CHIMACUM DRAINAGE DISTRICT

History, Current Conditions, and Potential Options for the Future

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Prepared by Jefferson County Conservation District
with contributions from the Jefferson Land Trust,
Jefferson County Environmental Public Health, and
North Olympic Salmon Coalition

SECTION 1: INTRODUCTION

This report provides a concise summary of the Chimacum watershed and the events that have led to the current drainage system and ecological conditions. It also includes an initial analysis of potential options for addressing the ongoing drainage and flooding problems, as well as habitat degradation in the watershed.

Jefferson County Drainage District #1 (DD1), formed in 1919 for the purpose of implementing and managing a drainage and flood control system throughout the Chimacum watershed, has been inactive since 1974. Flooding and drainage problems have persisted throughout the past half century, much as they did during the previous half century, impacting landowners and fish habitat. During the past few decades, drainage problems have worsened because of chronic noxious weed infestations, increasing beaver populations and the lack of comprehensive maintenance.

During this period of drainage district inactivity, drainage system maintenance responsibilities have fallen upon individual landowners. This has resulted in inconsistent, inefficient, and sometimes ineffective efforts to address conditions, that by their very nature, demand a comprehensive approach to be successful. The burden of obtaining and complying with increasingly challenging permits intended to protect the environment has also fallen upon individual landowners, while regulatory agencies are faced with the challenge of administering and ensuring compliance with multiple permits that are implemented independently by individual landowners. These fragmented efforts over the past half century have also led to disputes between landowners and conflicts with regulatory agencies.

Many of the Chimacum watershed landowners have expressed interest in reactivating Jefferson County Drainage District #1 to help improve both drainage function, comprehensively address ongoing maintenance needs, and further explore potential habitat improvements. Both farmland and habitat currently are producing benefits far below their potential, and there appears to be considerable room for improvement to both.

No value judgments are made regarding one land use versus another in this report. The rights of private property owners and the impacts to their properties are acknowledged as legitimate, as are the broader societal and ecological needs and benefits of more naturally functioning ecosystems.

No judgments are made about the wisdom of those who came before us and converted the forested wetlands to an agricultural landscape. What was done was done. This report is an attempt to summarize past events as they have led to present conditions, and to provide an initial examination of potential paths forward.

It is almost certain that the path forward will not satisfy all interests, but hopefully it will result in some benefits for all interests. Whether reactivation of Jefferson County Drainage District #1 is part of that path forward is to be determined by others.

The terms used to describe the Chimacum Creek channels in this report are as follows:

- Chimacum Creek is the channel downstream of the confluence of the east and west branches.
- West Chimacum Creek (WCC), commonly known simply as Chimacum Creek, is the west branch stream channel.
- East Chimacum Creek (ECC) is the east branch stream channel.

SECTION 2: DRAINAGE DISTRICT HISTORY AND CHARACTERIZATION

2.1 Background and History

Drainage districts are local special purpose districts organized under chapters 85.06.010 and 85.38.180 of the Revised Code of Washington. The Chimacum Drainage District, officially known as Jefferson County Drainage District #1 (DD1), was formed on June 23, 1919. The district remained active until 1974, with intermittent periods of inactivity during those 54 years. Considerable drainage system infrastructure (e.g., ditching, stream channel straightening and deepening, and tile drain installation) was completed in the early years of the district but keeping up with ongoing maintenance has always been a challenge.

A November 15, 1973 letter to the editor of the *Port Townsend Leader* from Griffith Short provides an explanation of conditions in the early 1970s just prior to the suspension of district activities. In 1972, George W. Huntingford, Robert C. Johnson and Griffith Short had successfully petitioned the Superior Court of Jefferson County to be appointed as DD1 commissioners following several years of district inactivity. According to the letter, "Much of the valley was flooded most of the year in 1970 and 1971."

Mr. Short describes in his letter how between the spring of 1972 and fall of 1973 about two and one-quarter miles of ditch (presumably West Chimacum Creek) cleaning was completed from the Chimacum bridge at Rhody Drive (SR 19) upstream through the Short properties. A portion of this work was completed with $927.20 from the DD1 account from assessments collected prior to 1968 (it is assumed that no assessments were collected between 1968 and 1972 and that the district was inactive during those years). The DD1 funds were supplemented by $1,464.40 in USDA Agricultural Stabilization & Conservation Service cost-funds and $1,496.00 in private contributions from Griffith and Norris Short.

Short and Johnson resigned from their positions 18 months after being appointed, presumably because of new elected official public disclosure requirements. Short's letter also alludes to frustrations with increasingly onerous permitting requirements and a lack of trust amongst some landowners in the valley. After the resignations of Johnson and Short, Huntingford was the only commissioner. Apparently the two commissioner positions vacated by Short and Johnson were not filled and DD1 went inactive again in 1974 and has remained inactive since.

According to state law (RCWs 36.96 and 85.38.220), if a special purpose district does not carry out its functions for five consecutive years or fails to hold an election for seven consecutive years, it should be dissolved, which is done by the county legislative authority after holding a public hearing. Alternatively, the county legislative authority can suspend the operations of a special purpose district, allowing it to be reactivated in the future. To the best of our knowledge, the operations of DD1 were formally suspended by the Jefferson County Board of Commissioners, thus the district can be reactivated. As of December 2004, the Jefferson County treasurer reported a balance of $1,216.64 in the DD1 account.

Issues with DD1 and drainage system management began long before the 1970s. In a 1964 newsletter, the Jefferson County Soil Conservation District encouraged readers to go out and vote in the 1964 drainage district election. The article references how an improperly held 1962 election was not validated, resulting in a sitting commissioner remaining in office. The newsletter also states:

So the problem resolves to whether you want a proper election. It also involves what kind of a valley you wish to live in. One which is full of tules and marsh vegetation or one with proper water management with productive farms using good conservation practices. The potential of Chimacum Valley has never been realized.

A 1955 field examination of the drainage system conducted by the USDA Soil Conservation Service (current Natural Resources Conservation Service) indicated that little maintenance work had been done in the previous years. The report also states that maintenance was inadequate following completion of the initial drainage system infrastructure work that occurred during the 1920s.

Maintenance or a lack thereof, has been a key factor limiting the effectiveness of DD1 since the beginning. Over the decades, various other factors have compounded the inherently challenging drainage conditions in the Chimacum watershed. These factors include the introduction and spread of highly invasive reed canarygrass, channel siltation from landslides, increasingly onerous permitting requirements, and a general decline in agricultural activity. Some of these factors have led to landowner disputes. For varying reasons, many landowners did not see the value in paying taxes to the drainage district or were simply unable to pay them. When drainage system maintenance work was insufficient, by necessity, many commercial farmers took on the maintenance work by themselves, but that work was largely limited to the lands that they had control over and what they were willing and able to spend independently.

