Bellevue Salmon Spawner Surveys (1999-2022)

Kelsey Creek, West Tributary, Richards Creek, and Coal Creek

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The City of Bellevue has monitored salmon spawning in select Bellevue streams since 1999. Two types of monitoring have been implemented: 1) professional spawning surveys by the Washington Department of Fish and Wildlife (WDFW) or other consultants; and 2) volunteer observations from Bellevue Stream Team's Salmon Watcher Program. Professional surveyors walk established spawning reaches within Kelsey and Coal Creek stream basins, count live fish, sample carcasses and document salmon redds. Stream Team program data is collected by volunteer Salmon Watcher observers at established monitoring locations. Salmon Watchers are annually trained in salmon identification and commit to monitoring selected sites for at least 15 minutes twice a week.

The Kelsey and Coal Creek basins, like many other mid-sized, independent tributaries in the Lake Washington Watershed, provide spawning and rearing habitat for Chinook, Sockeye, and Coho salmon. The number of salmon that spawn in Bellevue streams is affected by the abundance of the overall salmon return (hatchery and natural-origin) to the Lake Washington Watershed, and by the physical characteristics of each stream basin.

However, salmon returns have been variable over the last decade throughout the greater Puget Sound Region. Bellevue streams may be particularly affected due to physical barriers to fish migration and stormwater pollutants in the stream system. Dense mats of aquatic vegetation in Mercer Slough and the lower Kelsey Creek wetland complex may be inhibiting adult Chinook Salmon from migrating into spawning areas located in the upper reaches of the Kelsey Creek basin. Additionally, the greater Bellevue area is highly urbanized which may be negatively affecting Coho Salmon, an indicator species that is extremely vulnerable to stormwater runoff from impervious surfaces near waterways.

Understanding regional stream health is a vital concern for the City of Bellevue. In March 2022, the City's Utilities Department approved a new 20-year Environmental Monitoring Program (EMP) Implementation Plan to better assess the health of Bellevue's streams and monitor the changes resulting from urbanization and restoration efforts (Herrera Environmental Consultants, Inc. 2022). Under the EMP, annual professional spawning surveys have been reduced to only include Coal Creek to allow for broad environmental monitoring using a range of new and expanded indicators throughout the City. Kelsey Creek continues to be monitored by Stream Team volunteers, and City staff will follow an adaptive management approach to make decisions about whether professional surveys will resume in the future. The City will continue to address salmon migration issues and will prioritize habitat and water quality enhancements with the goal of increasing salmon utilization of Bellevue streams in future years.

1. INTRODUCTION

Chinook, Sockeye, and Coho salmon inhabit the Lake Washington Watershed and use City of Bellevue streams for spawning and rearing, specifically those in the Kelsey and Coal Creek basins. Chum and Pink salmon do not inhabit the Lake Washington Watershed and were not present historically. Migratory and resident Cutthroat Trout are also present in the Lake Washington Watershed and are common in Bellevue streams. Kokanee, a lake-bound relative of Sockeye Salmon, have historically used Bellevue streams for spawning but have primarily been observed in tributaries of Lake Sammamish within in the last decade.

The Lake Washington Watershed (Watershed Resource Inventory Area [WRIA] 8) is among the most highly urbanized freshwater systems within the Puget Sound Evolutionarily Significant Unit (ESU) for Chinook Salmon (Puget Sound Indian Tribe and WDFW 2017). In 1917 the water surface elevation of Lake Washington was lowered nine feet in order to create the Ship Canal, resulting in the loss of stream delta and lake littoral habitat. At the same time, the Cedar River was diverted away from the Black River to flow directly into Lake Washington. The original outlet of Lake Washington, the Black River, was dammed and the river drained. Since then, anadromous salmonids have entered the Lake Washington Watershed through the Ballard Locks and the Lake Washington Ship Canal (Figure 1-1).

