic or Latino. The CEQ guidance identifies areas of “minority communities” as being where “*minority population percentage of the affected area is meaningfully greater than the minority population percentage in the general population or other appropriate unit of geographic analysis*” (CEQ 1997). The Federal Interagency Working Group on Environmental Justice (IWGEJ) provides additional guidance for defining “meaningfully greater” in identifying environmental justice communities (NEPA Committee and IWGEJ 2017). This analysis considers two criteria for identifying communities of color. It first considers whether the population of color in any Census block group within the study area exceeds 50 percent, which would identify the presence of a community of color (i.e., the “50 percent analysis”). It then evaluates whether the population of color in any remaining block group is greater than 10 percent higher than the “reference community,” which in this case is the broader relevant county. The communities that meet either of these thresholds are identified as “communities of color.”

The percentages of people of color in Chelan and Douglas counties are 32 and 36 percent, respectively (**Table D-2**). The population of color within these counties is slightly higher than the state-wide proportion of 31 percent. Accordingly, the thresholds to identify communities of color in Chelan and Douglas counties, respectively, are 42 and 46 percent.

This analysis identifies communities of color in the study area based on Census block group level data. Race and ethnicity characteristics are based on the ACS 2015–2019 5-year estimates (**Table D-2**). The “50 percent analysis” identifies 18 block groups as communities of color. **Table D-2** also describes the percentages of people of color in block groups within the study area and identifies three additional block groups with populations of color greater than 10 percent above the threshold for the associated county.

Of the 84 block groups considered, 21 have percentages of people of color above the established thresholds. These block groups account for 24.7 percent of the total population of Chelan and Douglas counties. The populations of color in the study area are predominantly Hispanic/Latino or “other.” **Figure D-4** maps these block groups identified as communities of color.

The population of color across the MSA is predominantly Hispanic/Latino. In Chelan County, the populations of communities of color generally include between 50 and 65 percent (in one case as high as 92 percent) of the population identifying as Hispanic/Latino at the block group level. In Douglas County, the statistics are generally similar. The population of color of the MSA also includes a substantial proportion of individuals who identify their race as “other” or “two or more races,” and two block groups with relatively high proportions of the population that identify as American Indian or Alaska Native. The population of color of the MSA does not include many individuals identifying as Black/African American, Asian, or Native Hawaiian/Other Pacific Islander.