2.2 Watershed Characterization and Historical Conditions

The Chimacum watershed totals approximately 37 square miles (~23,680 acres) (Bahls and Rubin 1996; SCS 1955). The watershed is pear-shaped, draining from south to north with West Chimacum Creek (WCC) and East Chimacum Creek (ECC) comprising the primary waterways. The two spring- and lake-fed channels flow through two parallel valleys (West, Center or Chimacum Valley and East or Beaver Valley, respectively) in the form of an inverted Y. They join approximately 2.3 miles upstream of the outlet at Port Townsend Bay. There are approximately 29.5 miles of main channels between the two forks. WCC comprises a little less than 80 percent of the average combined flows of the two tributaries.

WCC originates in Delanty Lake at river mile (RM) 13.1 with another small tributary flowing out of nearby Peterson Lake. Two additional small tributaries flow out of forested wetlands about 1.5 miles to the south and join, becoming what is presently known as Barnhouse Creek. Much of WCC stream channel is about 20 feet wide with vertical or near-vertical banks.

ECC originates in forested wetlands approximately 5.5 miles upstream of the fork with WCC. Swansonville Creek, formerly a tributary to Ludlow Creek, was diverted to ECC as part of the early drainage modifications and stream channelization. Average stream channel width on ECC is less than ten feet with vertical or near-vertical banks.

Both streams are low to very low gradient, particularly through the reaches where farming is most prevalent (WCC RM 9.4 to confluence with ECC, and nearly entire length of ECC). Total elevation change for these stream reaches are about 122 feet and 81 feet respectively resulting in gradients less than 0.4 percent. The gradient in the reach of WCC from RM 5.8 to 3.4 is less than 0.06 percent.

The climate is mild with cool, dry summers and wet and cloudy but mild winters. Annual precipitation ranges from about 20 inches at the north end to about 30 inches at the south end of the watershed.

About two-thirds of the annual precipitation falls during the six-month period from October to the end of March, mostly as rain. Climate change modeling predicts a wetter rainy season with more intense storm events and drier summers.

Geology and Soils

Ancient tectonic forces and the advance and retreat of glacial ice sheets formed these relatively broad, flat valleys and adjacent ridges and terraces. Valley floors are up to 3,000 feet wide. Valley bottom soils are hydric and mostly organic peats and mucks that developed from decayed vegetation under the wet conditions of the glacial basins and ponded areas. These soils are poorly drained and relatively deep. If drained, they are considered prime farmland soils and fall under Class II, USDA's second-best land capability classification. In 1955, the SCS estimated there were about 4,000 acres of Class II soils and another 1,000 acres comprising Class III and Class IV soils.

The challenge with these soils when cultivated is water control. Careful and complex water management, including both drainage and management of the water table is critical for agricultural productivity. Cultivation of these soils can result in settling up to one inch per year or more if the water table is below a depth of 30 inches.

Pasture and hay productivity estimates are noted in the SCS 1955 field examination report. At the time, 75 percent of the valley area was estimated to be producing less than four tons of forage per acre. It is stated in the report that 95 percent of the valley could produce five or more tons per acre "with improved flood control, drainage and good management." The report also states that "much improvement in farming management has occurred during the past five to ten years." This time frame coincides with the first decade of conservation district activity.

Pre-Agricultural Settlement Conditions

Euro-American settlement of Chimacum watershed began in the 1850s. Very few of the original inhabitants of the area, the Chemakum Tribe, were still alive at the time (Bahls and Rubin 1996). According to General Land Office surveys conducted between 1858 and 1873 and personal accounts from old timers, the watershed was historically mostly coniferous forest with western redcedar and spruce swamps, meandering stream channels, beaver ponds, and thickets of Pacific crabapple and Douglas spirea in the broad stream valleys (Bahls and Rubin 1996). Reference is made to the "Chimacum Prairie" in some literature, and recent work by the US Forest Service Pacific Northwest Research Station has identified several small prairies in the area of Chimacum and Port Hadlock/Irondale. The largest of these prairies was centered at the intersection of Beaver Valley and Center roads. Bahls and Rubin also recorded homesteader accounts of large wood in the streams and large wood rising to the surface of the land out of the peat during cultivation.

Fish Presence

The Chimacum watershed once included native runs of anadromous coho salmon, summer and fall chum, steelhead, and resident cutthroat and rainbow trout (NOSC 2018; Bahls and Rubin 1996). The native coho and chum runs are greatly reduced from their historic levels (Bahls and Rubin 1996; Lichatowich 1994). The coho were considered a unique run because of their geographic isolation and late run timing; however, this may have changed because of the introduction of coho from other streams, most notably the Quilcene River. The coho, steelhead, and trout likely spawned primarily upstream of RM 8.5 of WCC, in Naylors Creek, and in upper ECC, but reared throughout the system. Summer chum spawned in the lower mile or two of Chimacum Creek. Chum were extirpated from Chimacum Creek by the late 1980s following a heavy storm that caused the Irondale Road fill to fail during chum spawning time. The road failure sent an estimated 20,000 cubic yards of fill downstream, burying the chum redds. Summer chum were reintroduced beginning in 1996 with Salmon Creek stock (Johnson and Weller 2003).

Historical data regarding natural habitat conditions for coho salmon are not available. However, there were old timer accounts from the early 20th century of abundant coho salmon and cutthroat trout, particularly in the headwaters reaches (Bahls, P. and J. Rubin 1996). The Washington Department of Fish & Wildlife rates coho runs as healthy, but this rating is relative to habitat conditions in the 1950s when data collection began, and by that time the watershed had been significantly altered for decades.

2.3 Drainage District Facilities

The original territory of DD1 encompassed about one-third of the Chimacum watershed, totaling 7,526 acres (see Figure 1 below). It extended from near the West Chimacum Creek (WCC) headwaters at present-day State Route 104 and the East Chimacum Creek (ECC) headwaters just south of the Swansonville Road-Beaver Valley Road intersection, downstream almost to Ness' Corner Road. The western boundary mostly followed West Valley Road, and the eastern boundary more or less followed Beaver Valley Road. Most of Chimacum Ridge, which separates the two valleys was excluded from the district.

Considerable ditching had been completed by individual landowners prior to the formation of the district, but the majority of the ditching work was done in the 1920s during the first decade following district formation (SCS 1955). This work included straightening and channelizing both WCC and ECC, and excavation of many miles of drainage ditches and installation of drain tile. Stream channel straightening reduced the total channel lengths of the two main channels and tributaries by approximately 25 percent (Bahls and Rubin 1996). The total channelized stream length of WCC is approximately 7 miles. On ECC it is almost the entire 5.5 miles.

