

# TECHNICAL MEMORANDUM

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**Date:** October 11, 2024  
**To:** Matt Dillin, Chehalis River Basin Flood Control Zone District  
**From:** MaryLouise Keefe, PhD, Kleinschmidt Associates  
**Cc:** Jason Kent, PE, PMP, Kleinschmidt Associates  
**Re:** Mitigation Contingency

## Chehalis Basin Strategy Proposed Flood Retention Expandable Mitigation Plan – Mitigation Contingency

### Introduction

As part of the Chehalis River Basin Flood Control Zone District's (Applicant) proposed flood damage reduction project, the Applicant has prepared The Chehalis Basin Strategy Proposed Flood Retention Expandable Mitigation Plan (Revised Mitigation Plan [RMP]; Kleinschmidt 2024). This plan describes mitigation actions at sites throughout the upper Chehalis Basin across three mitigation categories including:

1. Forest Conversion;
2. Chehalis River Riparian Enhancements for Shade Production; and
3. Aquatic Habitat Enhancements and Barrier Removals.

Within each category, specific sites and conceptual mitigation actions were proposed in sufficient quantity to offset impacts presented in the Draft Environmental Impact Statements (DEISs) prepared by the Washington Department of Ecology (Ecology 2020) under the State Environmental Policy Act (SEPA) and the United States Army Corps of Engineers (Corps 2020) under the National Environmental Policy Act (NEPA). However, within the project development and environmental review process, it is premature to secure binding commitments from landowners for the use of their property for mitigation. Contemporaneously, the Office of the Chehalis Basin (OCB) Board is undertaking a process to select the best solution for flood abatement and flood damage reduction within the Chehalis Basin. The Applicant's proposed flow-through dam project is currently being considered as a solution to flood damage reduction. If the flow-through dam project is selected to advance to final design and permitting, the Applicant in coordination with the OCB can begin engaging in legal commitments with identified landowners. However, in the period between the publishing of the mitigation plan and project implementation, it is possible that certain identified mitigation properties will sell, landowners will change, or landowners may even change their mind. This creates some uncertainty around the specific parcels that have been selected and proposed for mitigation in the RMP. To address this uncertainty and ensure the sufficiency of the proposed mitigation, the Applicant identified additional contingency

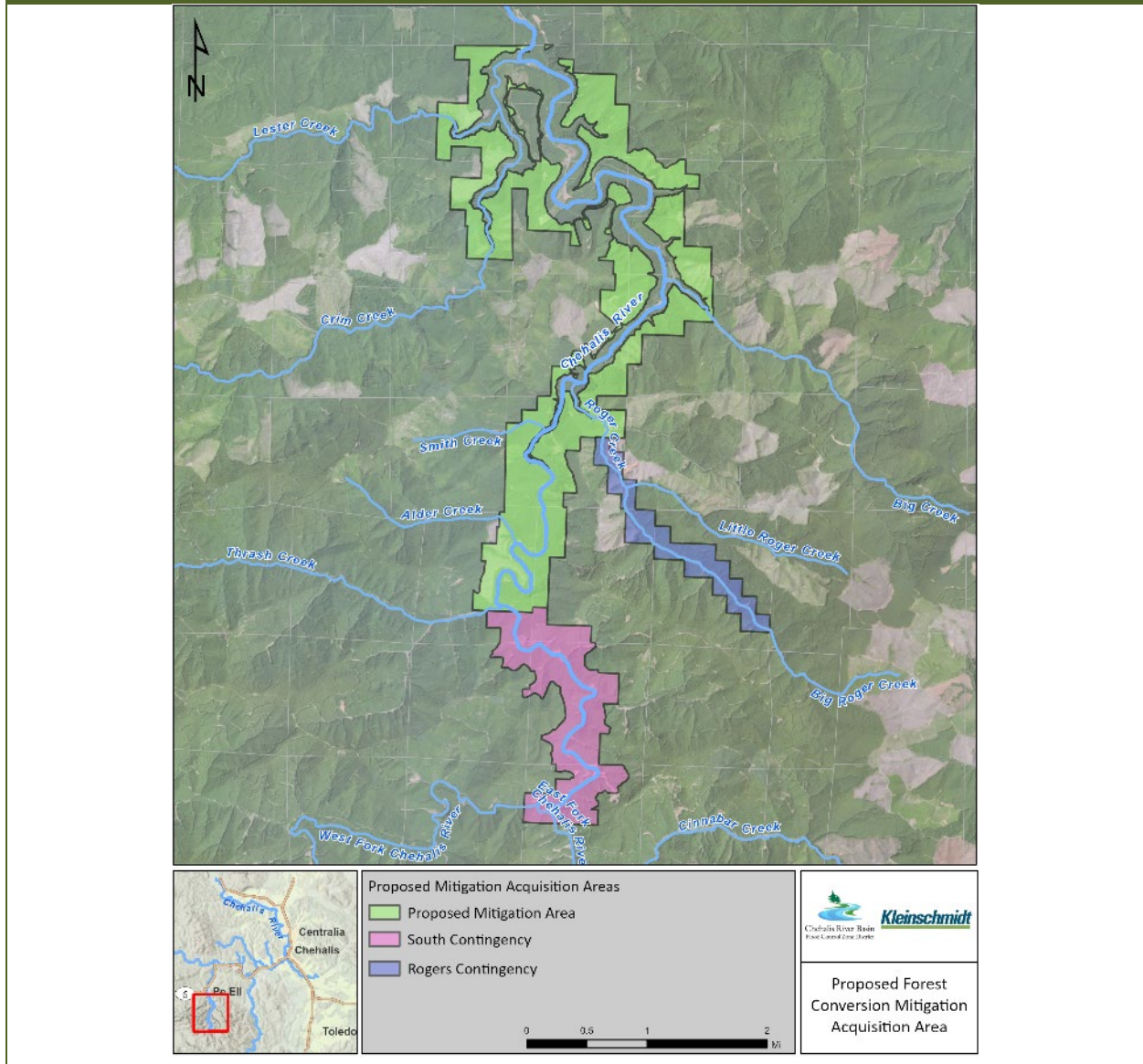
mitigation sites that can be used to replace sites that become unavailable or supplement sites if needed as part of the Applicant's proposed Adaptive Management Plan (Chapter 9 of the RMP).

This technical memorandum provides information, by mitigation action type, on the number and location of contingency sites identified during mitigation plan development but not included in the proposed plan. While these sites were not proposed for the mitigation plan, they have been subject to varying degrees of feasibility assessment, ranging from remote based characterization to landowner engagement and site-specific field surveys. Tools used to evaluate the sites are the same as those described for mitigation site selection in Chapter 7 of the RMP.

### **Category 1: Forest Conversion**

As described in Chapter 8 of the RMP, the final block selected for forest conversion encompasses 1,921 acres upstream and upslope of the mainstem Chehalis River from immediately upstream of the flow-through dam to the confluence of Thrash Creek (Proposed Mitigation Area in Figure 1). Two other contingency blocks were selected that provide a total of 902 acres containing upland, riparian, and wetland habitat (Figure 1). The first of these, the South Contingency block includes up to 634 acres that extend from the confluence of Thrash Creek upstream to the East and West forks both of which support salmon spawning habitat. The Rogers Contingency block is an area of 268 acres that extends from the mouth of Rogers Creek upstream approximately 2.4 miles.

**Figure 1**  
**Acquisition Scenarios of Forest Parcels under Forest Conversion Mitigation Actions.**



**Category 2: Chehalis River Riparian Enhancements for Shade**

The Applicant used the Shade-a-lator model to identify shade supply available in the upper mainstem Chehalis River basin between the location of the flow-through dam and the Newaukum River confluence including the South Fork Chehalis River, Bunker Creek, and the Newaukum River. As mitigation, riparian enhancement on 131 parcels along the upper mainstem Chehalis River and Bunker Creek would prevent 880,606,358 average kilocalories of heat energy per day (kcal/day) from reaching the mainstem Chehalis River. The results of shade modeling indicated availability of shade supply from an additional 491 parcels (Table 1) not selected for mitigation that combined could provide approximately 2.4 billion average

kcal/day (Appendix A) of thermal abatement during summer months (Figures 2-5). In addition, there are a few smaller tributary systems in the vicinity of the town of Pe Ell that have not yet been analyzed for shade supply but review of remote imagery indicate opportunity for riparian enhancement in these systems. Depending on the hydrology of these tributary basins and their potential to influence mainstem temperatures in summer, parcels within these tributaries may also be available for shade mitigation.