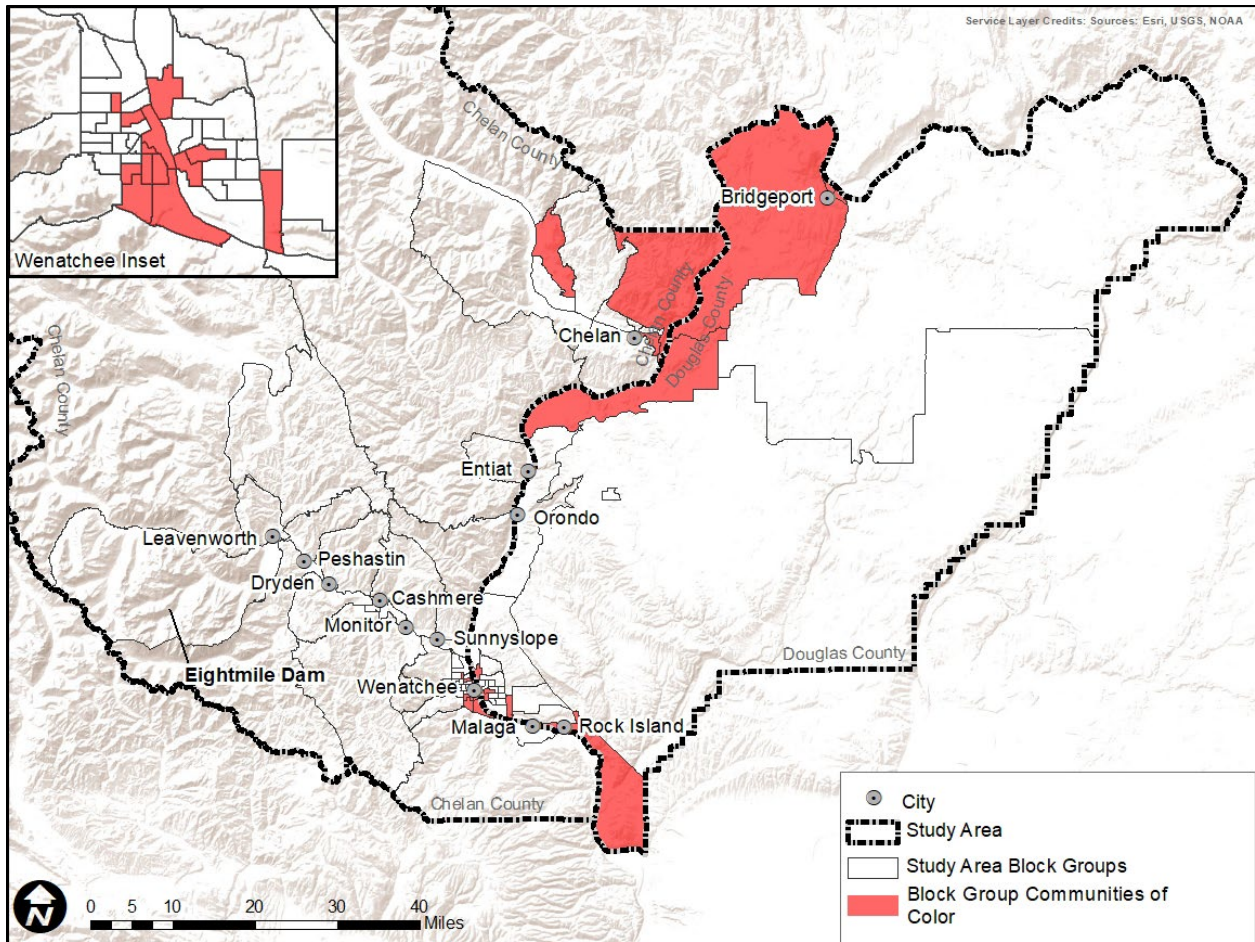
The populations of color are largely centered around the City of Wenatchee and East Wenatchee. In Chelan County, they also include Census block groups with relatively large populations of color in and around the town of Chelan. In Douglas County, in addition to communities around East Wenatchee, there are block groups with relatively large populations of color near the towns of Bridgeport and Rocky Butte, as well as in other communities moving south along the Columbia River, and in the area south of Rock Island. The population of color of the MSA includes a substantial proportion of individuals who identify their race as “other” or “two or more races,” and two block groups with relatively high proportions of the population that identify as American Indian or Alaska Native.

Table D-2. Populations of Color in Study Area Block Groups

Census Area		Total Population ¹	Total People of Color	Percentage of People of Color	Racial Groups Breakdown						Hispanic/Latino Origin – Any Race	
					White (Hispanic or Non-Hispanic)	Black/African American	American Indian and Alaska Native	Asian	Native Hawaiian and other Pacific Islander	Other		Two or More Races
Chelan County		76,229	24,413	32%	80%	1%	1%	1%	0%	13%	4%	28%
Douglas County		42,023	15,062	36%	69%	0%	1%	1%	0%	25%	3%	32%
Washington State		7,404,107	2,330,162	31%	75%	4%	1%	9%	1%	4%	6%	13%
Tract	Block Group	Total Population ¹	Total People of Color	Percentage of People of Color	White (Hispanic or Non-Hispanic)	Black/African American	American Indian and Alaska Native	Asian	Native Hawaiian and Other Pacific Islander	Other	Two or More Races	Hispanic/Latino Origin-Any Race
Chelan County (Percentage of People of Color Threshold 42%)												
960300	6	709	461	65%	68%	0%	0%	0%	0%	32%	0%	65%
960300	7	1,103	514	47%	93%	0%	0%	0%	0%	7%	0%	47%
960400	2	1,470	954	65%	63%	0%	0%	0%	0%	20%	16%	63%
960802	5	1,449	765	53%	70%	0%	0%	0%	0%	19%	12%	53%
961000	1	770	417	54%	95%	0%	0%	0%	0%	0%	5%	51%
961000	2	774	605	78%	31%	0%	18%	2%	0%	28%	21%	58%
961000	6	1,081	620	57%	68%	0%	0%	0%	0%	13%	19%	47%
961100	1	1,131	554	49%	61%	3%	0%	0%	0%	32%	4%	45%
961100	2	2,444	1,391	57%	48%	0%	0%	0%	0%	47%	5%	54%
961100	3	2,562	1,908	74%	72%	0%	0%	0%	0%	28%	0%	74%
961100	4	1,978	1,054	53%	54%	9%	4%	0%	0%	29%	4%	36%
961100	5	2,201	2,034	92%	41%	0%	0%	0%	0%	59%	0%	92%
Douglas County (Percentage of People of Color Threshold 46%)												
950100	2	878	623	71%	29%	0%	0%	0%	0%	71%	0%	71%
950100	3	1,328	1,182	89%	22%	0%	2%	0%	0%	71%	4%	86%