The drainage district was the source of controversy from the beginning, mostly because of the tax imposed on landowners for expensive surveying, stream channel straightening, and ditch construction (Bahls and Rubin 1996; SCS 1955). Considerable work occurred in the 1920s, for which many property owners had to take out mortgages. The Great Depression soon followed, resulting in the economic failure of many farms. In fact, the SCS reported in their 1955 field examination that "unstable economic conditions, poor management and lack of maintenance almost bankrupted the district." Interviews with old timers by Judith Rubin revealed that considerable ditching work was performed in the early 1940s by the Soil Conservation Corps. This presumably meant the Soil Conservation Service (SCS, now called the Natural Resources Conservation Service or NRCS); however, SCS accounts suggest that most of the ditching work was done in the 1920s, followed a period of very limited activity until about 1946 when the East Jefferson County Soil Conservation District (present day Jefferson County Conservation District or JCCD) was established. The joint request from the conservation district and drainage district resulted in the 1955 SCS field examination and preparation of plans the following year.

Long-time conservation district supervisor John Boulton once explained that one of the motivators for forming the conservation district in 1946 was the prospect of acquiring surplus World War II equipment from the federal government to rent out for land clearing and drainage projects. No record is available as to whether such equipment was acquired; however, a November 20, 1964 conservation district newsletter includes a list of equipment available for rent, including a grader and a land leveler.

Beavers were common in the lower watershed until major forest clearing and drainage work began near the end of the 19th century. Trapping occurred during the first half of the 20th century, significantly reducing beaver populations, but they were reintroduced around 1960 (Bahls and Rubin 1996). According to landowner accounts, ditch and beaver dam maintenance work was performed inconsistently, leaving most maintenance responsibilities up to individual landowners. Not all landowners performed the maintenance work, resulting in some landowners being impacted by a lack of downstream maintenance; a scenario that has become increasingly common in recent years.

<u>1956 Work Plan</u>

In 1956 the SCS prepared preliminary plans for extensive drainage district improvements. These plans followed a field examination completed in 1955. This work was requested by the DD1 and JCCD and signed by DD1 chair Marcus Larsen and JCCD chair Gilbert Binsfield.

The field examination indicated that little drainage system maintenance work had been done during the previous years. The following is an excerpt from the 1955 report about the early years of the drainage district:

> *The drainage district was established soon after the first World War following a period of sporadic developments by individuals. The work was poorly managed and the equipment was scarcely adequate to do the work. Unstable economic conditions, poor management and lack of maintenance almost bankrupted the district and reportedly caused the failure of several farm enterprises. Following this there was little real accomplishment until late years. There were periods when drainage accessments (sic) were not made or if made, not collected. The establishment of the soil conservation district in 1946 and the technical assistance and encouragement thereby furnished can be given much of the credit for stimulating the improved conditions now evident. In the revival of activity that began in the valley in about 1946 it was reportedly found necessary to have the court appoint commissioners to manage the district until an election could be held since the district had been semi-inactive for many years.*

The report described three Chimacum watershed community problems:

1. *Flooding – Works of Improvement measures are needed to eliminate erosion and control water runoff sufficient to eliminate inundation of farmlands and adjoining roadways and to alleviate siltation of perennial streams. 1953 winter flood water was particularly damaging with entire farms under water.*
2. *Drainage – Community ditches are needed to lower water table sufficient for crop production.*
3. *Additional Works – Any additional works which will control water and put it to use in crop production would be a desirable secondary need.* [This refers to irrigation.]

The work plan drawings identified problem areas (see Figure 2 below). Not surprisingly, these problem areas are very similar to areas identified in more recent salmon restoration and protection plans (Bahls and Rubin 1996; NOSC 2018) as historic year-round wetlands. The drawings also identified several existing dams recommended for removal and recommended installation of several adjustable water control structures. of three. The dams were presumably less sophisticated structures installed to manage the water table. One dam located a short distance upstream of Rhody Drive was replaced with an adjustable water control structure, which remains in place today. No record has been found documenting what else of the preliminary plans were implemented; however, old-timer accounts suggest it was limited to the lower portion of the watershed (Bahls and Rubin 1996).

In 1987 the SCS conducted a geologic assessment following upper WCC landslides that occurred in 1982 and 1985 and contributed substantial amounts of sediment to the stream channel. Area landowners had removed reed canarygrass and some sediment from the channel (roughly RM 7.0 to 9.0) during the summer of 1987. In addition to the large debris basin at approximate RM 9.4, two small debris basins were noted near RM 8.8 and 7.6 (Eaglemount and Egg & I roads, respectively). Recommendations were made for annual dredging of the large debris basin and monitoring of the small basins. In addition, various alternatives were evaluated for reed canarygrass removal and channel dredging to open up flows and reduce flooding. Stream fencing to eliminate livestock access and tree planting along the stream banks were also recommended. Debris basin maintenance ended sometime in the early 2000s and fencing and tree planting (mainly willow and cottonwood) began in earnest in the late 1980s.