**Table 1**  
**Contingency Shade Parcels by Subbasin.**

STREAM	NUMBER OF PARCELS
Upper Mainstem Chehalis River	109
South Fork Chehalis River	73
Bunker Creek	17
Newaukum River	292
<b>Total</b>	<b>491</b>

### **Category 3: Aquatic Habitat Enhancements and Barrier Removal**

#### ***Aquatic Habitat Enhancements***

The Aquatic and Terrestrial Mitigation Opportunities Assessment Report (Kleinschmidt 2020) identified 44 candidate sites for aquatic habitat mitigation in the upper mainstem Chehalis River. Since then, an additional ten (10) opportunities were identified from remote assessment, field surveys, and landowner engagement and were further investigated. After extensive modeling, field surveys, and communication with Washington Department of Fish and Wildlife (WDFW), 16 of the potential 54 mitigation actions were determined to be feasible and implementable as mitigation for the flow-through dam. These 16 actions proposed in the RMP to offset potential aquatic habitat impacts included seven (7) spawning habitat enhancements, four (4) off-channel habitat enhancements, two (2) floodplain connectivity and three (3) tributary enhancements. No other feasible contingency sites have been identified within the mainstem Chehalis River between River Mile (RM) 115 and RM 88.

#### ***Barrier Removals***

Mitigation for fish and aquatic habitat impacts also include opening access to fish habitat where passage barriers currently restrict fish passage. The Applicant’s proposed mitigation plan includes removal or replacement of six (6) barriers to open up 39.3 miles (62 kilometers) of tributary habitat that can support salmon.

Fish passage enhancement opportunities were assessed by identifying total or highly restrictive barriers to anadromous fish passage in WDFW’s database, and those that partially restrict access to significant amounts of linear habitat. The Applicant then evaluated the nature of the barrier (perched, depth, or velocity limited), the estimated degree of passage blocked and associated benefit, length of upstream

habitat increased, stream gradient, the number of barriers in the tributary basin, and road conditions. Landowner willingness to engage and allow access for site-specific data collection was another factor in site selection, resulting in nineteen culverts with potential for use as mitigation.

During the feasibility assessment an additional 15 culverts were identified and are proposed as contingency in the event that one of the mitigation culverts falls through. They have been assessed as feasible with amenable landowners and field surveys. The length of habitat upstream of these culverts ranges from approximately 0.1 mi to 6.8 miles (Table 2) and collectively provides opportunity for salmon access to an estimated 17.7 miles of salmon habitat.

Figure 2  
Shade Contingency Parcels – Upper Mainstem Chehalis River.

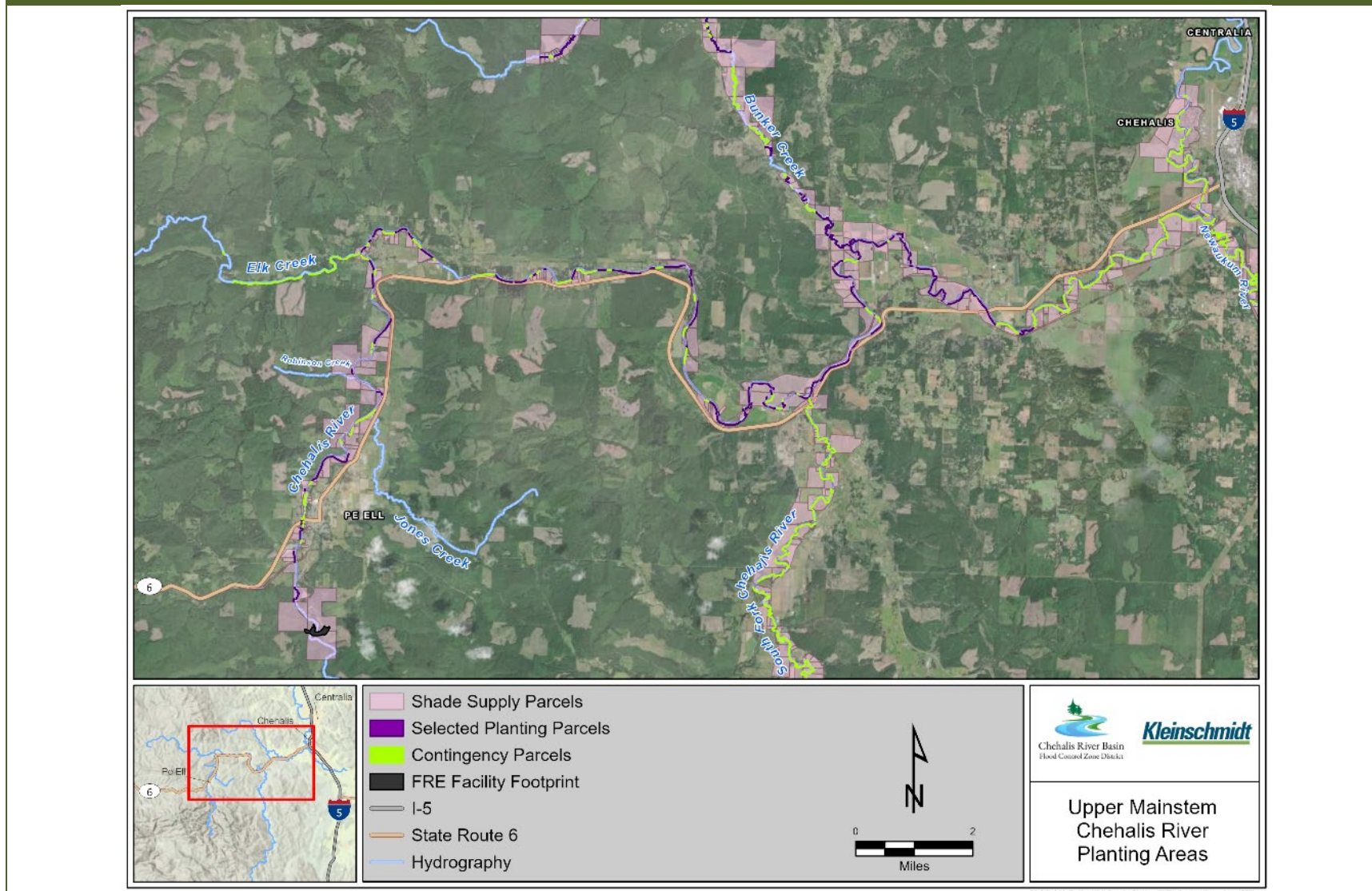


Figure 3  
Shade Contingency Parcels – South Fork Chehalis River.