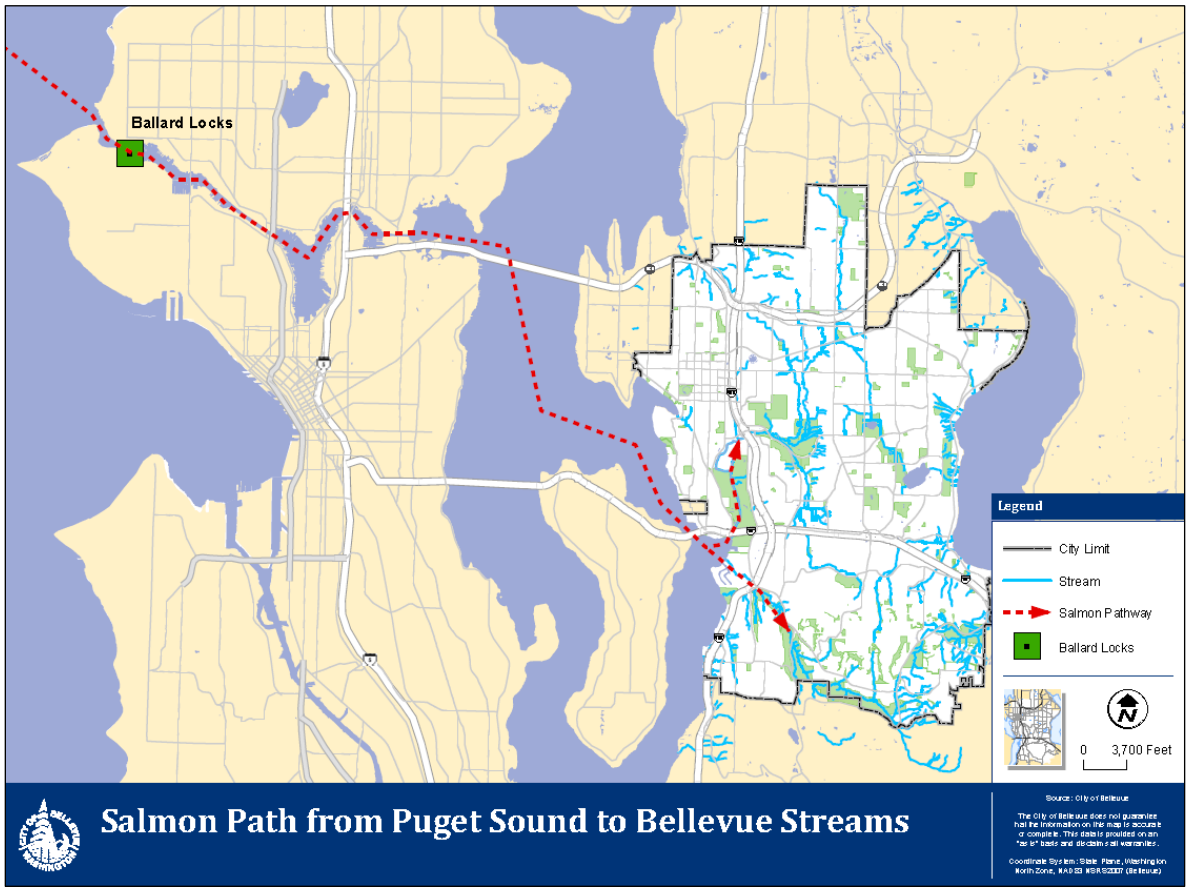

Figure 1-1. Salmon path from Puget Sound to Bellevue Streams.

City of Bellevue stream systems, like many in the Puget Sound Region, are negatively affected by urban development and increasing population growth. Increases in impervious surfaces result in altered flow regimes (Moscrip and Montgomery 1997), impaired water quality (e.g. introduced stormwater contaminates, increased stream temperatures) (Scott et al. 1986, Scholz et al. 2011), and changes to natural stream processes that impact ecological structure and function (Richey 1982, Booth and Jackson 1997). Anadromous (returning from saltwater) and adfluvial (returning from a lake) salmonids access Coal Creek directly from Lake Washington while the Kelsey Creek basin is connected to Lake Washington by the Mercer Slough wetland complex. Chinook and Sockeye salmon typically enter streams early in September and spawn into late October and early November (Table 2-3). Coho Salmon typically enter in October and spawn through December. Adfluvial Coastal Cutthroat Trout generally enter in early December with spawning continuing through April or May.