Figure 1. Original Chimacum Drainage District with 2020 Tax Parcels

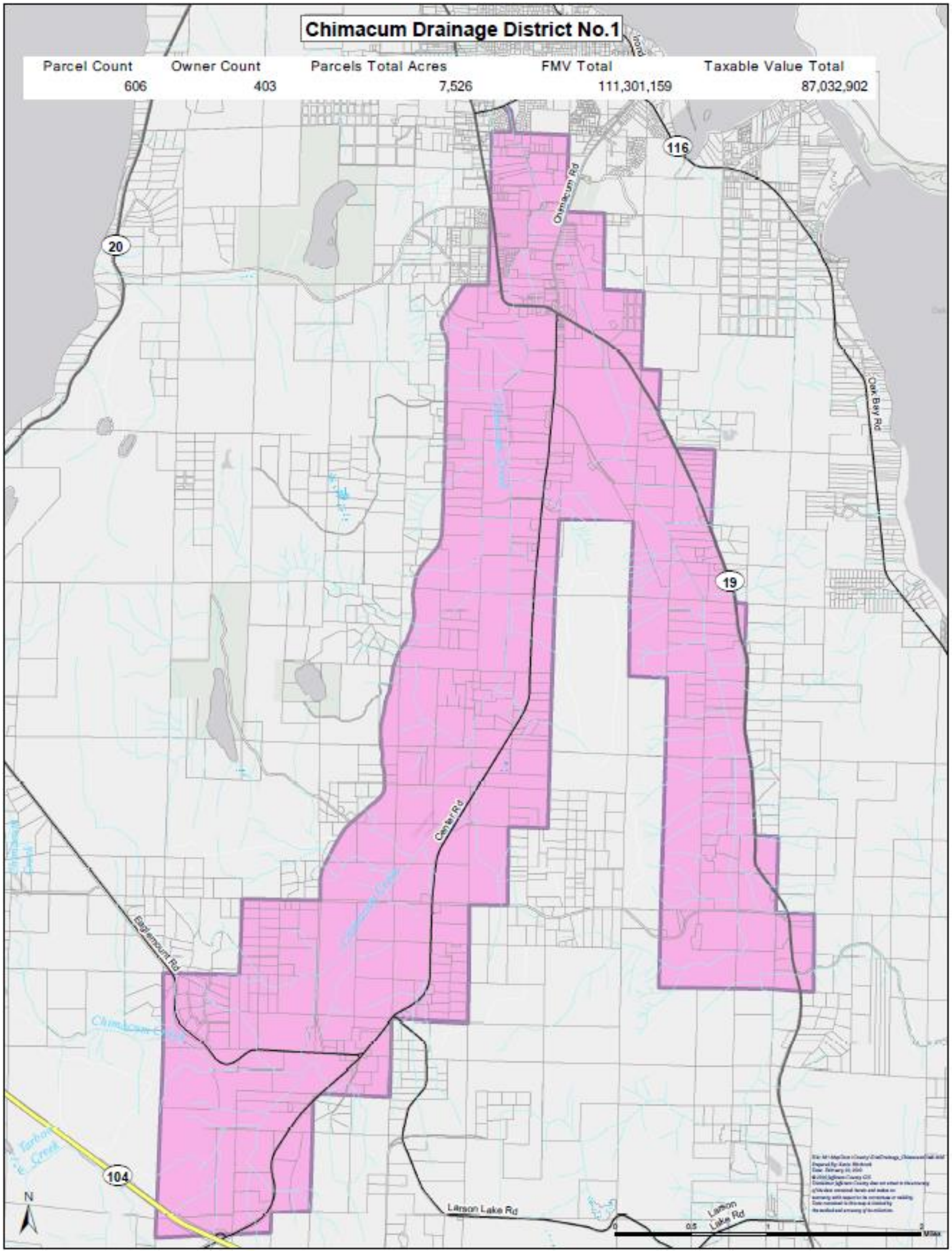
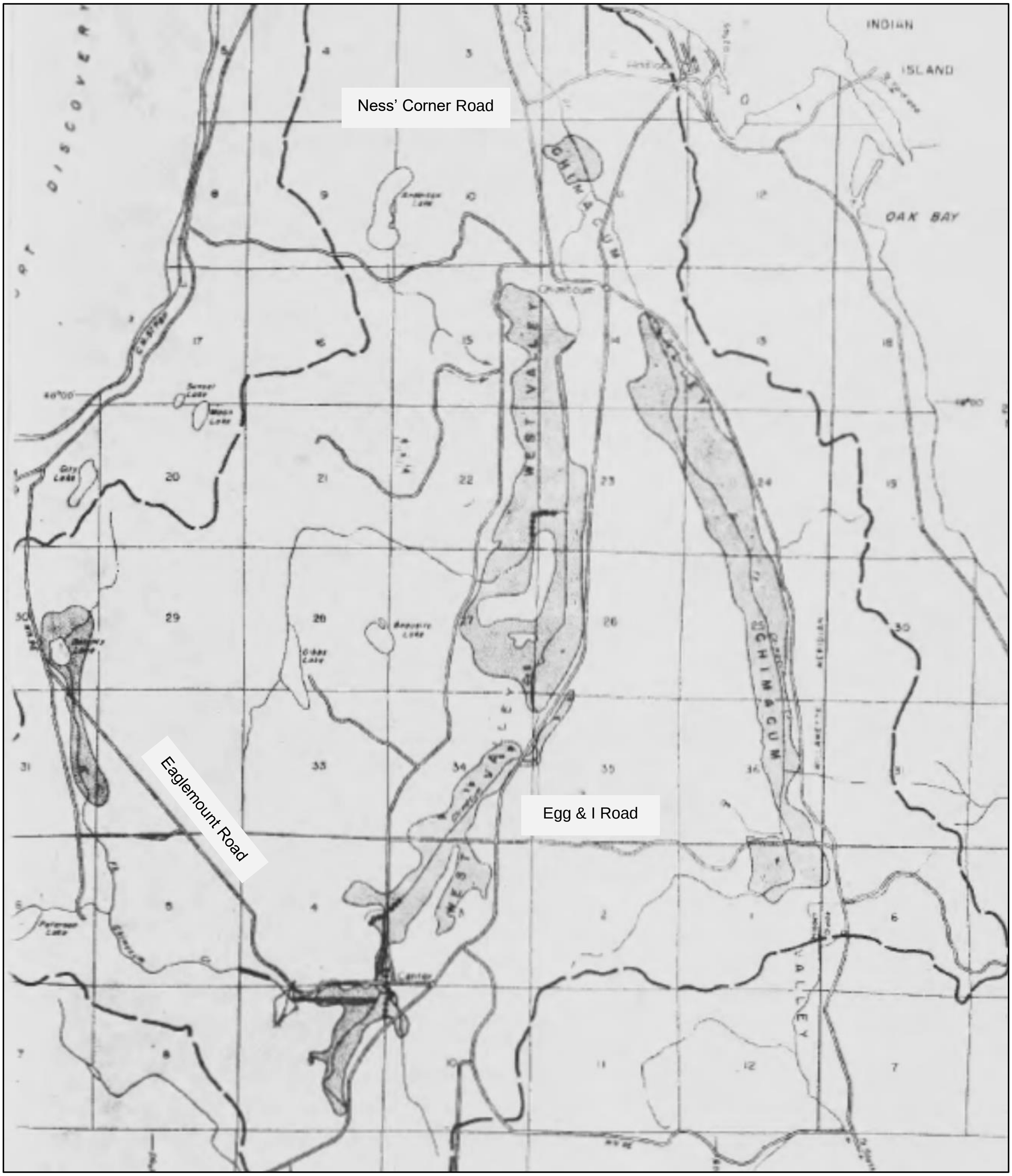