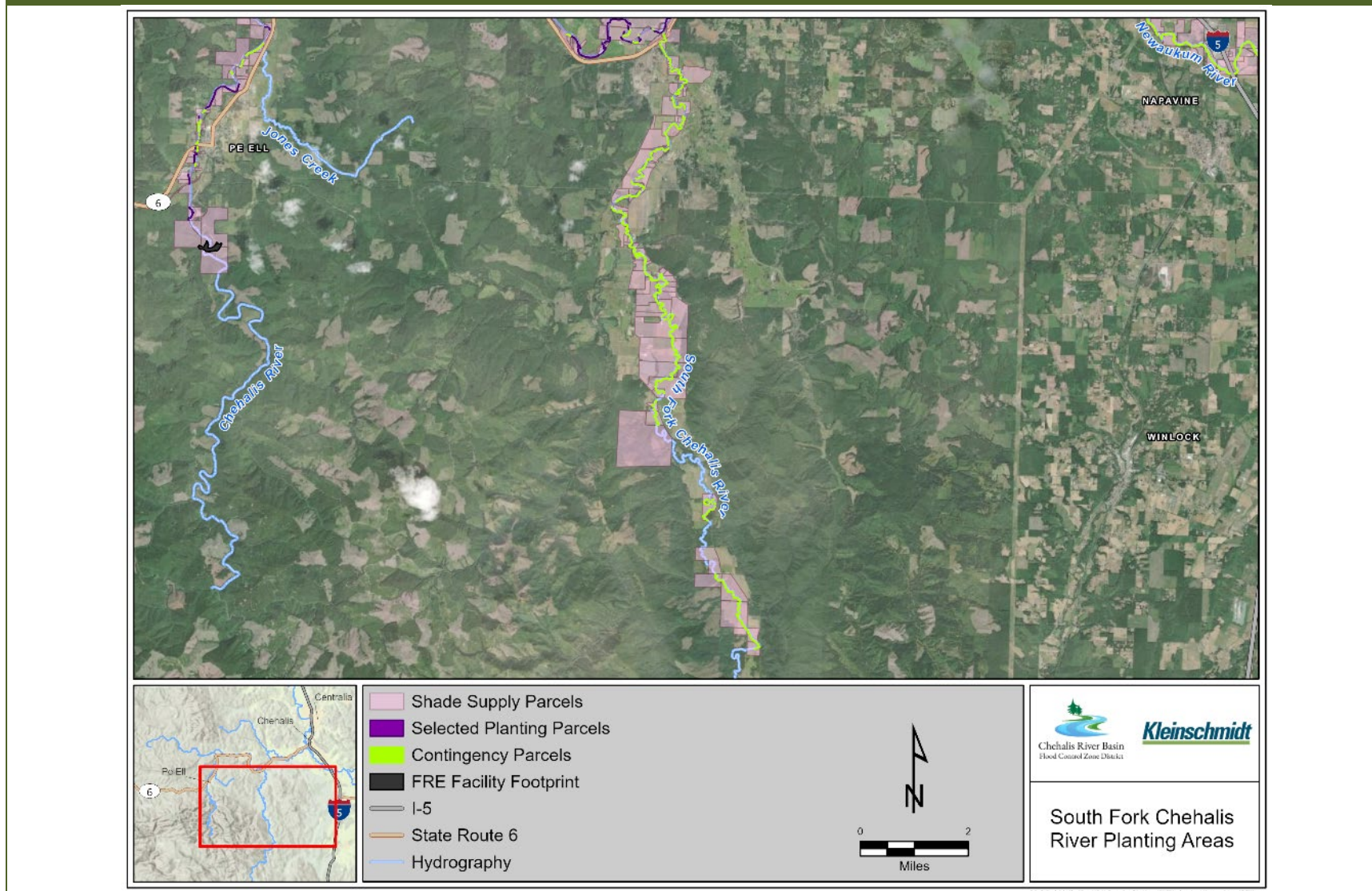


Figure 4  
Shade Contingency Parcels – Bunker Creek.

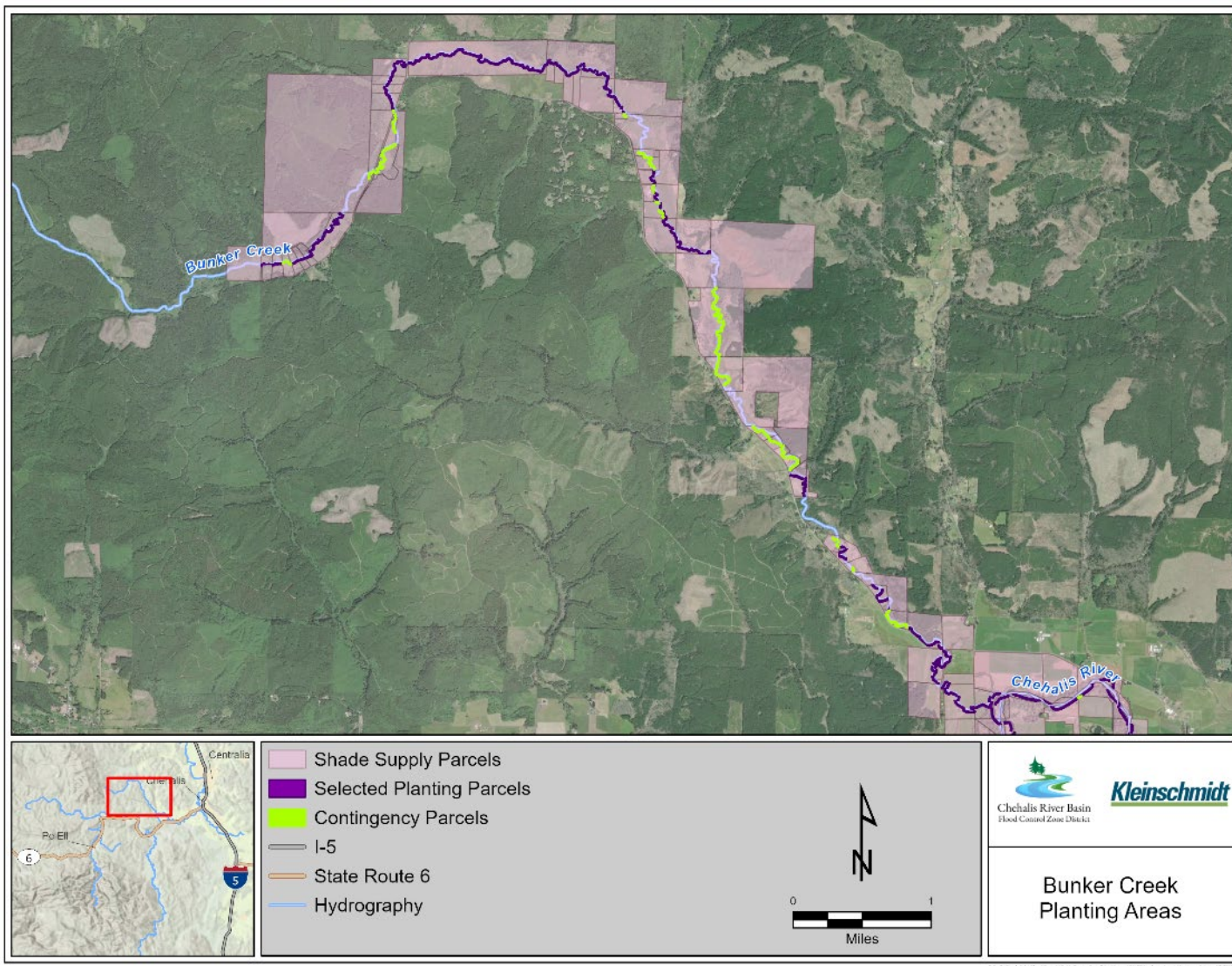
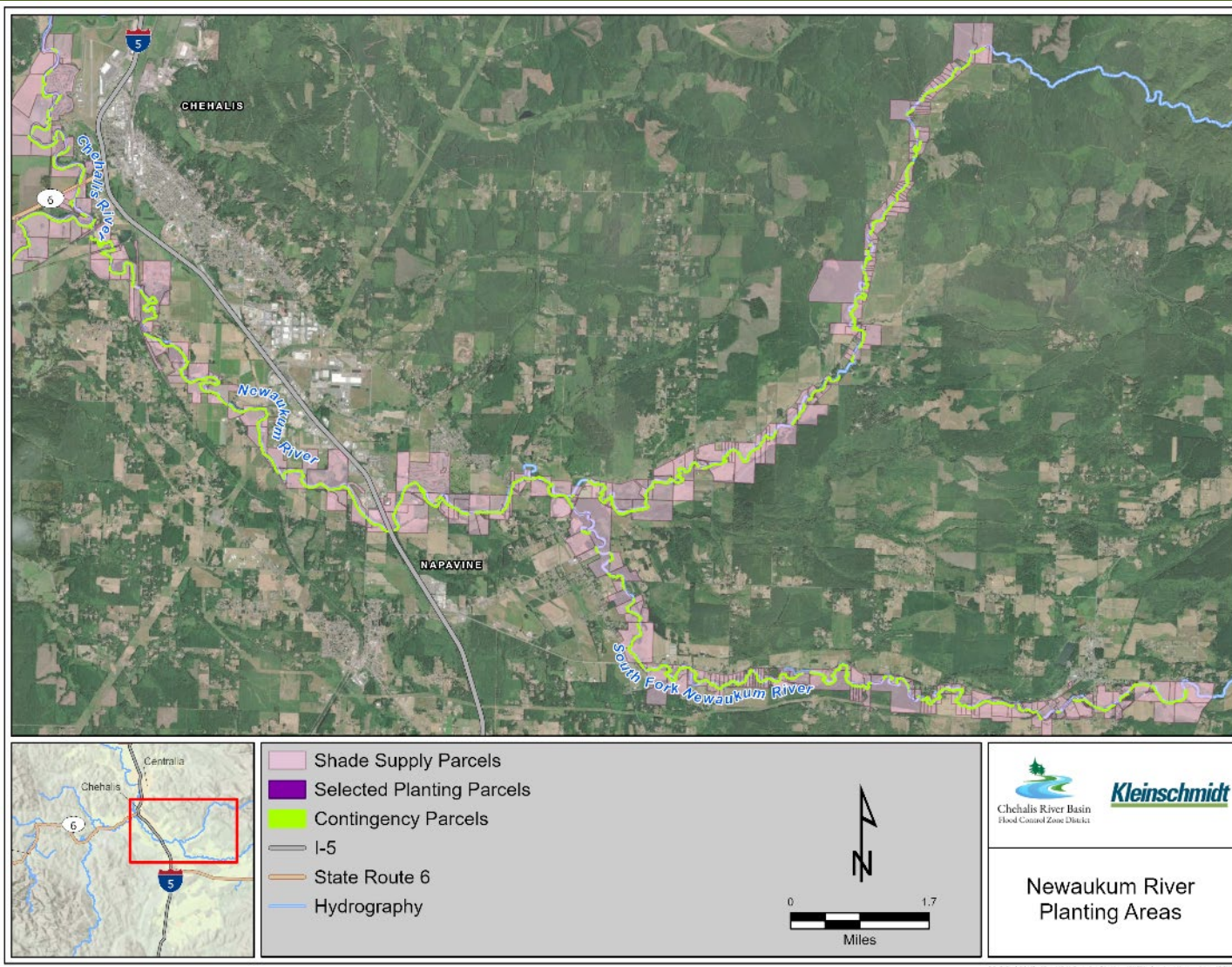




Figure 5  
Shade Contingency Parcels – Newaukum River.