Tract	Block Group	Total Population ¹	Total People of Color	Percentage of People of Color	White (Hispanic or Non-Hispanic)	Black/African American	American Indian and Alaska Native	Asian	Native Hawaiian and Other Pacific Islander	Other	Two or More Races	Hispanic/Latino Origin-Any Race
950100	4	1,247	1,109	89%	13%	0%	1%	0%	0%	77%	9%	88%
950100	5	1,271	822	65%	43%	0%	0%	1%	0%	49%	7%	57%
950300	2	1,110	632	57%	43%	0%	3%	3%	0%	50%	0%	52%
950300	5	1,425	743	52%	64%	0%	0%	0%	0%	32%	3%	49%
950400	3	2,005	1,057	53%	53%	0%	1%	1%	1%	44%	0%	49%
950500	3	492	229	47%	53%	0%	12%	0%	0%	16%	18%	24%
950700	1	1,828	962	53%	56%	0%	2%	0%	0%	38%	5%	49%
<p>Note:</p> <p>1/ Total population refers to an estimated value based on Census responses and may therefore differ across metrics.</p> <p>2/ Percentages sum to 100 percent across racial groups; Hispanic/Latino category is not included in this breakdown because of overlap between Hispanic/Latino category and multiple racial categories.</p> <p>Source: United States Census 2020.</p>												

Figure D-4. Map Identifying Locations of Communities of Color within the Study Area



Sources: DNR 2022; United States Census 2020.

Low-Income Communities

Data from the U.S. Census Bureau ACS 5-year estimates (2015–2019) inform the assessment of low-income communities across the study area at the Census block group level. For this analysis, low-income is defined as income less than 200% of the poverty level. The federal poverty level for an individual in 2020 was \$12,760 (ASPE 2021). Thus, individuals with an income of less than \$25,520 (two times the poverty level) are considered low-income.

For this analysis, a block group is considered to contain a “low-income community” if the proportion of individuals living at or below twice the poverty level is greater than the proportion for the State. The low-income percentage for Washington is 26 percent. This value establishes the threshold for identifying “low-income communities” for this analysis. Of the 84 block groups within the Wenatchee MSA study area for this analysis, 58 have low-income proportions above the established threshold (Table D-3). Figure D-5 depicts the locations of identified low-income communities graphically.

Of the 58 “low-income communities,” 19 are also identified as “communities of color.” The identified low-income communities cover a broader geographic area as compared with the block groups with communities of color. In addition to low-income areas in many of the same locations as the identified communities of color, low-income block groups are located along the entirety of Lake Chelan