Table 1. Timeline of Major Drainage District Events

Year	Event
1850s	Euro-American settlement begins.
Early 1900s	Individual landowner drainage ditch work. Beaver reported to be abundant in watershed.
1919	Jefferson County Drainage District #1 formed.
1920s	West and East Chimacum creeks straightened, many miles of ditches dug.
1929-1930s	Stock Market crash, Great Depression begins. Numerous farms go out of business.
1930 to 1946	DD#1 mostly inactive.
1935	USDA Soil Conservation Service (SCS) established.
1946	East Jefferson County Soil Conservation District (JCSCD) formed.
1946	DD#1 commissioners appointed by court.
1946	DD#1 commissioners appointed by court.
1950s	Reed canarygrass introduced; invades wetlands and waterways, reducing capacity and flow of small and low gradient streams.
1953	Significant flooding of farmland.
1955	SCS completes DD#1 Field Assessment at request of JCSCD and DD#1.
1956	SCS completes Work Plan for DD#1 improvements.
1960s	Beaver reintroduced to the watershed.
1964	JCSCD reports poor maintenance of drainage system.
1968-1972	DD#1 inactive.
1970 & 1971	Much of valley reported to be flooded for most of the year.
1972	DD#1 commissioners appointed by court.
1973	State Drainage District Law revised; most changes pertain to elections.
1974	Two DD#1 commissioners resign, district goes inactive again.
1975-present	Drainage system maintenance work performed by individual landowners.
1970-95	Chimacum School District operates coho hatchery program.
Early 1980s	Irondale Road fill failure buries chum salmon redds in lower Chimacum Creek.
1982 & 1985	Major landslides upstream of RM 9.4 on West Chimacum Creek contribute sediment downstream, further reducing capacity.
1982	West Chimacum Creek Valley flooded most of winter due to reed canarygrass in channel.
1984	Scores of coho salmon are stranded in fields and caught in field fencing during floods.
Mid 1980s	Chimacum Creek summer chum go extinct.
1987	Landslide sediment excavated from WCC by landowners. Sediment basin constructed.
1987	SCS conducts geologic assessment and recommends fencing to control livestock access and planting trees on stream banks to reduce reed canarygrass growth and stabilize banks.
1980s & 1990s	Many miles of stream fencing installed to prevent livestock access. Reed canarygrass thrives in stream channels from restricted livestock access. Initial efforts to restore riparian forest conditions, mostly by planting willow and cottonwood.
1996	Summer chum reintroduction program initiated.
Early 2000s	First Conservation Reserve Enhancement Program projects begin. Many miles of riparian restoration implemented over following two decades.
Early 2000s	Non-livestock farming begins to attract increased interest and small acreages begin to be converted to vegetables, small grains, orchards, and blueberries.
2016	Last dairy in watershed ceases operation.
2020	Conservation District provided cost-share funding to 14 landowners for the removal of reed canarygrass from a total of five miles of stream channel on both forks.

Figure 2. Chimacum Drainage District Problem Areas, 1955

1955 Soil Conservation Service map showing watershed drainage and flooding problem areas (shaded).



SECTION 3: CURRENT ENVIRONMENTAL AND ECONOMIC CONDITIONS

3.1 Farmland

As of the spring of 2022 there are nearly 3,000 acres of actively farmed land in the drainage district and 60 property owners (127 parcels) enrolled in the open space agricultural property tax program. The vast majority of these acres are in permanent cover with forage crops for pasture, hay, or silage. Most of the remaining farmland is under annual cultivation for vegetables and small grains, with a very small percentage of land planted to orchards and blueberries. Based on a cursory analysis of 2019 orthophotographs, a little over 2,000 acres were rated to be in a fairly productive condition with a high percentage of desirable forage or under a high level of management (under cultivation or regularly harvested), leaving about one-third of the farmland to be marginally productive.

In order to assess the recent decline in productive farmland, a very preliminary analysis of orthophotography from 2000 and 2019 was conducted. Based on this analysis, it appears that nearly 400 acres of farmland that was in a fairly productive condition and/or cultivated in 2000 was in a highly degraded condition or no longer farmed in 2019. Accounting for what appeared to be marginally productive farmland in 2000, the decline in quality farmland over this nineteen-year span amounted to between 15 and 20 percent. Most of this decline appears to be due to flooding and/or an excessively high water table, although simple neglect may also be a contributing factor. Some land is flooded year-round and other acreages are dominated by reed canarygrass and soft rush.

3.2 Flooding

Periodic flooding during winter storms is common and generally not considered a major problem, but large storm events or rapid snowmelt can have more significant impacts, including impacts to roads and other infrastructure. Flooding during the growing season is usually very problematic to farming, delaying or preventing cultivation, planting, and crop production and harvest, and grazing, and in extreme cases, drowning out crops. Permanent flooding or flooding that extends into the growing season can also be damaging to riparian forestland, resulting in high tree and shrub mortality. Four main factors contribute to flooding in the Chimacum watershed:

1. exceptionally low gradient streams,
2. broad, flat stream valleys,
3. excessive in-stream vegetation growth that restricts channel capacity and flow, and
4. beaver dams that restrict flow and create ponds.

The Chimacum Creek valleys have probably been subject to flooding since the end of the last ice age. Several millennia of flooding is what resulted in the development of the deep peat soils. And if drained, these soils can be very productive farmland. This is what led to the development of the Chimacum Drainage District and subsequent drainage improvement works.

Maintenance of the drainage network over the past century has been sporadic, with periods of inactivity followed by short-term cleaning and dredging projects. The introduction and subsequent invasion of reed canarygrass beginning in the 1950s has significantly hindered the effectiveness of the drainage system.

Efforts to control reed canarygrass by planting woody vegetation began in the late 1980s. These efforts were undertaken, in part, because of degraded water quality in the streams due mostly to fecal coliform contamination. Prior to fencing, livestock had unrestricted livestock access to waterways. Besides causing bacterial contamination, livestock contributed to streambank erosion. Once livestock were fenced out of the waterways, reed canarygrass flourished.

Early efforts to control the reed canarygrass included mowing and dredging. More permanent control methods involved the planting of woody vegetation to shade out the canary grass. Easily propagated and fast-growing willows and hybrid cottonwoods were planted beginning in the late 1980s. These plantings provided favorable forage and habitat for beaver. Since the 1990s, it is estimated that beaver have constructed over 20 dams in the lower watershed, resulting in extensive ponding and flooding. While flooding in the valleys had been an annual occurrence in many areas, usually limited to a few months during the wet season, beaver dams have resulted in year-round flooding. In addition to rendering some land unfarmable, approximately 15 acres of previously restored riparian forest buffers have succumbed to the flooding, resulting in high mortality of trees and shrubs. Nearly 400 acres of former farmland are now in a highly degraded condition or no longer farmable, due in large part to these hydrologic changes.

3.3 Water Quality and Aquatic and Riparian Habitat

Three reaches of the Chimacum Creek mainstem and one reach on East Chimacum Creek (ECC) are listed by the Department of Ecology as *Impaired* for temperature. Two reaches of the mainstem are listed as *Impaired* for fecal coliform bacteria, and one reach is listed as *Impaired* for dissolved oxygen. Water quality data collected over the past three-plus decades shows that considerable reductions in bacterial contamination have occurred, mainly during the early 1990s as a result of agricultural best management practice implementation and habitat improvement projects. Some temperature monitoring stations downstream of riparian restoration sites show a decreasing water temperature trend. However, at most stations, including well-shaded upstream controls water temperatures have been increasing. This is not surprising because air temperature also has been increasing

Reed canarygrass, bittersweet nightshade, and other semi-aquatic and aquatic vegetation inhibit stream flow, thus increasing water temperatures. The ponding of water behind beaver dams has created greater surface area and lower stream flow velocities, exacerbating water temperature concerns. Compounding matters, air temperatures have increased over the past few decades. The combination of higher water temperatures and the annual dieback and decay of reed canarygrass and other aquatic vegetation contributes to low dissolved oxygen.