The City of Bellevue has monitored salmon spawning activity in Bellevue streams since 1999 by conducting spawning surveys in coordination with professional surveyors that monitor salmon returns throughout the Lake Washington Watershed. Survey data provides a strong foundation for assessing trends in salmon use within Bellevue's streams and allows for comparison to overall salmon returns throughout the Lake Washington basin.

Concurrent with professional surveys, Bellevue streams are monitored by the Bellevue Stream Team Salmon Watchers, a volunteer program where trained volunteers observe stream sites throughout the salmon spawning season. Salmon Watcher data helps document the distribution of spawning adult salmon, timing, and relative abundance. While volunteers do not walk in streams like professional surveyors, they do watch for fish at many locations upstream and downstream of professional survey reaches, in streams that are not part of professional surveys, and on days when the professional surveys are not performed. Salmon Watchers can conduct spot surveys more quickly after high flow storm events that make walking surveys difficult, and often see fish before the professional surveyors or in stream sections located outside of the professional survey reaches. Additionally, some Salmon Watcher sites are concentrated around restoration project sites to better aid in monitoring fish use of habitat and fish passage improvements. The professional salmon survey and volunteer Salmon Watcher data go hand in hand to help us get a better picture of salmon utilization of Bellevue streams.

Bellevue Salmon Watcher opportunities are available each fall and data has been collected since 1988 as part of a regional program. As of 2016, Bellevue is the only jurisdiction continuing with the original program. Historic data for Bellevue and King County can be found at https://kingcounty.gov/services/environment/animals-and-plants/salmon-and-trout/salmon-watchers/reports.aspx

This document reports adult salmonid spawning activity observed in the Kelsey and Coal Creek basins during the years 1999-2022, with particular emphasis on 2022 surveys and observations.

2. SPAWNER SURVEYS AND RESULTS

2.1 PROFESSIONAL SURVEY METHODS

Salmon spawning surveys in Bellevue streams begin in late-August or early-September and are conducted weekly until late December. During the surveys, counts of live and dead fish are enumerated for all salmonid species, and individual redds constructed by Chinook Salmon, Coho Salmon and Cutthroat Trout are recorded using handheld GPS units. Sockeye Salmon redds are not recorded, as this species often spawns close together with numerous overlapping redds that are difficult to accurately differentiate. All salmon carcasses are assessed for length, sex, origin (natural versus hatchery), age, and egg retention. Index reaches were established for Bellevue streams during the early 2000s with various new index reaches later added, including West Tributary Reach-5 and Coal Creek Reach 2 in 2011, Coal Creek Reach A in 2013, and Coal Creek Reach 2B in 2014. Currently, there are ten index reaches delineated in Kelsey Creek (Reach A, 1-7, Wetland, and Trestle), five in the West Tributary (Reach 1-5), one in Richards Creek, and four in Coal Creek (Reach A, 1, 2, and 2b) (Figures 2-1 & 2-2). Professional surveys were only performed in Coal Creek in fall 2022.

2.2 SALMON WATCHERS PROGRAM METHODS

Volunteers are asked to watch their chosen site(s) for at least 15 minutes, twice a week (Figure 2-3). Which sites are observed and for how long changes each year depending on volunteers, weather, and other variables. Volunteers record location, start and end time, fish observed, and additional notes. Prior to 2020, all volunteers attended a 2-hour Salmon Watcher Workshop in-person to learn salmon identification and program instructions. No training was offered in 2020 due to the Covid-19 pandemic so only previously trained volunteers were invited to participate. A 90-minute online training was required in 2021 and 2022 with additional information provided via email. Because some sites may have more than one volunteer and the same fish may be present for multiple days, fish may be counted more than once.