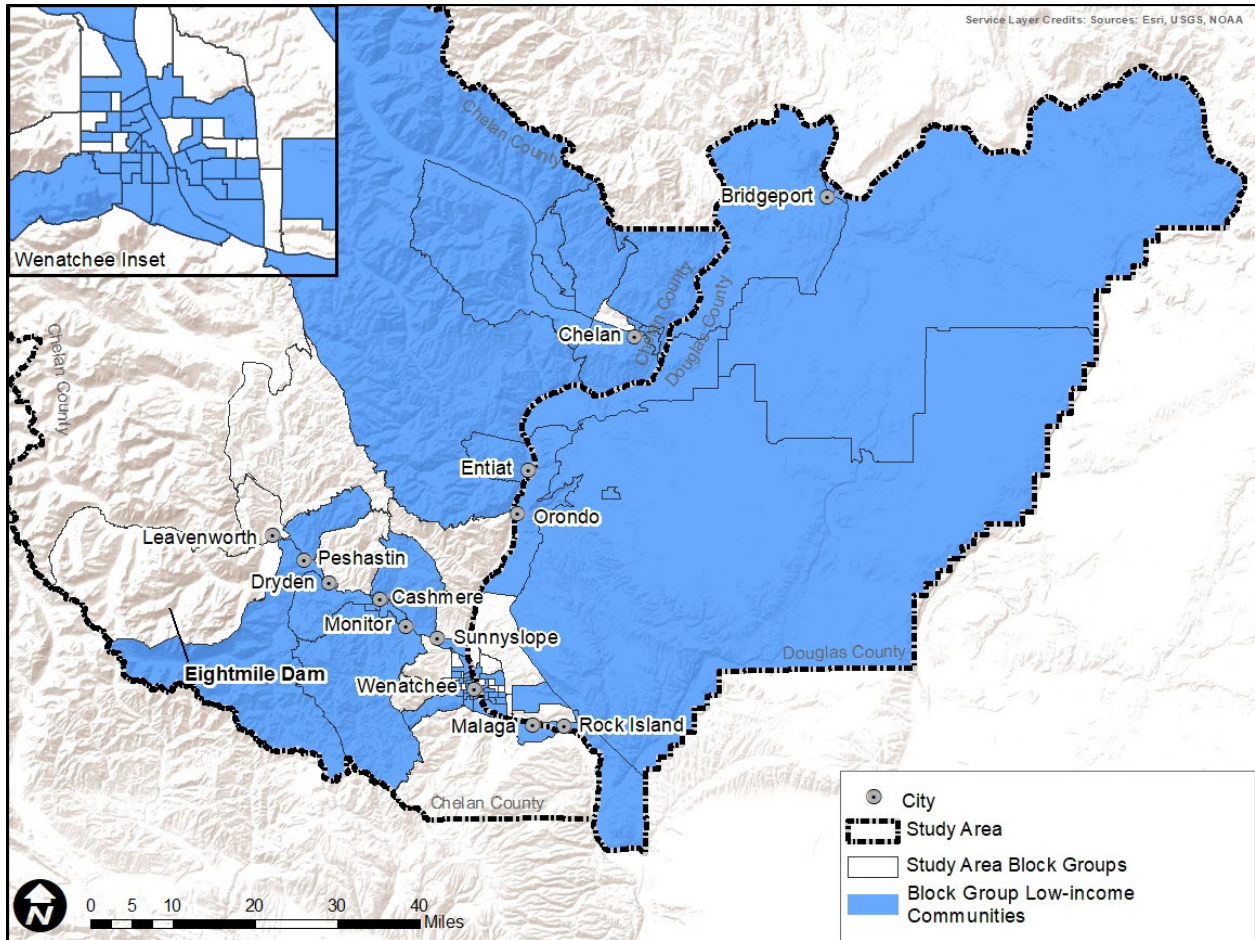
(northwest of the town of Chelan), south of the town of Chelan, in the area to the north of Cashmere, and south of the City of Leavenworth and Eightmile Lake.