Water quality improvements can be attributed to the fencing of livestock out of waterways and planting of woody riparian buffers. Over ten miles (counting each stream side separately) of ECC and West Chimacum Creek (WCC) and their tributary streams, covering nearly 200 acres, have been planted to riparian forest buffers or woody hedgerows over the past three decades. This includes over five miles along the WCC and nearly four miles on ECC. Not including tributary ditches, it is estimated that over two-thirds of West and East Chimacum creeks and their tributaries remain in herbaceous vegetative cover, fully exposed to sunlight.

Nearly all livestock have been fenced out of the streams in the watershed. Many tributary ditches remain accessible to livestock and two small sites on Putaansuu Creek have livestock access for drinking. Swan and other waterfowl inhabit the seasonally flooded fields and pastures, and subsequent runoff into the streams is a potential source of contamination.

Fisheries

Although long-term quantitative data are not available, native summer chum and coho runs in the Chimacum watershed are presumed to be a fraction of historic pre-agricultural settlement levels (NOSC 2018; Bahls and Rubin 1996; Lichatowich 1994). The summer chum was extirpated in the mid-1980s, but was reintroduced and has made a come-back with annual returns averaging 1,133 fish from 2002 to 2021. Coho have been in a steady decline since counts began in 1998 with an average return of 187 fish from 2014 to 2020 (WDFW data 2022). Spawning habitat area for chum is comparable to pre-agricultural settlement, and estimated at about 80 percent for coho; however, coho rearing habitat, particularly summer rearing, is estimated to be a fraction of pre-agricultural settlement (Bahls and Rubin 1996). A few barriers to fish passage in the watershed are likely inhibiting access to spawning habitat. However, because salmon spend most of their life cycle in the marine environment, freshwater habitat is not the only factor that determines the number of returning fish. Poor coho returns, which have been noted throughout Puget Sound, are likely due in part to poor ocean conditions. From 2003 to 2021 ocean conditions were ranked poor for seven years, fair for eight years, and good for only four years.

Table 2. Current and Historic Stream and Wetland Conditions

Adapted from the 2018 *Chimacum Creek Restoration and Protection Plan.*

Stream Component	Historic	Current	Reduction
Wetlands	2,240 acres (1,650 inundated in winter, 590 year-round)	904 acres (mostly agricultural land)	>60%
Channel Length	27.2 miles	21.7 miles	>20%
Riparian Forest	Unknown	36% of main channels in various stages of development	>60%
Agricultural Ditches within Valley Bottom	None prior to agricultural development	~16 miles of ditches, 26% with riparian vegetation	N/A

SECTION 4: DRAINAGE MANAGEMENT

Most of the information in this section is a summary of much more extensive information found in the *Chimacum Creek Restoration and Protection Plan* prepared by the North Olympic Salmon Coalition in 2018. Any instream activities require a permit from the Washington Department of Fish & Wildlife (WDFW), as do some beaver management activities. The commercial use of herbicides and applications in and around water require special licensing from the Washington Department of Agriculture.

4.1 Vegetation Management

Keeping drainage ditches and stream channels open and flowing requires control of reed canarygrass. Reed canarygrass is adapted to grow in poorly drained soils and seasonally flooded areas and can even grow in low-velocity waterways. A non-native perennial grass that spreads both by seed and vegetatively through aggressive rhizomes, it has thrived in the Chimacum watershed and has become a nuisance species. It can reach heights of over six feet and form mats of vegetation across streams and ditches, choking the flow of water and creating challenges for adult and juvenile fish migration.

Reed canarygrass can be managed through regular mowing of the stream banks and mechanical removal from waterways, herbicide treatment, or a combination of methods. To be effective, bank mowing needs to be done several times per year. Most reed canarygrass management work can only occur during the growing season, and sometimes only during the summer months when the water table is lower and equipment access is feasible.

During the summer of 2020, Jefferson County Conservation District sponsored a reed canarygrass removal project. The project involved cost sharing with individual landowners to mechanically remove reed canarygrass from WCC and ECC. An excavator attachment specially designed for removing reed canarygrass was used. A total of five miles of stream channel was cleared of canarygrass at a total cost of $62,500, not including project management. The project successfully improved stream flow and reduced flooding; however, one year after the treatment, reed canarygrass was growing back into the stream channel.

Because reed canarygrass is not shade tolerant, long-term control can be achieved by shading it out with trees and shrubs. However, the aggressive rhizomatous nature of reed canarygrass and heights to which it grows make it very difficult for trees and shrubs to compete and get established. Therefore, the reed canarygrass must be managed until the trees and shrubs are large enough to compete with the grass, which takes several years. Various methods have been used with varying degrees of success for temporary control of reed canarygrass on riparian forest restoration sites, including spot spraying of herbicides, mowing, and smothering with temporarily installed heavy tarps or permanently installed cardboard pinned in place with live stakes. Herbicidal treatment must be repeated in order to be effective. Smothering with tarps requires about a year of treatment to effectively knock back the existing vegetation, but it does nothing to the seed bank in the soil.

And as noted above, shading out reed canarygrass with trees and shrubs improves habitat for beaver, which can lead to even greater flooding problems than existed with just reed canarygrass. Because reed canarygrass control is required for several years to enable trees and shrubs to establish and compete, plantings must be designed with maintenance access in mind. Nevertheless, the habitat benefits of riparian forest buffers, including stream shading are well documented.

Reed canarygrass control strategies are detailed in the *Chimacum Creek Restoration and Protection Plan.*

4.2 Beaver Management

Beaver are important components of healthy ecosystems; however, they can have significant adverse impacts on landscapes that are managed for agricultural and timber production, infrastructure, such as roads and buildings, as well as riparian forest restoration. Minimizing adverse beaver impacts is an ongoing challenge, since beaver are continuously reproducing, colonizing new territory, and altering their surroundings.

Beaver management can include managing the beaver, their dams, their habitat, or a combination of these activities. Managing beaver means removing them from the area or killing them. Permits from the WDFW are required for lethal trapping or trapping and relocation off the property.

Managing beaver dams can be done by installing pond leveler devices and notching dams. Both of these activities require permits from the WDFW, and modification of dams that reduce wetland areas may not be allowed. It is important to regularly monitor for beaver activity to prevent establishment of dams that significantly alter the environment and result in establishment of new wetland areas. Managing beaver habitat can be attempted through plant selection and fencing or other protection measures to lessen beaver damage to plantings and reduce their readily available food supply. Certain species of trees and shrubs are preferred by beaver, some are not preferred, and some are resistant to beaver. The species that are resistant may still be used by beaver, but they are more likely to survive.