**Table 2**

**List of Feasible Culverts As Potential Backup to Replace a Mitigation Culverts in the Event Circumstances Render Its Replacement Infeasible.**

STREAM	ACTION	WDFW FISH BARRIER ID	SPECIES	HABITAT UPSTREAM (KILOMETERS)	REASON
Tributary to Bunker Creek	Replace undersized culvert	601174	coho, steelhead	6.8	Slope
Marcuson Creek	Remove sill, replace culvert	021(27501)(02750)	coho, steelhead	3.6	Structure/Velocity
Tributary to Deep Creek	Replace perched culvert	021(24024)(01701)	coho, steelhead	0.65	Water Surface Drop
Tributary to Chehalis River	Replace culvert	125 1305W23B	coho, steelhead	2.95	Slope
Curtis Hill/Penning Road Drainage	Replace culvert	125 1303W17A	coho, steelhead	2.5	Water Surface Drop
Tributary to Nicholson Creek	Replace culvert	940492	coho, steelhead	<0.6	Slope
Tributary to Stearn Creek	Replace culvert	601392	coho, steelhead	1.9	Slope
Tributary to Ripple Cr	Replace twin culverts	125 1302W32A	coho, steelhead	1.2	Slope
Nicholson Creek	Replace culvert	021(27820)(02365)	coho, steelhead	>0.3	Slope
Garret Creek	Replace culvert	21(27820)(02631)	coho, steelhead	>0.1	Depth
Tributary to Stearns Cr	Replace culvert	125 1302W30A	coho, steelhead	1.85	Slope
Beaver Creek	Replace perched culvert	125 1304W36C	coho, steelhead	3.24	Water Surface Drop
Tributary to Bunker Creek	Replace culvert	125 1303W07A	coho, steelhead	5.0	Velocity
Tributary to Bunker Creek	Replace Culvert	601702	coho, steelhead	4.8	Velocity
Van Ornum Creek	Replace culvert	125 1403W32D	coho, steelhead	2.85	Slope

## **Wetlands**

Chapter 8 of the RMP described the proposed wetland mitigation including: 1) 27 wetlands covering 3.0 acres that would be conserved under the Forest Conversion Plan, 2) 42.5 acres of depression wetland restored/created at RM 87.6-89.3, and 3) 276.5 acres of wetland buffer. Contingency sites for wetland mitigation are available from four different sources. First, 2023 site surveys at the proposed mitigation site (RM 88.4) indicated there would be sufficient area to provide about two times the estimated wetland mitigation area required. Further, a previous assessment from remote imagery had identified 34 candidate wetland mitigation sites (Kleinschmidt 2020). Additional screening resulted in seven (7) of the initial 34 candidate wetland mitigation sites being selected for follow-up field reconnaissance, one of which was selected for mitigation. The remaining six (6) properties contain potential wetland mitigation areas for a combined contingency of up to 12 acres of additional wetland enhancement.

Additional contingency for wetland conservation and buffer expansion also is anticipated within the 1,921 acres of timberlands proposed for forest conversion. Prior wetland delineation of approximately 760 acres of this area (Anchor QEA 2018) documented 27 wetlands with a total wetland area of 3.0 acres. Of these 27 small, forested wetlands, only one has a buffer of 25 feet. Therefore, we are assuming that we can mitigate by planting 185 acres of wetland buffer associated with these wetlands. Because previous wetland surveys in this area covered 46% of the habitat, we expect that additional forested wetlands are likely to exist and provide potential for more wetland conservation and buffer creation. Opportunistic wetland mitigation is also anticipated within the 21.3 miles of riparian enhancement along the Chehalis River, where existing wetlands have not yet been surveyed nor delineated. The quantity of available wetland mitigation in the forest conversion and riparian enhancement areas would need to be assessed in future field efforts.

## **Conclusion**

In addition to the mitigation sites proposed in the RMP, the Applicant has identified contingency sites for each of the resource specific mitigation plans. These sites have been evaluated as feasibility for mitigation through remote, or in many cases, site-specific assessments and many have landowners that have expressed interest in working the mitigation program. With this pool of contingency sites identified, the Applicant is confident that sufficient mitigation is available to meet the mitigation goals as proposed in the RMP.

## References

- Anchor QEA (Anchor QEA, LLC), 2018. *Wetland, Water, and Ordinary High Water Mark Delineation Report*. Chehalis River Basin Flood Damage Reduction Project. Prepared for the Washington State Department of Ecology, Washington Department of Fish and Wildlife, and U.S. Army Corps of Engineers. December 2018.
- Corps (U.S. Army Corps of Engineers), 2020. *National Environmental Policy Act (NEPA) Environmental Impact Statement (EIS)*. Chehalis River Basin Flood Damage Reduction Project. Prepared for the U.S. Army Corps of Engineers, Seattle District. September 18, 2020.
- Ecology (Washington State Department of Ecology), 2020. *State Environmental Policy Act Draft Environmental Impact Statement*. Chehalis River Basin Flood Damage Reduction Project. Shorelines and Environmental Assistance Program. Publication 20-06-002. February 2020.
- Kleinschmidt (Kleinschmidt Associates), 2020. *Aquatic and Terrestrial Mitigation Opportunities Assessment Report*. Prepared for the Chehalis River Basin Flood Control Zone District. July 2020.
- Kleinschmidt (Kleinschmidt Associates), 2024. *Chehalis Basin Strategy Proposed FRE Mitigation Plan*. Prepared for the Chehalis River Basin Flood Control Zone District. July 2024.

Appendix A  
Contingency Parcel List for Shade  
Mitigation

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This appendix provides a list of shade mitigation contingency parcels with summary details pertaining to the size, location, estimated shade benefit (average kilocalories per day of thermal input to the river blocked by shade), and relative rank with respect to shade benefit available.

STREAM	ACRES	RANK	SITE CITY	PIN	AVERAGE KILOCALORIES PER DAY
Chehalis	2.3	4	Chehalis	022440001001	44168604
Chehalis	2.8	6	Chehalis	018502000000	38364914
Chehalis	1.6	7	Chehalis	018535000000	38223389
Chehalis	2.2	8	Adna	018772000000	35778508
Chehalis	1.3	12	Adna	018783004002	30032513
Chehalis	1.3	13	Chehalis	018512000000	29990034
Chehalis	1.2	24	Chehalis	018538000000	23931464
Chehalis	2.1	25	Chehalis	021830000000	23777026
Chehalis	1.6	31	Chehalis	018482000000	21845220
Chehalis	1.4	42	Chehalis	022434036001	18846416
Chehalis	1.3	46	Adna	018768006000	18087862
Chehalis	2.1	49	Chehalis	022289000000	17620564
Chehalis	0.8	57	Adna	018751001000	16592103
Chehalis	2.5	58	Chehalis	021826000000	16529408
Chehalis	1.5	65	Chehalis	005825000000	15688809
Chehalis	1.2	73	Chehalis	021820000000	14389949
Chehalis	0.4	74	Chehalis	018527001000	14215592
Chehalis	1.3	76	Chehalis	005685000000	14168726
Chehalis	1.7	93	Adna	018762000000	12416320
Chehalis	2.0	95	Chehalis	005872000000	12307520
Chehalis	0.7	103	Chehalis	018775007000	11271392
Chehalis	1.1	106	Adna	018778000000	10978961
Chehalis	1.0	110	Boistfort	019352003000	10808714
Chehalis	1.3	113	Chehalis	018787000000	10578528
Chehalis	1.5	139	Pe Ell	019273001000	8939487
Chehalis	1.0	150	Adna	018779000000	8106184
Chehalis	0.6	163	Pe Ell	019772002000	7446426
Chehalis	0.6	167	Chehalis	018481000000	7370182
Chehalis	1.2	169	Chehalis	022295003002	7247877
Chehalis	0.8	177	Adna	018759001000	6920474
Chehalis	1.0	178	Adna	018721002000	6919686
Chehalis	0.1	182	Chehalis	021828003000	6790564
Chehalis	1.4	188	Chehalis	022297006000	6492104
Chehalis	0.4	203	Chehalis	018492000000	5898990
Chehalis	0.8	204	Chehalis	021824001000	5868276
Chehalis	0.7	212	Adna	018542000000	5621567