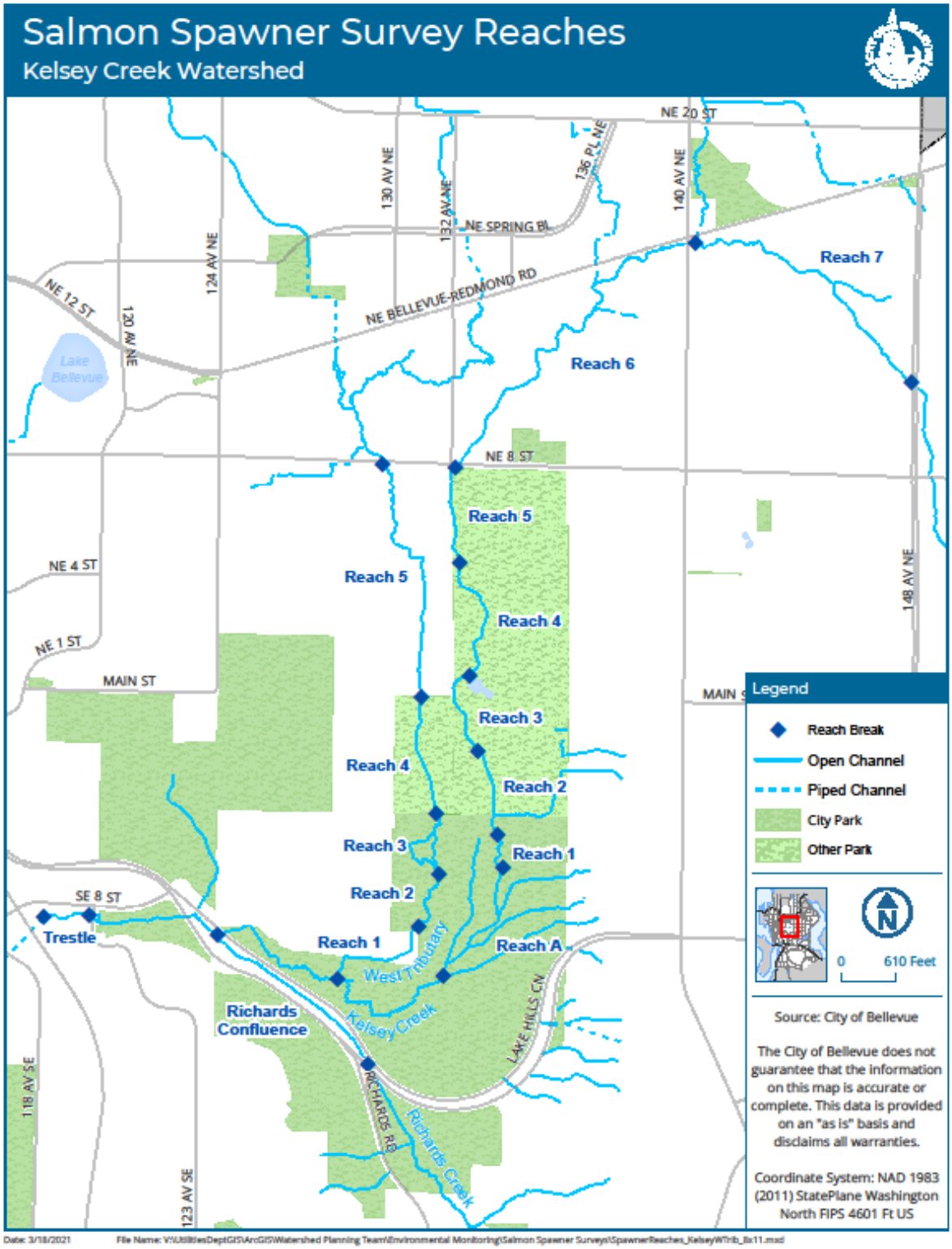

Figure 2-1. Map of survey reaches in the Kelsey Creek Watershed.