Beaver management and control strategies are detailed in the *Chimacum Creek Restoration and Protection Plan.*

Section 5: Ecosystem Restoration Opportunities

Most of the information in this section was taken from the *Chimacum Creek Restoration and Protection Plan* prepared by the North Olympic Salmon Coalition in 2018. That plan includes extensive analysis of habitat conditions and restoration considerations and includes recommendations for further analysis.

5.1 Stream Channel Restoration

As of the spring of 2022 over 1.5 miles of stream channel had been restored to more natural channel configurations. Three additional projects have been designed. Of these projects, the Kodama Farm project on East Chimacum Creek is closest to implementation, having completed 60 percent design and preliminary permitting. The next step is securing funding for final design, permitting, and construction. Designs have been prepared for the Holt and Moziac projects on West Chimacum Creek but no progress has been made on permitting. A wetland delineation – a requirement for Army Corps of Engineers permitting – has been completed for the Moziac Farm project.

5.2 Riparian Habitat Restoration

As noted earlier, Chimacum Creek is listed as impaired because of both high water temperatures and bacterial contamination. And as described above, the vast majority of the WCC and ECC riparian areas are currently dominated by reed canarygrass. Riparian forest buffers make up about one-third of the stream miles within the drainage district. Healthy aquatic habitat is generally dependent on well-established riparian forest buffers. These buffers shade the waterways to moderate water temperatures, and the trees and shrubs provide habitat for various species, including invertebrates that are a source of food for fish. Fallen trees contribute to the stream channel diversity by creating pools, riffles, and cover for fish. However, in low gradient stream reaches these effects are minimal due to low stream velocity. Furthermore, trees falling into the stream channel can result in increased flooding and a high water table.

Research conducted in the Chimacum watershed over the past 25 years indicates that water temperatures have been increasing (JCCD 2015, and unpublished data). Because Chimacum Creek has been largely devoid of shade-producing riparian vegetation for over a century, and in fact historically was characterized by numerous beaver ponds with large surface areas, there is some speculation that fish species that utilize streams in the Chimacum watershed have adapted to these higher temperatures. Nevertheless, woody riparian buffers provide filters between upland activities and the stream water and help compete with reed canarygrass.

Hedgerows have been planted along drainage ways in Whatcom County, resulting in a great deal of success. Hedgerows are appropriate for narrow channels, generally less than 15 feet in width. Hedgerows accomplish the objective of competing with reed canarygrass, while also providing some shade for the watercourse. Because hedgerows are comprised of shrubby species, they do not grow very tall, thus do not contribute much shade to adjacent cropland. Suitable species establish quickly and are thicket formers. This enables them to fill in voids, stabilize channel banks, and regrow if cut for channel maintenance work. Many of the best species are resistant to beaver, too.

5.3 Wetland Restoration

Wetlands provide numerous ecological benefits, including habitat, water quality filtration, floodwater storage, aquifer recharge, and streamflow attenuation. Virtually all the natural wetlands in the watershed have been substantially altered. However, numerous areas in the watershed experience chronic flooding as they probably have for millennia. In fact, the rich organic soils in the valley bottoms developed under such conditions. It is these soils that attracted Euro-American settlement and agricultural development.

The areas that are most frequently flooded are currently very marginal pasture or hayland. The low productivity and never-ending flooding and drainage battles suggest that they may be better suited for wetland habitat. The Wetland Reserve Program administered by the USDA Natural Resources Conservation Service can provide financial assistance for wetland restoration, as well as compensation to landowners for taking farmland out of production. Initial analysis of some of these properties is included in the 2018 *Chimacum Creek Restoration and Protection Plan*.

NOSC and the engineering firm Natural Systems Design, Inc. completed a reach-by-reach assessment with recommended protection and restoration actions, which is detailed in the *Chimacum Creek Restoration and Protection Plan*. The plan also includes preliminary analysis for potential restoration on the following projects:

West Chimacum Creek	**RM**	**Notes**
Holt Property	9.4-9.9	West Chimacum and Barnhouse creeks. Stream remeander, wetland and riparian restoration. Preliminary design complete.
Willow Wood Farm (old Bundy Farm)	7.6-8.2	Stream remeander and riparian restoration. Includes four properties.
Moziac Farm (old Yarr Farm)	7.4-7.7	Substantial acreage below stream channel water elevation. Stream remeander, wetland and riparian restoration.
Short Family Farm	4.8-5.8	Substantial acreage flooded throughout winter. Wetland and riparian restoration.
Finnriver Farm (Brown Farm)	3.5-3.9	Stream remeander, riparian restoration. Reach includes four landowners.
East Chimacum Creek		
Kodama Farm (Pryde property)	4.3-4.5	Stream remeander, wetland and riparian restoration. Restoration design complete.
Ruby Ranch (Goularte property)	4.0-4.3	Riparian restoration.
Ovenell Property	3.4-3.8	Riparian forest buffer dominated by deciduous trees. Numerous beaver dams. Wetland restoration.

SECTION 6: DRAINAGE DISTRICT OPERATIONS, COSTS AND FUNDING

If the Chimacum Drainage District is reactivated, the first thing that the district should do is prepare a management plan. See Appendix B for a sample drainage district management plan from Whatcom County. Such a plan should be a collaborative project that involves regulatory/permitting agencies, area tribes and salmon recovery organizations, as well as agricultural interests. Considerable preliminary planning work has already been done by the North Olympic Salmon Coalition to address many of the issues and opportunities as they relate to salmon habitat, which should be a critical component of the management plan. Staff time from partner organizations and consultant expenses necessary to prepare the plan could potentially be paid for with grant funding.

If reactivated, the drainage district will have certain ongoing fixed operational expenses, as well as costs for routine maintenance work and special projects. Annual routine expenses will be fairly consistent and predictable, whereas special project costs will vary from year to year.

Revenues are commonly generated by assessing the properties within the district. Assessments are typically per acre and adjusted according to the benefits received. Determining the benefits is usually done based on the elevation of the land and flood risk. In other words, the lowest elevation lands, being the most susceptible to flooding, receive the greatest benefits from a drainage system, thus are assessed at the highest rate. Higher ground in the district, which contributes to flooding but receives comparatively little benefit from the drainage system is assessed at a lower rate. There may be multiple zones and associated rates within a district to reflect varying degrees of benefits.

A preliminary analysis of drainage districts in Whatcom County (Bierlink 2022) revealed budgets that ranged from an average of about $2 to $8 per acre of district land. Given the variable rates assessed, it is assumed that the highest assessment rates are higher than these averages and the lowest are below the average. Total assessments collected in 2020 for Whatcom County drainage districts ranged from a low of $2,000 to a high of $20,000. The smallest district is 171 acres and has an annual assessment of $2,000. The largest is 14,322 acres and has an annual assessment of $15,000. One district with 2,572 acres had annual assessment revenues of $20,000.