STREAM	ACRES	RANK	SITE CITY	PIN	AVERAGE KILOCALORIES PER DAY
Chehalis	1.8	215	Chehalis	004709002001	5543544
Chehalis	0.5	217	Adna	018780000000	5378665
Chehalis	0.6	221	Chehalis	018784000000	5270016
Chehalis	0.2	238	Chehalis	021618001000	4934782
Chehalis	0.6	242	Adna	018773000000	4824652
Chehalis	1.4	249	Chehalis	021810000000	4710153
Chehalis	0.2	252	Boistfort	019479003000	4607087
Chehalis	0.4	255	Chehalis	018510000000	4538507
Chehalis	0.5	260	Pe Ell	020236003000	4460782
Chehalis	0.9	261	Boistfort	019205003000	4422522
Chehalis	0.9	262	Boistfort	019362003001	4407293
Chehalis	0.3	264	Chehalis	005683000000	4351500
Chehalis	0.6	265	Boistfort	019433001000	4349970
Chehalis	0.2	270	Chehalis	018542002000	4254740
Chehalis	0.7	279	Boistfort	019300003000	4134911
Chehalis	0.6	288	Pe Ell	020089002006	3933187
Chehalis	0.7	291	Pe Ell	007807000000	3841980
Chehalis	1.1	297	Pe Ell	019821001001	3752909
Chehalis	0.3	306	Boistfort	019479001000	3591719
Chehalis	0.2	345	Pe Ell	019774002000	2815733
Chehalis	0.3	346	Pe Ell	019706002000	2806822
Chehalis	0.5	354	Pe Ell	020171001000	2722278
Chehalis	0.5	361	Pe Ell	007989001000	2579417
Chehalis	0.4	366	Chehalis	021812001000	2524882
Chehalis	0.4	369	Pe Ell	007806002000	2500750
Chehalis	0.6	383	Pe Ell	020171002000	2347110
Chehalis	1.0	391	Pe Ell	019901001000	2311968
Chehalis	0.5	400	Chehalis	022289001000	2227435
Chehalis	0.4	401	Pe Ell	019773000000	2220730
Chehalis	0.1	407	Boistfort	019479006000	2178486
Chehalis	0.2	408	Pe Ell	019256003000	2176216
Chehalis	0.3	409	Chehalis	005794001000	2167174
Chehalis	0.3	426	Pe Ell	019268001004	2005345
Chehalis	0.5	445	Chehalis	021828002000	1765349
Chehalis	0.3	448	Chehalis	021828004000	1734773
Chehalis	0.5	461	Pe Ell	020017008001	1623267
Chehalis	0.1	464	Chehalis	021828000000	1592761
Chehalis	0.6	466	Chehalis	018498002000	1564284
Chehalis	0.3	469	Pe Ell	007899002002	1533431
Chehalis	0.1	486	Chehalis	021829000000	1382398

STREAM	ACRES	RANK	SITE CITY	PIN	AVERAGE KILOCALORIES PER DAY
Chehalis	0.4	491	Pe Ell	020036008000	1337976
Chehalis	0.4	507	Pe Ell	019256004002	1174599
Chehalis	0.5	508	Pe Ell	010253002000	1157445
Chehalis	0.1	509	Boistfort	019479005000	1134598
Chehalis	0.5	512	Pe Ell	020011001000	1083289
Chehalis	1.1	513	Pe Ell	019263003000	1081927
Chehalis	0.1	518	Pe Ell	019792000000	1029886
Chehalis	0.1	527	Chehalis	004709000000	964700
Chehalis	0.2	528	Pe Ell	020235004000	964374
Chehalis	0.1	539	Chehalis	018518000000	880137
Chehalis	0.4	551	Pe Ell	019268010000	774043
Chehalis	0.3	555	Pe Ell	019772001001	753277
Chehalis	0.2	557	Adna	018621000000	744667
Chehalis	0.1	567	Pe Ell	020319001004	680161
Chehalis	0.1	579	Chehalis	022282000000	612500
Chehalis	0.7	586	Pe Ell	020025001000	491269
Chehalis	0.4	590	Pe Ell	020181001000	476143
Chehalis	0.2	592	Pe Ell	007868003001	466966
Chehalis	0.9	596	Pe Ell	019270003000	442456
Chehalis	0.2	602	Pe Ell	020039000000	424112
Chehalis	0.3	608	Pe Ell	007912000000	371358
Chehalis	0.4	609	Boistfort	019293000000	361041
Chehalis	0.4	613	Pe Ell	019268004000	287872
Chehalis	0.0	616	Chehalis	018539000000	266454
Chehalis	0.3	621	Pe Ell	020182001002	203181
Chehalis	0.2	629	Pe Ell	007860000000	129682
Chehalis	1.4	630	Pe Ell	020182001001	129567
Chehalis	0.1	634	Pe Ell	007899001000	53264
Chehalis	0.1	638	Pe Ell	019270002000	39324
Chehalis	0.2	640	Boistfort	019304003000	25520
Chehalis	0.0	650	Pe Ell	007867001000	5303
Chehalis	0.1	651	Pe Ell	019913001002	3454
Chehalis	0.2	653	Pe Ell	010360001001	581
South Fork Chehalis	6.5	2	Boistfort	019666055001	53919407
South Fork Chehalis	6.3	5	Boistfort	016174002001	39567594
South Fork Chehalis	4.5	9	Boistfort	016269004002	31638052
South Fork Chehalis	2.9	20	Boistfort	019534012001	26065270
South Fork Chehalis	1.9	21	--	016008002000	25754610
South Fork Chehalis	3.9	27	Boistfort	016150000000	23304522
South Fork Chehalis	4.5	28	Boistfort	016170000000	22938833



STREAM	ACRES	RANK	SITE CITY	PIN	AVERAGE KILOCALORIES PER DAY
South Fork Chehalis	2.5	29	Boistfort	016024001003	22805325
South Fork Chehalis	4.7	32	Boistfort	012828000000	21769625
South Fork Chehalis	4.3	33	Boistfort	012830000000	21247054
South Fork Chehalis	2.8	34	Boistfort	016168001000	20693193
South Fork Chehalis	4.3	36	Boistfort	015962003000	20427309
South Fork Chehalis	1.9	37	Boistfort	019478007000	20359717
South Fork Chehalis	3.4	68	Boistfort	016162000000	15005901
South Fork Chehalis	1.7	77	Boistfort	016168002000	13860920
South Fork Chehalis	1.3	79	Boistfort	016017005000	13528155
South Fork Chehalis	1.3	80	Boistfort	018937003000	13489786
South Fork Chehalis	1.9	91	Boistfort	016166003000	12494763
South Fork Chehalis	1.8	99	Curtis	016269004001	11654324
South Fork Chehalis	2.4	101	Boistfort	016268002000	11497342
South Fork Chehalis	1.4	114	Boistfort	019088000000	10447449
South Fork Chehalis	2.4	115	Boistfort	016278001000	10389948
South Fork Chehalis	1.2	122	Boistfort	016024001002	10033589
South Fork Chehalis	2.0	133	Boistfort	016166002000	9499210
South Fork Chehalis	1.2	144	Boistfort	016025003000	8676959
South Fork Chehalis	0.9	151	Boistfort	018930000000	8020027
South Fork Chehalis	1.0	155	Boistfort	019647003006	7913874
South Fork Chehalis	1.6	173	Boistfort	012808000000	7155135
South Fork Chehalis	1.3	174	Boistfort	016274002009	7146532
South Fork Chehalis	0.7	183	Boistfort	016024001001	6733295
South Fork Chehalis	0.4	197	Boistfort	019091002000	6195972
South Fork Chehalis	0.7	200	Boistfort	016158005008	6088928
South Fork Chehalis	0.8	201	Boistfort	016166005000	6048315
South Fork Chehalis	0.5	207	Boistfort	019645001002	5802943
South Fork Chehalis	0.7	213	Boistfort	019485001001	5585078
South Fork Chehalis	1.1	214	--	019509001002	5581089
South Fork Chehalis	1.2	229	Boistfort	016151022002	5088099
South Fork Chehalis	0.4	231	Boistfort	019647003007	5039065
South Fork Chehalis	0.7	235	Boistfort	019659002000	4974216
South Fork Chehalis	0.3	256	Boistfort	016158005010	4532447
South Fork Chehalis	0.6	257	Boistfort	016019000000	4530185
South Fork Chehalis	1.0	287	Boistfort	019104001000	3940743
South Fork Chehalis	0.6	289	--	016153001000	3872188
South Fork Chehalis	0.8	301	Boistfort	016166004000	3698150
South Fork Chehalis	1.5	305	Boistfort	012961000000	3602750
South Fork Chehalis	0.5	309	Boistfort	019478006000	3532418
South Fork Chehalis	0.9	319	Boistfort	019490000000	3182648