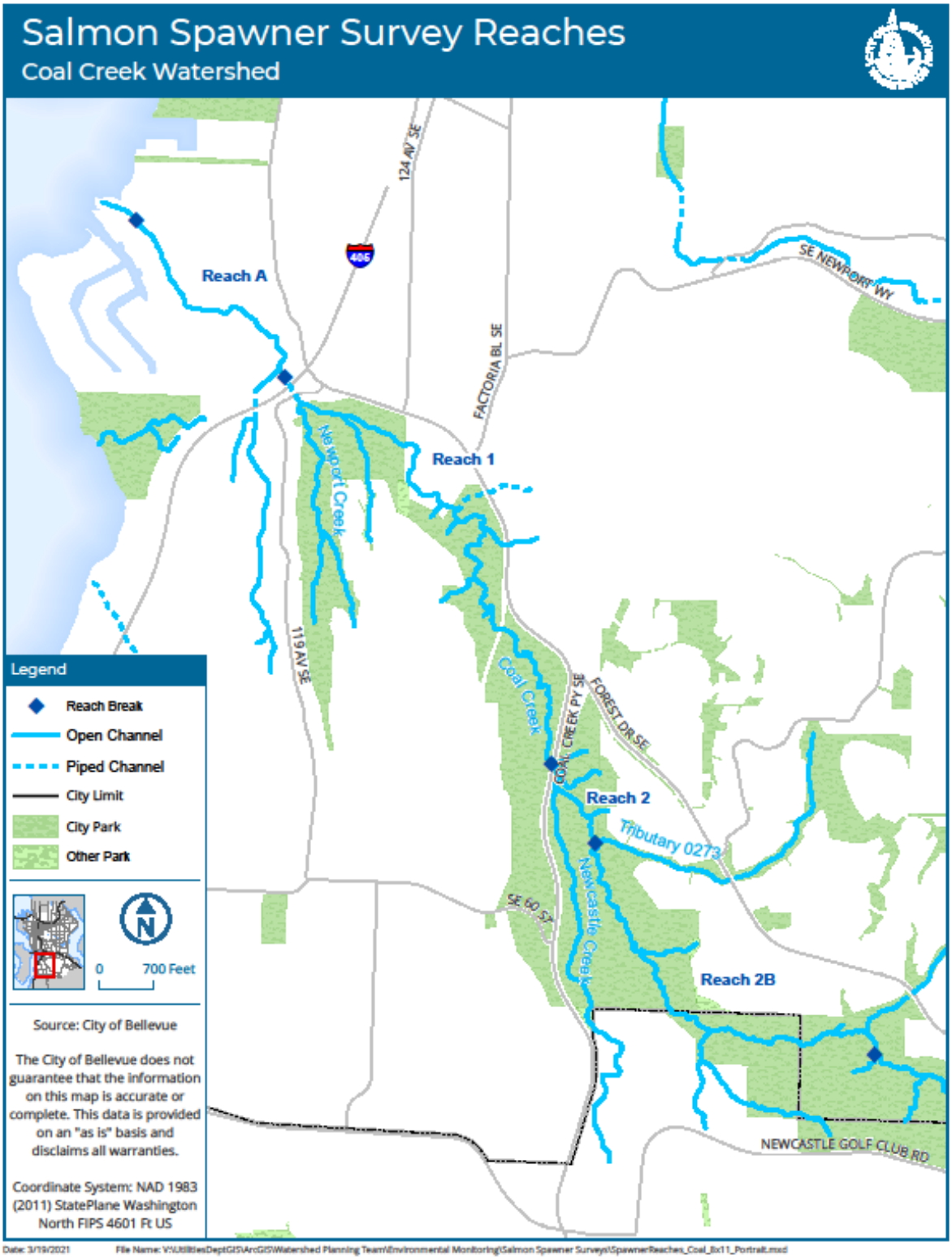

Figure 2-2. Map of survey reaches in the Coal Creek Watershed.