Chimacum Drainage District comprises 7,526 acres under 387 separate ownerships (Hitchcock 2022). Of those 387 landowners, 60 are enrolled in the open space agriculture property tax program, totaling 127 out of 586 parcels.

6.1 Fixed Costs: Elections, Insurance, Bonding, and Audits

Drainage districts typically have a three-member board of commissioners, each serving a six-year term. Drainage district elections do not fall under the general election statute, thus are typically held independently. However, they are required to be held on the first Tuesday after the first Monday in February in each even-numbered year. Drainage district voting rights are somewhat complicated, but essentially, only property owners within the district who are qualified voters are eligible to vote. Elections are not held if no one or only one person files for the position. The county auditor is responsible for drainage district election notices and is required to conduct the election if the district has less than 500 qualified voters. If there are over 500 qualified voters, the district may conduct its own elections or contract with the county auditor. At last count, there were 606 parcels and 403 property owners in the DD1. Since the drainage district elections statute allows up to two votes per landowner, it appears that DD1 would have the option to conduct its own elections. Election expenses incurred by the county auditor are to be reimbursed by the district.

According to Whatcom County Public Works, which oversees the drainage districts in Whatcom County, each district is required to have a public official bond and an audit officer bond. The current annual cost of those bonds is $75 per public official and $175 for the audit officer.

Drainage districts are audited by the state every three years. In Whatcom County, these audits generally cost less than $1,000.

6.2 Annual Maintenance

The most routine activity of an established drainage district is maintenance of the waterways to provide for adequate flow. In the case of the Chimacum watershed, this means reed canarygrass and other vegetation removal, beaver trapping, and maintenance of beaver dams and associated pond leveler devices.

As noted in Section 4.1, the conservation district sponsored a reed canarygrass removal project in 2020 that benefited about five miles of stream. The cost was $62,500, not including administrative costs for permitting and project management. At present, it is estimated that there are six to seven miles of stream channel with chronic reed canarygrass infestations. The number of miles of drainage ditch with chronic reed canarygrass infestations have not been calculated, but it is probably reasonable to assume as many as ten miles of waterways that would require ongoing maintenance to control reed canarygrass.

Following the adoption of a drainage management plan, prepared in consultation with permitting agencies, drainage districts are typically granted five-year permits for the ongoing activities identified in their plans.

6.3 Special Projects

The drainage district may sponsor or co-sponsor special projects that fall outside of those covered by routine maintenance and the permits that cover such maintenance. These projects might include special drainage system projects, including decommissioning of obsolete drainage ditches, hedgerow establishment along drainage ditches and narrow stream channels to combat noxious weed growth and lower water temperatures, and removal of sediment buildup in specific reaches of drainage ways.

In addition to projects to support the proper functioning of the drainage system, a drainage district may undertake or partner with other organizations to undertake habitat improvement or restoration projects. This might include correcting barriers to fish passage or large-scale restoration projects. Some stream reaches are candidates for major restoration work that would include restoration of natural channel meanders and riparian forest buffer establishment. And some reaches are candidates for large-scale wetland restoration. Many potential projects have already been identified and some preliminary analysis has already occurred. Projects of this nature will require special planning and engineering to ensure satisfactory results and minimize adverse environmental impacts. They will require willing participation by landowners or property acquisition.

On December 31, 2009, the Quilcene-Snow watershed water resources management program rule (WAC 173-517) was adopted by the Washington Department of Ecology. The water rule greatly curtails new water uses after that date. No new water is available for agriculture in the Chimacum sub-basin without mitigation. However, winter water is available for new water rights; therefore, if the water can be stored, it may be possible to obtain a water right for water use during the growing season. Whether or not this is feasible or how this might work is yet to be determined. However, with projections of wetter winters characterized by more intense storm events and drier summers, it may become important to pursue some form of storage in the future. Given the other water and drainage management activities that the drainage district would be responsible for, water storage for irrigation might also fall under its jurisdiction.

Funding for some of the smaller special projects may be generated by setting aside a portion of the annual assessment revenues and/or through limited increases in assessments. Grants or other revenue sources will be necessary for the larger projects.

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APPENDIX A – KEY EXCERPTS FROM STATE DRAINAGE DISTRICT LAW AND RELAVENT HYPERLINKS

Drainage District Powers (RCW 85.06 and 85.38.180)

Drainage District Elections (RCWs 85.38.100 through 85.38.130)

Drainage District Financing

Special District Financing – Alternative Method (RCW 85.38.140)

Rates and Charges (RCW 85.38.145)

Special Assessments – Valuation – Assessment Zones – Criteria for Assessments (RCW 85.38.150)

Systems of Assessment – Hearing – Notice – Adoption of Ordinance – Appeals – Review – Emergency Assessment (RCW 85.38.160)

Drainage District Reactivation (RCW 85.38.220)

Suspension of Operations—Procedure—Reactivation.

Any special district may have its operations suspended as provided in this section. The process of suspending a special district's operations may be initiated by: (1) The adoption of a resolution proposing such action by the governing body of the special district; (2) the filing of a petition proposing such action with the county legislative authority of the county in which all or the largest portion of the special district is located, which petition is signed by voters of the special district who own at least ten percent of the acreage in the special district or is signed by ten or more voters of the special district; or (3) the adoption of a resolution proposing such action by the county legislative authority of the county in which all or the largest portion of the special district is located.

A public hearing on the proposed action shall be held by the county legislative authority at which it shall inquire into whether such action is in the public interest. Notice of the public hearing shall be published in a newspaper of general circulation in the special district, posted in at least four locations in the special district to attract the attention of the public, and mailed to the members of the governing body of the special district, if there are any. After the public hearing, the county legislative authority may adopt a resolution suspending the operations of the special district if it finds such suspension to be in the public interest, and shall provide a copy of the resolution to the county treasurer. When a special district is located in more than one county, the legislative authority of each of such counties must so act before the operations of the special district are suspended.

After holding a public hearing on the proposed reactivation of a special district that has had its operations suspended, the legislative authority or authorities of the county or counties in which the special district is located may reactivate the special district by adopting a resolution finding such action to be in the public interest. Notice of the public hearing shall be posted and published as provided for the public hearing on a proposed suspension of a special district's operations. The governing body of a reactivated special district shall be appointed as in a newly created special district.

No special district that owns drainage or flood control improvements may be suspended unless the legislative authority of a county accepts responsibility for operation and maintenance of the improvements during the suspension period.

APPENDIX B – LINK TO DRAINAGE MANAGEMENT GUIDE FOR WHATCOM COUNTY DRAINAGE IMPROVEMENT DISTRICTS

Prepared in 2009 by Whatcom Conservation District in partnership with state and local agencies. Guide includes a sample Drainage District Management Plan.