STREAM	ACRES	RANK	SITE CITY	PIN	AVERAGE KILOCALORIES PER DAY
South Fork Chehalis	0.4	331	Boistfort	019485001002	2954953
South Fork Chehalis	0.7	338	Boistfort	019534012002	2858341
South Fork Chehalis	0.3	352	Boistfort	016017006000	2729465
South Fork Chehalis	0.4	355	Boistfort	019492002000	2658379
South Fork Chehalis	0.4	358	Boistfort	019503000000	2610415
South Fork Chehalis	1.1	359	Boistfort	015962002000	2590154
South Fork Chehalis	0.2	370	Boistfort	016017007000	2482938
South Fork Chehalis	0.2	399	Boistfort	016158005002	2264217
South Fork Chehalis	0.3	405	Boistfort	019661001002	2184606
South Fork Chehalis	2.0	415	Boistfort	012959000000	2120204
South Fork Chehalis	0.2	422	Boistfort	019483000000	2045387
South Fork Chehalis	0.3	443	Boistfort	012965002000	1781320
South Fork Chehalis	0.4	462	Boistfort	019532003001	1620451
South Fork Chehalis	0.3	463	Boistfort	016152003000	1610161
South Fork Chehalis	0.4	472	Boistfort	016020000000	1492752
South Fork Chehalis	0.2	481	Boistfort	016017004000	1430257
South Fork Chehalis	0.2	500	Boistfort	019532003002	1235349
South Fork Chehalis	0.2	532	Boistfort	016158001000	922215
South Fork Chehalis	0.1	537	Boistfort	018931000000	898723
South Fork Chehalis	0.4	541	Boistfort	019534001001	863071
South Fork Chehalis	0.3	542	Boistfort	019485001003	852872
South Fork Chehalis	0.1	573	Boistfort	019094001000	649727
South Fork Chehalis	0.0	577	Boistfort	016158005001	635038
South Fork Chehalis	0.4	611	Boistfort	016274002005	317277
South Fork Chehalis	0.1	623	--	016153002000	158412
South Fork Chehalis	0.3	633	Boistfort	016145000000	85678
Bunker	4.9	90	Adna	022735001000	12517506
Bunker	3.3	179	Adna	022650001000	6879109
Bunker	2.1	259	Adna	022762009000	4507504
Bunker	1.6	318	Adna	022907002000	3192630
Bunker	1.5	321	Adna	022778002001	3150826
Bunker	1.2	365	Adna	022778002020	2528265
Bunker	0.6	379	Adna	022898005000	2384578
Bunker	0.8	386	Adna	022778002008	2336637
Bunker	0.6	403	Adna	022697003001	2203138
Bunker	1.0	417	Adna	022642004000	2113133
Bunker	0.6	429	Adna	022644003003	1958495
Bunker	0.5	479	Adna	022650002000	1434999
Bunker	0.3	561	Adna	022631000000	719761
Bunker	0.3	563	Adna	022644003001	707700

STREAM	ACRES	RANK	SITE CITY	PIN	AVERAGE KILOCALORIES PER DAY
Bunker	0.6	574	Adna	022778002016	647056
Bunker	0.5	600	Adna	022642003000	429665
Bunker	0.3	615	Adna	022900005000	272928
Newaukum	2.9	14	Chehalis	017902002000	29016175
Newaukum	4.1	15	Chehalis	005871071015	28149217
South Fork Newaukum	6.0	16	Onalaska	017354000000	27422885
Newaukum	3.0	18	Chehalis	017696004000	26272956
South Fork Newaukum	2.6	22	Chehalis	017286002000	24540677
Newaukum	2.2	23	Chehalis	017904002002	24538505
Newaukum	1.8	35	Chehalis	017910001000	20464704
Newaukum	2.9	41	Chehalis	018051000000	19121473
Newaukum	1.6	45	Chehalis	017917003000	18205752
Newaukum	1.9	47	Chehalis	017030005000	17893802
Newaukum	2.5	50	Chehalis	018101001000	17384859
Newaukum	2.7	51	Chehalis	018076001002	17162153
Newaukum	1.8	52	Chehalis	017904002001	17095049
Newaukum	1.5	53	Chehalis	017575000000	17045911
South Fork Newaukum	2.9	54	Onalaska	032832002000	16864168
Newaukum	1.4	61	Chehalis	017719003000	16101266
Newaukum	1.2	63	Chehalis	017688001000	15910299
Newaukum	1.3	64	Chehalis	017565003000	15897293
South Fork Newaukum	1.5	66	Onalaska	017404002001	15357005
Newaukum	1.3	67	Chehalis	017037000000	15329756
Newaukum	1.9	70	Chehalis	017663000000	14852579
Newaukum	1.9	71	Chehalis	017917002000	14561788
North Fork Newaukum	2.4	75	Chehalis	017069000000	14172204
Newaukum	1.6	78	Chehalis	017032000000	13619291
North Fork Newaukum	2.3	84	Chehalis	017022002000	13281772
Newaukum	1.4	85	Chehalis	017578000000	13243285
Newaukum	1.0	86	--	018105003009	13031272
South Fork Newaukum	1.4	89	Onalaska	017380002006	12778785
North Fork Newaukum	2.5	96	Chehalis	017023004000	11972333
Newaukum	2.6	98	Chehalis	017874001000	11667906
Newaukum	1.4	100	Chehalis	005871071014	11506326
North Fork Newaukum	1.5	102	Chehalis	017030007000	11490366
Newaukum	1.0	104	Chehalis	021815000000	11268397
North Fork Newaukum	3.1	105	Chehalis	017005000000	11228826
North Fork Newaukum	1.7	107	--	017031002003	10951502
South Fork Newaukum	1.7	108	Chehalis	017211002000	10940821
South Fork Newaukum	1.5	109	Onalaska	017287012005	10857389

STREAM	ACRES	RANK	SITE CITY	PIN	AVERAGE KILOCALORIES PER DAY
Newaukum	0.7	112	Chehalis	017847012000	10630126
Newaukum	1.0	117	Chehalis	017847009000	10318269
South Fork Newaukum	1.7	118	Chehalis	017211001000	10247707
North Fork Newaukum	1.6	119	Chehalis	017073002000	10203558
South Fork Newaukum	0.9	120	Onalaska	032803001006	10140398
Newaukum	1.2	121	Chehalis	017718000000	10095223
Newaukum	1.7	124	Chehalis	017576000000	10004886
South Fork Newaukum	1.7	125	Onalaska	017166002000	9963579
South Fork Newaukum	1.1	126	Onalaska	017361008000	9806925
Newaukum	1.0	128	Chehalis	018082000000	9705851
South Fork Newaukum	1.6	129	Onalaska	032840002000	9686775
South Fork Newaukum	1.1	130	Onalaska	017361006000	9547704
Newaukum	1.5	132	Chehalis	017578001000	9504497
Newaukum	1.2	135	Chehalis	017690000000	9220696
South Fork Newaukum	1.1	136	Onalaska	017405000000	9092418
South Fork Newaukum	1.5	137	Chehalis	017192012003	9084520
Newaukum	1.9	138	Chehalis	017912000000	9054940
Newaukum	0.6	143	Chehalis	017880001003	8731625
South Fork Newaukum	1.3	146	Onalaska	017332009008	8531693
North Fork Newaukum	1.9	147	--	017031002005	8338604
North Fork Newaukum	2.3	149	Chehalis	020738003000	8119624
South Fork Newaukum	1.1	153	Chehalis	017245001000	7955151
Newaukum	0.6	154	Chehalis	018083001008	7952397
South Fork Newaukum	1.2	156	Onalaska	017422010000	7842506
Newaukum	0.6	159	Chehalis	018105003006	7712713
Newaukum	0.7	161	Chehalis	017939000000	7555602
Newaukum	0.8	164	Chehalis	017717001000	7433119
South Fork Newaukum	0.7	170	Onalaska	017332009001	7244868
South Fork Newaukum	0.7	171	Onalaska	032806002002	7241247
Newaukum	0.6	175	Chehalis	017664000000	7135249
South Fork Newaukum	0.3	176	Onalaska	032835002000	6925403
Newaukum	0.7	181	Chehalis	017692000000	6797692
North Fork Newaukum	2.2	191	Chehalis	016847000000	6318385
Newaukum	1.1	192	Chehalis	017668001000	6310955
North Fork Newaukum	1.1	195	Chehalis	017007002007	6255192
North Fork Newaukum	0.9	196	--	016829001001	6223516
South Fork Newaukum	0.9	198	Chehalis	017085001004	6168145
South Fork Newaukum	1.8	199	Onalaska	032874000000	6096722
Newaukum	1.0	202	Chehalis	018085001000	6039260
North Fork Newaukum	0.8	206	Chehalis	017021003000	5836558