Figure 2-3. Salmon Watcher site locations, City of Bellevue, Washington.

2.3 PROFESSIONAL SURVEY RESULTS

Kelsey Creek Basin (including the West Tributary and Richards Creek): 1999-2021 Results Summary

Chinook Salmon: Adult Chinook Salmon migration in the Kelsey Creek basin typically begins in early September; Chinook Salmon spawning activity begins in early October, peaks in mid-October, and is generally completed by mid-November (Table 2-3). However, Chinook Salmon utilization of the Kelsey Creek basin was not observed between 2018 and 2021 (professional surveyors did not observe any live fish, record redds, or recover any carcasses) (Table 2-1).

Past spawning surveys (beginning in 1999) indicate that large numbers of Chinook Salmon have spawned in the Kelsey Creek basin in some years. The most recent spike in Chinook Salmon spawning activity occurred in 2006 and 2007 when 90 and 77 redds were observed in Kelsey Creek (Table 2-1). However, few Chinook Salmon have been observed in Kelsey Creek during the last 13 years (2008-2021). When Chinook Salmon are present in the Kelsey Creek basin, most spawn in the Kelsey Creek mainstem. Small numbers of Chinook Salmon have been observed spawning in the West Tributary and use of Richards Creek is sporadic.

Sockeye Salmon: Over the last 13-years, the numbers of Sockeye Salmon in Kelsey Creek have consistently been very low or zero (Table 2-1). Like Chinook Salmon, significant numbers of Sockeye Salmon have previously used the Kelsey Creek basin. Professional surveys counted 207 live Sockeye Salmon in 2000 and 430 in 2006 (Table 2-1), demonstrating that the Kelsey Creek basin has supported large numbers of Sockeye Salmon spawners. Sockeye Salmon migration and spawn timing in the Kelsey Creek basin is similar to Chinook Salmon. Adults migrate into the stream during early/mid-September, with spawning peaking in mid-October and generally completing by mid-November.

Coho Salmon: Coho Salmon migration and spawn timing in the Kelsey Creek basin is later than Chinook and Sockeye salmon, with adults typically migrating into the stream during mid-October and spawning mid-November through early-December (Table 2-3). Coho Salmon spawning activity has been observed in the Kelsey Creek basin most years that surveys were conducted (Table 2-1), but the number of Coho Salmon spawning in Kelsey is generally small. In 2013 and 2014 (Table 2-1) surplus adult hatchery Coho Salmon from the Issaquah Hatchery were transported and released into Kelsey Creek (Table 2-4) in an effort to improve natural spawning and smolt production. However, surplus hatchery outplants were unsuccessful and Coho Salmon observations have dropped to the low levels seen in recent years.

Coho Salmon spawning activity in the Kelsey Creek basin can be difficult to document because stream flows are often higher during the late fall/early winter when Coho Salmon spawn, making fish and redds difficult to locate. Additionally, many of the Coho Salmon redds on record were

observed in the upper reaches of Kelsey Creek (above the golf course) in mid-to-late December. Adfluvial Cutthroat Trout are also frequently seen building redds throughout the basin during this time. It is possible that some portion of previously recorded Coho Salmon redds were misidentified Cutthroat Trout redds.

Table 2-1. Summary of fish observations in the Kelsey Creek basin (1999-2021).

Kelsey Creek (including Richards Creek and West Tributary)								
Year	Chinook			Sockeye		Coho		
	Redds	Live Fish	Carcasses	Live Fish	Carcasses	Redds	Live Fish	Carcasses
1999	76	111	117	0	0	0	0	0
2000	1	17	13	207	103	0	18	13
2001	4	9	0	46	10	3	12	7
2002	5	16	12	23	6	0	0	0
2003	0	1	6	1	0	8	14	5
2004	17	20	88	12	6	0	1	0
2005	14	27	37	3	0	1	1	2
2006	90	168	220	430	162	2	2	2
2007	77	221	155	14	5	8	5	9
2008	8	25	38	0	1	12	8	0
2009	5	11	15	4	0	6	3	0
2010	0	1	1	6	0	0	0	0
2011	0	0	1	1	1	0	0	0
2012	0	0	0	0	0	9	30	2
2013	0	1	1	0	0	123*	294*	261*
2014	0	0	0	0	0	0*	138*	91*
2015	0	0	0	0	0	0	0	0
2016	0	0	0	0	0	0	0	0
2017	2	13	10	0	0	22	0	0
2018	0	0	0	0	0	4	0	0
2019	0	0	0	0	0	5	1	0
2020	0	0	0	0	0	3	0	0
2021	0	0	0	0	0	3	0	1
2022	Surveys not conducted in Kelsey Creek in 2022							