Table D-3. Low-Income Populations in Study Area Block Groups

Census Area		Total Population ¹	Total Low-Income	Low-Income Percentage
Chelan County		75,073	24,638	33%
Douglas County		41,862	14,084	34%
Washington State		7,266,810	1,860,917	26%
Tract	Block Group	Total Population ¹	Total Low-Income	Low-Income Percentage
Chelan County				
960100	1	1192	362	31%
960100	2	998	270	27%
960300	1	514	218	42%
960300	3	1498	550	37%
960300	4	842	494	59%
960300	5	717	258	36%
960300	6	709	195	28%
960300	7	1103	512	46%
960400	1	576	200	35%
960400	2	1470	465	32%
960400	3	1173	597	51%
960500	1	905	289	32%
960500	3	1444	621	43%
960500	4	1757	557	32%
960500	5	1271	434	34%
960500	6	2060	543	27%
960600	2	1229	310	28%
960600	3	1486	409	29%
960700	2	1118	358	32%
960802	1	2107	1241	59%
960802	2	888	262	30%
960802	4	1503	437	29%
961000	1	770	290	38%
961000	2	774	391	51%
961000	3	557	262	47%
961000	4	541	188	35%
961000	6	1081	628	58%
961000	7	657	300	46%
961100	1	1131	447	40%
961100	2	2356	959	41%
961100	3	2562	1505	59%

Tract	Block Group	Total Population ¹	Total Low-Income	Low-Income Percentage
961100	4	1978	983	50%
961100	5	2078	1252	60%
961100	6	553	152	27%
961200		1972	591	30%
961302	1	1883	661	35%
961302	3	891	269	31%
961302	6	1590	604	38%
Douglas County				
950100	1	942	289	31%
950100	2	878	399	45%
950100	3	1328	700	53%
950100	4	1247	991	79%
950100	5	1271	681	54%
950100	6	625	197	32%
950200	1	1553	409	26%
950200	2	1513	444	30%
950300	3	1415	608	43%
950300	5	1409	525	37%
950400	3	2005	1103	55%
950500	2	1310	473	36%
950500	3	492	290	59%
950600	1	1311	568	43%
950700	1	1828	989	54%
950700	2	1364	619	45%
950700	3	1369	391	29%
950800	1	1614	783	49%
950800	2	1960	592	30%
950800	3	2205	659	31%
<p>Note: 1/ Total population refers to an estimated value based on Census responses and may therefore differ across metrics.</p> <p>Source: United States Census 2020.</p>				

Figure D-5. Map Identifying Locations of Low-Income Communities within the Study Area



Sources: DNR 2022; United States Census 2020.

Overburdened Communities

RCW 70A.02 directs agencies to use cumulative environmental health impact analysis, such as the Washington State Department of Health (DOH) Environmental Disparities (EHD) Map to consider the effects of a proposed action on overburdened communities. This analysis uses the Census-tract level data and overall environmental health disparities rankings from the EHD Map to identify additional overburdened communities that are experiencing environmental health disparities. The EHD map compares communities across the state and provides descriptive information and context for the pollution measures, proximity to hazardous sites, and social vulnerabilities that may characterize certain communities within the study area. The map contains 19 indicators split across four themes as follows: (i) Environmental Exposures; (ii) Environmental Effects; (iii) Sensitive Populations; and (iv) Socioeconomic Factors.

- *Environmental Exposures:* Emissions and concentrations of PM2.5 and ozone, proximity to heavy traffic roadways, and toxic releases from facilities.

- *Environmental Effects:* Risk of exposure to lead, and proximity to hazardous waste sites, Superfund sites, and Risk Management Plan facilities. *Sensitive Populations:* Death from cardiovascular disease, low birth weight.
- *Socioeconomic Factors:* Limited English-speaking abilities; no high school diploma; poverty; people of color; transportation expense; unaffordable housing; and unemployed (DOH 2021).