STREAM	ACRES	RANK	SITE CITY	PIN	AVERAGE KILOCALORIES PER DAY
Newaukum	0.7	210	Chehalis	018068001000	5674831
South Fork Newaukum	0.6	211	Onalaska	032810010002	5635710
Newaukum	0.5	218	Chehalis	017679000000	5367575
South Fork Newaukum	0.7	219	Onalaska	032845012000	5356421
South Fork Newaukum	0.6	220	Onalaska	017412001000	5286374
North Fork Newaukum	1.5	222	Chehalis	016926000000	5242179
South Fork Newaukum	0.7	223	Onalaska	017411003000	5221317
South Fork Newaukum	1.0	226	Chehalis	017194000000	5153626
Newaukum	0.5	227	--	018105003008	5116213
Newaukum	0.7	228	Chehalis	018104002000	5105882
Newaukum	0.7	233	Chehalis	018076001001	4985027
South Fork Newaukum	0.6	234	Onalaska	017380002008	4980316
Newaukum	0.7	236	Chehalis	018071001000	4972022
South Fork Newaukum	0.8	241	Onalaska	017412002000	4847295
South Fork Newaukum	0.6	243	Onalaska	017332009007	4800706
North Fork Newaukum	0.7	244	Chehalis	016919005004	4796568
South Fork Newaukum	0.8	246	Onalaska	017413000000	4762168
Newaukum	0.5	247	Chehalis	018082001000	4754594
South Fork Newaukum	0.7	248	Chehalis	017064000000	4737597
South Fork Newaukum	1.0	250	Onalaska	032810006000	4705243
Newaukum	0.5	251	--	018105003007	4619435
North Fork Newaukum	1.0	253	Chehalis	017002003004	4605431
Newaukum	0.7	254	Chehalis	018067001000	4586539
South Fork Newaukum	0.5	266	Onalaska	017329003000	4342458
Newaukum	0.7	268	Chehalis	017847008000	4296042
North Fork Newaukum	0.9	269	Chehalis	020701001007	4281538
Newaukum	0.5	271	Chehalis	017572001000	4210758
South Fork Newaukum	0.9	272	Onalaska	017362004000	4193962
North Fork Newaukum	0.4	273	Chehalis	017023003000	4169531
South Fork Newaukum	0.4	276	Onalaska	017411004000	4146129
North Fork Newaukum	0.7	277	Chehalis	017024001000	4146000
South Fork Newaukum	0.5	278	Onalaska	017413001004	4137804
South Fork Newaukum	0.5	280	Onalaska	017380001005	4110915
South Fork Newaukum	0.3	281	Onalaska	032803004006	4093756
Newaukum	0.4	282	Chehalis	017847010000	4020713
North Fork Newaukum	0.9	283	Chehalis	016828012000	4019582
North Fork Newaukum	1.0	284	Chehalis	016837002000	4001313
South Fork Newaukum	0.5	285	Onalaska	032841000000	3972979
North Fork Newaukum	1.5	286	Chehalis	016831000000	3964907
Newaukum	0.8	290	Chehalis	017928000000	3857872

STREAM	ACRES	RANK	SITE CITY	PIN	AVERAGE KILOCALORIES PER DAY
North Fork Newaukum	0.5	293	Chehalis	020866015000	3824565
North Fork Newaukum	1.1	294	Chehalis	020699001000	3822683
North Fork Newaukum	0.7	295	Chehalis	017009002001	3782791
South Fork Newaukum	0.4	296	Onalaska	017404002002	3758460
North Fork Newaukum	0.7	299	Chehalis	017021002002	3702863
North Fork Newaukum	1.6	300	Chehalis	017010008000	3701018
South Fork Newaukum	1.1	302	Chehalis	017192012004	3682626
South Fork Newaukum	1.1	303	Onalaska	017287012004	3651794
South Fork Newaukum	0.4	304	Onalaska	017332009003	3641416
South Fork Newaukum	0.8	307	Onalaska	017380001004	3583078
North Fork Newaukum	0.8	308	Chehalis	016919006003	3565552
North Fork Newaukum	1.0	310	Chehalis	020866014001	3497271
North Fork Newaukum	1.2	311	Chehalis	020735000000	3488530
Newaukum	0.4	312	Chehalis	017927002000	3474888
South Fork Newaukum	0.6	313	Onalaska	017413001005	3471868
Newaukum	1.5	314	Chehalis	017565001000	3433483
South Fork Newaukum	0.5	315	Onalaska	017330013003	3343346
South Fork Newaukum	0.8	316	Onalaska	017336000000	3331313
North Fork Newaukum	0.7	320	Chehalis	020866001002	3159007
South Fork Newaukum	0.3	322	Onalaska	017384003000	3139758
Newaukum	0.5	325	Chehalis	017566000000	3062943
North Fork Newaukum	0.7	327	Chehalis	017002001001	3056585
North Fork Newaukum	0.9	328	Chehalis	020698002000	3038992
South Fork Newaukum	0.5	330	Onalaska	017332003000	2974081
North Fork Newaukum	0.8	332	Chehalis	020865003002	2942744
North Fork Newaukum	0.3	333	Chehalis	020701001014	2940962
Newaukum	0.5	334	Chehalis	017569000000	2930598
Newaukum	0.2	337	Chehalis	017717004001	2905811
North Fork Newaukum	0.5	339	Chehalis	020701001021	2852669
South Fork Newaukum	0.2	340	Onalaska	017365005001	2847620
North Fork Newaukum	0.7	341	Chehalis	017002002004	2835309
South Fork Newaukum	0.5	342	Onalaska	017413001003	2828098
Newaukum	0.2	344	Chehalis	017572003000	2819162
South Fork Newaukum	0.4	351	Onalaska	017332009010	2738271
South Fork Newaukum	0.5	353	Onalaska	017330002000	2728480
South Fork Newaukum	0.4	356	Onalaska	017330003000	2640976
Newaukum	0.3	362	Chehalis	018099002000	2578908
South Fork Newaukum	0.5	364	Onalaska	032818001005	2543869
North Fork Newaukum	0.9	367	Chehalis	016916002002	2523064
North Fork Newaukum	0.5	368	Chehalis	020866002000	2502287

STREAM	ACRES	RANK	SITE CITY	PIN	AVERAGE KILOCALORIES PER DAY
South Fork Newaukum	0.3	372	Onalaska	017380001003	2474306
North Fork Newaukum	0.9	373	--	017023001000	2465773
North Fork Newaukum	0.6	374	Chehalis	020701001006	2453505
South Fork Newaukum	0.7	375	Onalaska	017330013002	2449503
South Fork Newaukum	0.3	376	Onalaska	017386006000	2446637
Newaukum	0.2	377	Chehalis	017678000000	2439067
South Fork Newaukum	0.3	380	Onalaska	017330008002	2376678
North Fork Newaukum	0.5	382	Chehalis	016915001003	2361956
South Fork Newaukum	0.1	384	Onalaska	017365006000	2346673
North Fork Newaukum	0.3	385	Chehalis	020701001015	2345190
South Fork Newaukum	0.5	387	Chehalis	017052005000	2334578
North Fork Newaukum	0.4	388	Chehalis	017002003003	2323095
South Fork Newaukum	0.3	389	Onalaska	017330008001	2314914
South Fork Newaukum	0.3	390	Onalaska	017330009000	2314862
South Fork Newaukum	0.7	392	Onalaska	017330011000	2304389
South Fork Newaukum	0.6	393	Onalaska	017287012006	2299767
South Fork Newaukum	0.3	395	Chehalis	017245000000	2295294
South Fork Newaukum	0.5	396	Onalaska	017422004000	2294943
South Fork Newaukum	0.2	397	Onalaska	032844003000	2283708
South Fork Newaukum	0.5	402	Onalaska	017386003004	2215306
North Fork Newaukum	0.6	404	Chehalis	016828011000	2203048
Newaukum	0.2	406	Chehalis	018050016004	2182605
North Fork Newaukum	0.5	410	Chehalis	017007002009	2147089
Newaukum	0.5	411	Chehalis	018070001000	2135737
South Fork Newaukum	0.3	412	Onalaska	017411002000	2133347
North Fork Newaukum	0.4	413	Chehalis	020701001012	2127503
North Fork Newaukum	0.6	416	Chehalis	020861002001	2113728
South Fork Newaukum	0.3	418	Onalaska	017422011000	2087541
North Fork Newaukum	0.3	419	Chehalis	020701001016	2081802
North Fork Newaukum	0.9	420	Chehalis	016849006005	2066102
South Fork Newaukum	0.1	423	Onalaska	032810011000	2038361
North Fork Newaukum	0.3	424	Chehalis	017036001000	2031843
South Fork Newaukum	0.5	427	Onalaska	017330001000	1971356
North Fork Newaukum	0.4	428	Chehalis	020863001004	1967348
Newaukum	0.2	430	Chehalis	017911000000	1957961
North Fork Newaukum	0.2	431	Chehalis	020701001013	1950322
South Fork Newaukum	0.6	432	Onalaska	032845013000	1909610
Newaukum	0.1	433	Chehalis	017873003000	1902571
South Fork Newaukum	0.1	434	Onalaska	017380002001	1879226
Newaukum	0.2	436	Chehalis	017716001000	1823326