(* indicates years when returned Coho Salmon adults were outplanted from the Issaquah Hatchery)

Coastal Cutthroat Trout: Coastal Cutthroat Trout are observed in the Kelsey Creek basin during salmon spawning surveys, but surveys do not extend through the duration of the Cutthroat Trout spawning period (Table 2-3). Adfluvial Cutthroat Trout migrate into the Kelsey Creek basin in

early December and begin spawning shortly thereafter. The end of the Cutthroat Trout spawning period is not well documented in Kelsey Creek, but is likely prolonged, extending through the end of March. Additionally, small resident Cutthroat Trout are present in Kelsey Creek year-round.

Kokanee: Kokanee are adfluvial relatives to Sockeye Salmon and were once prevalent across the Lake Washington/Lake Sammamish basin (Bean 1981). Kokanee were documented in a 1946 survey in Mercer Slough, but the run size was considered "poor" (Garlick 1946). The remaining population of kokanee is now considered to be limited to Lake Sammamish tributaries (Berge and Higgins 2003). None of the surveys documented in this report have observed kokanee spawning activity in Kelsey Creek.

Coal Creek Basin

Chinook Salmon: 2022 was the first year since 2009 that no live Chinook Salmon or carcasses were seen in Coal Creek. Below average rainfall late into the spawning season (only 0.26 inches of rainfall between September 1st and October 21st) may have limited Chinook Salmon passage into Coal Creek this year. The rest of the Lake Washington Basin also experienced mixed returns. Larger than average returns were observed in Issaquah Creek (tributary to Lake Sammamish) while returns to other Lake Washington tributaries (Big Bear, Little Bear, North Creek) were slightly lower than average. Little Bear and North Creeks (tributaries to the Sammamish River and similar in size to Coal Creek) were also affected by drought conditions during the adult migration period and very few Chinook Salmon were observed in these streams in 2022. Small numbers of Chinook Salmon have been observed in Coal Creek most years that surveys have been conducted (Table 2-2). In a typical year, Chinook Salmon adult migration in Coal Creek begins in early September with spawning activity primarily occurring in October (Table 2-3).

Sockeye Salmon: No live Sockeye Salmon or carcasses were observed in Coal Creek in 2022 and the last time they were observed during professional surveys was in 2019 (Table 2-2). Previous years similarly had low or nonexistent Sockeye Salmon returns to the basin. Sockeye Salmon adults have been observed in Coal Creek beginning in early-to-mid September, with spawning activity generally peaking in mid-October and completed by mid-November (Table 2-3).

Coho Salmon: On November 16th, 636 adult Coho Salmon were outplanted from the Issaquah Hatchery. Prior to this outplanting effort, twelve live Coho Salmon, four redds, and two predated, pre-spawn carcasses were recorded (one female, one unknown sex). After the outplant, an additional 114 Coho Salmon redds were recorded. Six of these were located in lower Reach 1 or Reach A and were likely not built by outplanted fish. An additional 409 live Coho Salmon and