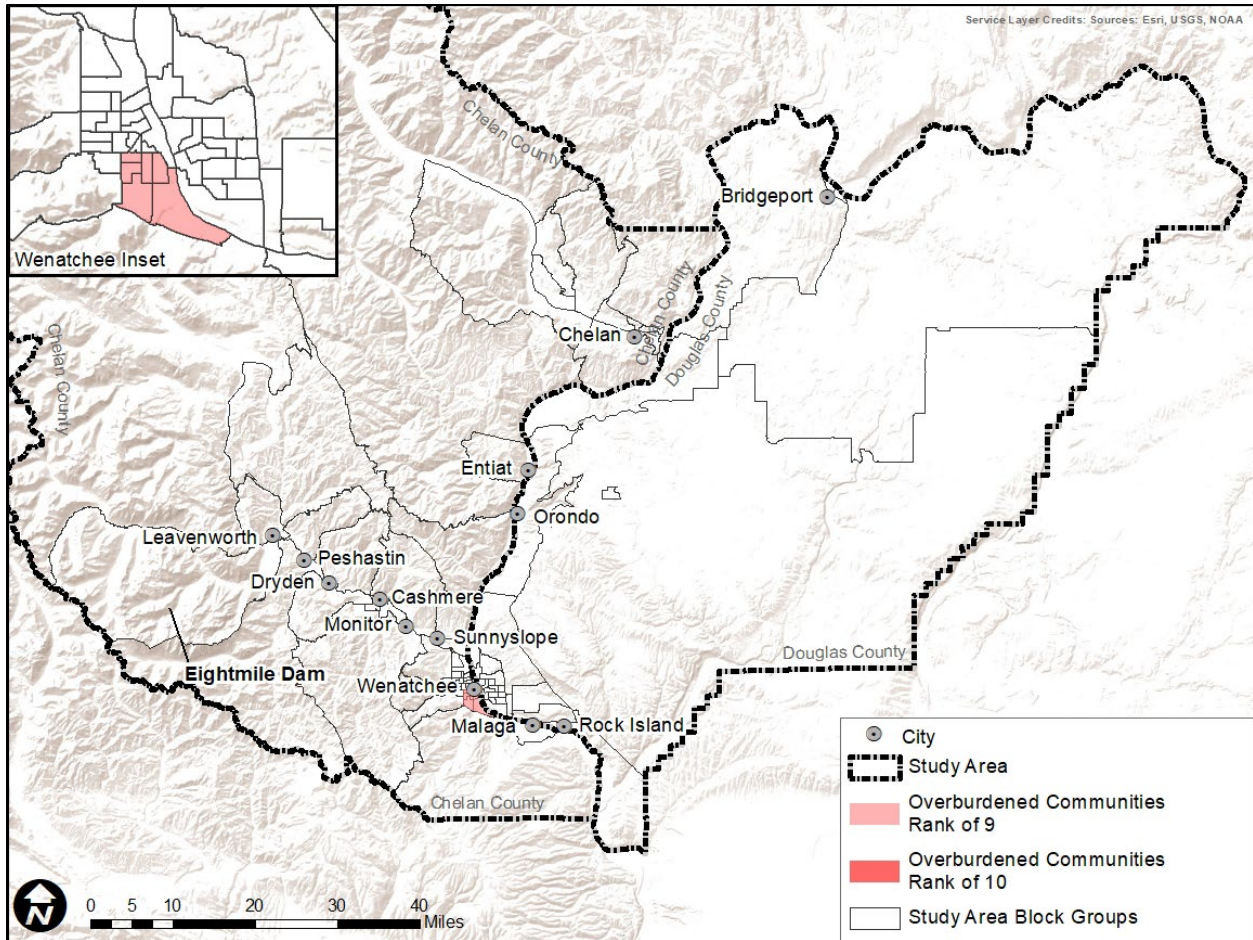
Each indicator is ranked using deciles (a set of 10 equally distributed subsections). For example, a ranking of 9 for “environmental exposures” means that approximately 10 percent of other Census tracts also experienced that level of environmental exposures (ranked as “9”), while 10 percent of Census tracts had higher environmental exposures (ranked as “10”), and 80 percent had lower exposures (tracts ranked 1 through 8). The average ranking across all indicators under each theme constitutes the overall theme ranking (University of Washington Department of Environmental & Occupational Health Sciences 2019).

The Environmental Justice Task Force suggests identifying “highly impacted” communities as those with an overall rank of 9 or 10 (although the recommendations specifically note that these ranks should not be used as a way to label an area as “an EJ community”) (Environmental Justice Task Force 2020). Building from this guidance, this analysis considers any community identified as having an overall environmental health disparities rank of 9 or 10 as “overburdened.” **Figure D-6** identifies those communities (by Census tract) that are identified as rank 9 or 10 with respect to environmental health disparities.