STREAM	ACRES	RANK	SITE CITY	PIN	AVERAGE KILOCALORIES PER DAY
North Fork Newaukum	0.4	439	Chehalis	020692002005	1809358
North Fork Newaukum	0.3	440	Chehalis	020863001005	1799469
North Fork Newaukum	0.6	441	Chehalis	020724001001	1799418
North Fork Newaukum	0.5	442	Chehalis	016919006001	1786432
North Fork Newaukum	0.1	444	Chehalis	017009000000	1779192
Newaukum	0.2	446	Chehalis	017667010000	1747352
Newaukum	0.6	447	Chehalis	017937000000	1745789
Newaukum	0.2	450	Chehalis	021817000000	1730346
North Fork Newaukum	0.5	452	Chehalis	016828009000	1687175
South Fork Newaukum	0.1	455	Onalaska	017412005000	1655689
North Fork Newaukum	0.3	456	Chehalis	020866017000	1653031
Newaukum	0.2	457	Chehalis	005871071144	1652987
South Fork Newaukum	0.4	458	Onalaska	017409000000	1640334
North Fork Newaukum	0.4	460	Chehalis	020863001006	1624302
Newaukum	0.1	465	Chehalis	018077003000	1574923
Newaukum	0.0	467	Chehalis	017565000000	1548838
South Fork Newaukum	0.1	468	Onalaska	017362003000	1543318
South Fork Newaukum	0.3	470	Onalaska	017332009011	1521315
North Fork Newaukum	0.3	471	Chehalis	017007002008	1519138
Newaukum	0.5	473	Chehalis	018067002000	1487450
Newaukum	0.1	475	Chehalis	017696004001	1472774
North Fork Newaukum	0.4	476	Chehalis	020866003000	1463087
North Fork Newaukum	0.2	477	Chehalis	017021002001	1457900
North Fork Newaukum	0.5	478	Chehalis	020861002002	1445911
South Fork Newaukum	0.4	480	Onalaska	017330007000	1431253
North Fork Newaukum	0.4	482	Chehalis	016934002008	1422673
South Fork Newaukum	0.5	483	Onalaska	017385001000	1417737
South Fork Newaukum	0.4	484	Onalaska	017287012007	1414944
North Fork Newaukum	0.2	485	Chehalis	017002002003	1404204
Newaukum	0.4	488	Chehalis	017045000000	1362107
North Fork Newaukum	0.5	489	Chehalis	020863001008	1359356
North Fork Newaukum	0.4	490	Chehalis	020701001004	1340023
North Fork Newaukum	0.7	493	Chehalis	020739000000	1335817
South Fork Newaukum	0.3	494	Onalaska	017386005000	1324321
North Fork Newaukum	0.3	495	Chehalis	017009003000	1314044
South Fork Newaukum	0.1	496	Onalaska	017380002009	1308718
South Fork Newaukum	0.2	503	Chehalis	017059003000	1203605
South Fork Newaukum	0.2	504	Onalaska	017332009004	1195103
North Fork Newaukum	0.3	505	Chehalis	020863001007	1194773
North Fork Newaukum	0.3	515	Chehalis	016828004000	1070262



STREAM	ACRES	RANK	SITE CITY	PIN	AVERAGE KILOCALORIES PER DAY
South Fork Newaukum	0.1	516	Onalaska	032837006000	1058292
South Fork Newaukum	0.3	517	Onalaska	017386004000	1032033
South Fork Newaukum	0.3	520	Chehalis	017047001000	1026635
North Fork Newaukum	0.4	521	Chehalis	020723011000	1014931
Newaukum	0.1	522	Chehalis	017665000000	1013768
South Fork Newaukum	0.0	524	Chehalis	017047003000	998551
North Fork Newaukum	0.7	525	Chehalis	016922002000	991427
North Fork Newaukum	0.1	526	Chehalis	017022001000	980219
South Fork Newaukum	0.2	529	Onalaska	017413001002	962174
South Fork Newaukum	0.1	530	Onalaska	017332009006	944820
Newaukum	0.2	531	Chehalis	017689000000	937367
North Fork Newaukum	0.3	534	Chehalis	016849006006	910337
Newaukum	0.1	535	Chehalis	017574002000	900713
North Fork Newaukum	0.3	536	Chehalis	016916000000	899909
Newaukum	0.2	540	Chehalis	017574001000	880112
North Fork Newaukum	0.3	544	Chehalis	017074000000	844540
South Fork Newaukum	0.5	545	Chehalis	017293001000	844400
North Fork Newaukum	0.1	548	Chehalis	016849001000	777446
North Fork Newaukum	0.2	550	Chehalis	016828010001	774580
North Fork Newaukum	0.2	552	Chehalis	016919006005	770469
North Fork Newaukum	0.3	553	Chehalis	020722003000	768267
South Fork Newaukum	0.3	558	Chehalis	017246000000	739295
North Fork Newaukum	0.7	559	Chehalis	020701001005	737056
South Fork Newaukum	0.1	565	Onalaska	032834000000	698295
Newaukum	0.9	566	Chehalis	017933001002	693244
North Fork Newaukum	0.1	569	Chehalis	016915001004	663045
North Fork Newaukum	0.3	570	Chehalis	020863001003	659666
North Fork Newaukum	0.1	571	Chehalis	017023002000	655241
North Fork Newaukum	0.1	572	Chehalis	016915003001	655083
South Fork Newaukum	0.1	575	Chehalis	017192004002	642322
South Fork Newaukum	0.7	576	Chehalis	017251001016	641773
South Fork Newaukum	0.0	581	Chehalis	017293002000	569898
North Fork Newaukum	0.1	585	Chehalis	020698001000	511766
South Fork Newaukum	0.1	588	Chehalis	017298000000	482769
South Fork Newaukum	0.3	589	Chehalis	017047002000	482080
North Fork Newaukum	0.3	591	Chehalis	017075000000	468488
North Fork Newaukum	0.3	593	Chehalis	020692002004	459157
Newaukum	0.2	594	Chehalis	018085002000	458361
North Fork Newaukum	0.2	597	Chehalis	017006001002	440457
North Fork Newaukum	0.1	598	Chehalis	020724002001	437483

STREAM	ACRES	RANK	SITE CITY	PIN	AVERAGE KILOCALORIES PER DAY
South Fork Newaukum	0.9	601	Onalaska	032836000000	424145
South Fork Newaukum	0.0	604	Onalaska	017365005002	416863
North Fork Newaukum	0.2	605	Chehalis	020701001002	406059
South Fork Newaukum	0.3	607	Onalaska	017386007000	382964
South Fork Newaukum	0.0	620	Onalaska	017380002007	223131
North Fork Newaukum	0.1	625	Chehalis	016916009001	149498
North Fork Newaukum	0.2	628	Chehalis	017039000000	136746
North Fork Newaukum	0.1	631	Chehalis	020866005000	111136
South Fork Newaukum	0.2	632	Onalaska	032810008000	103833
North Fork Newaukum	0.0	637	Chehalis	020723013000	39612
North Fork Newaukum	0.0	642	Chehalis	016828010002	22619
North Fork Newaukum	0.1	645	Chehalis	020722004000	16342
North Fork Newaukum	0.1	646	Chehalis	020738001000	13842
South Fork Newaukum	0.0	647	Onalaska	017380002002	11359
South Fork Newaukum	0.1	652	Chehalis	017044001000	2845