To evaluate the environmental health disparities rankings, the analysis considers whether any areas that were not identified specifically as communities of color or low-income communities are identified as overburdened using this approach. Because both Census tracts and block groups are used to identify communities of color, low-income communities, and overburdened communities, the analysis assumes that the tract-level environmental health disparity ranking applies to all block groups within that tract; this approach may over-estimate the block groups that may be overburdened.

These results indicate that all of the Census block groups that were identified as overburdened were also otherwise identified as low-income communities or communities of color. The six “overburdened” block groups are located in Chelan County, in the city of Wenatchee.

Figure D-6. Communities Ranked 9 or 10 by the DOH Environmental Health Disparities Map in the Study Area



Sources: DNR 2022; United States Census 2020; DOH 2021.

Potentially Affected Tribal Populations

Tribal populations may be uniquely affected by the alternatives due to their connections to the potentially affected resources. The project area is within the Yakama Ceded Lands, to which the Yakama Nation exercises its Treaty Reserved Rights, and traditional use area of the Confederated Tribes of the Colville Reservation for hunting, fishing, and gathering resources. These tribes target non-listed spring-run Chinook salmon returning to the Leavenworth National Fish Hatchery (LNFH). Since the reintroduction of coho salmon to the Icicle Creek drainages, tribal subsistence fisheries for coho salmon have been opened when runs are large and surplus fish are available. While the previously described Census data identify relative presence of American Indian populations, detailed information defining where the specifically affected tribal populations reside (i.e., members of the Yakama Nation and Confederated Tribes of the Colville Reservation) is not available. It is likely that some portion of the tribal members may live on the tribes' respective reservations (i.e., outside of the study area), while others may live within the MSA, or in other locations. Within the MSA, as described above, the analysis identifies two block groups with relatively high proportions of the population that identify as American Indian or Alaska Native, as compared to the statewide proportion of 1 percent for this population. These include one area in East Wenatchee where 12

percent of the population describes themselves as Native American or Alaska Native, and another directly across the Columbia River in Wenatchee where 18 percent of the population describes themselves as such. To the extent that fish resources are affected by the alternatives, the Yakama and Colville tribal members participating in these fisheries may be uniquely affected.

Additionally, the Yakama Nation cooperatively runs the hatchery program for coho salmon at the LNFH (USFWS 2016). Alternatives that affect operations of the LNFH have the potential to impact the tribal populations that are employed there.

Summary

Of the 84 total block groups in Chelan and Douglas Counties:

- **21 Communities of Color:** These block groups have percentages of populations of color ranging between 47 percent and 92 percent. The communities are predominantly Hispanic/Latino or “other.”
- **58 Low-Income Communities:** These block groups have percentages of low-income populations ranging from 26 percent to 79 percent of the total block population.
- **6 Overburdened Communities:** These block groups are part of a Census tract that is identified as rank 9 or 10 with respect to overall environmental health disparities identified by the State of Washington (DOH 2021). Of these, all are also identified as a community of color or low-income community.

Overall, 60 of the 84 total block groups in the study area are identified as a community of color, low-income community, and/or overburdened community (i.e., at least one of the three categories above). Together, the population of these block groups account for 64.8 percent of the total population of the two counties.

People of color comprise a proportion of the population in both Chelan and Douglas counties that is higher than the state average, with individuals identifying as Hispanic or Latino being the largest group of color within the study area. The cities of Wenatchee and East Wenatchee have higher percentages of people of color, and in the northwestern part of Douglas County near the town of Chelan, all of which are fairly distant from the project area. Low-income communities are distributed throughout the project area, particularly around Wenatchee, East Wenatchee, Cashmere, and well north of the project area around the town of Chelan. In Chelan County, the overburdened communities are limited to areas within the City of Wenatchee. In addition to these communities that live within the study area and which may be affected by the alternatives, the project area is within the Yakama Ceded Lands, to which the Yakama Nation exercises its Treaty Reserved Rights, and traditional use area of the Confederated Tribes of the Colville Reservation for hunting, fishing, and gathering resources, and tribal members may be uniquely affected by the alternatives to the extent that they result in impacts to fish populations in the Creek.

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