105 carcasses were observed in Coal Creek after November 16th (Table 2-2). Of these, 49 were female, 48 were male, and 8 were unknown (carcass was visible in the sedimentation pond but could not be retrieved or examined). Twenty or 41% of the female Coho Salmon were pre-spawn (100% egg retention), twenty-seven were fully spawned (0%) and three were partially spawned. Of the 23 females that were partial or pre-spawn, 11 had signs of predation. Only three of the 107 total carcasses had adipose fins and are presumed to be of natural origin; two of those fish were found in Reaches 2a and 2b amongst the outplanted fish. The number of Coho Salmon that naturally return to Coal Creek is typically small. However, similar outplanting efforts in 2013, 2014, 2019, and 2021 have been implemented (Table 2-4) with the goal of increasing natural spawning and smolt production. In 2022, three Coho Salmon redds were observed in Reach A, five in Reach 1, sixty-one in Reach 2 and forty-nine in Reach 2b. Spawning activity began in early November and culminated in mid-December. Based on redd location and spawn date, at least nine of the Coho Salmon redds were from fish that would likely have naturally returned to Coal Creek, therefore, not associated with the 2022 outplanting effort.

Table 2-2. Summary of fish observations in Coal Creek (2008-2022).

Coal Creek								
Year	Chinook			Sockeye		Coho		
	Redds	Live Fish	Carcasses	Live Fish	Carcasses	Redds	Live Fish	Carcasses
2008	0	0	0	0	0	6	0	3
2009	0	0	0	0	0	0	5	1
2010	1	1	0	0	0	0	1	0
2011	0	0	0	1	0	1	2	1
2012	1	19	1	66	8	2	17	2
2013	3	8	2	1	1	152*	921*	340*
2014	2	1	0	2	0	174*	1032*	210*
2015	2	10	3	0	0	2	8	1
2016	7	13	4	17	8	13	43	15
2017	3	9	8	6	4	21	48	12
2018	0	0	2	0	0	34	39	11
2019	7	21	11	2	0	114*	521*	259*
2020	3	11	9	0	0	7	1	2
2021	3	41	15	0	0	108*	191*	96*
2022	0	0	0	0	0	118*	421*	107*

(* indicates years when returned Coho Salmon adults were outplanted from the Issaquah Hatchery)

Coastal Cutthroat Trout: Adfluvial Cutthroat Trout spawn in Coal Creek beginning in early to mid-December. Like in Kelsey Creek, Cutthroat Trout spawning extends beyond regular surveying efforts, therefore the end time is not well documented. Four live Cutthroat Trout were observed between late November and mid-December on two separate redds in Reach 2b.

Additionally two redds of unknown species were found in Reach 1 in early November. Based on the smaller size of the redds, they were likely built by early adfluvial or resident Cutthroat Trout. It is also possible they could have been incomplete Coho Salmon redds due to the overlapping spawning seasons.

Kokanee: No Kokanee were observed in Coal Creek in 2022. In 2020, a spawning pair of Kokanee were observed in mid-November for the first time since professional surveys began in Coal Creek. Little is known about kokanee spawning in tributaries to Lake Washington, but kokanee spawning in Lake Sammamish tributaries typically occurs between October and January and peaks in late November (Berge and Higgins 2003). Adult kokanee spawners have been observed in other small Lake Washington tributaries including Swamp, McAleer, Lyon, and May Creeks (J. Bower, personal communication).

Table 2-3. Periodicity (timing) of salmonid stream habitat use in the Kelsey Creek and Coal Creek basins.

Species	Life Stage	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sept	Oct	Nov	Dec
Chinook	Adult In-Migration												
	Spawning												
	Egg Incubation/Fry Emerg.												
	Juvenile Rearing												
	Juvenile Out-Migration												
Coho	Adult In-Migration												
	Spawning												
	Egg Incubation/Fry Emerg.												
	Juvenile Rearing												
	Juvenile Out-Migration												
Sockeye	Adult In-Migration												
	Spawning												
	Egg Incubation/Fry Emerg.												
	Juvenile Rearing												
	Juvenile Out-Migration												
Cutthroat Trout	Adult In-Migration												
	Spawning												
	Egg Incubation/Fry Emerg.												
	Juvenile Rearing												
	Juvenile Out-Migration												

Table 2-4. Location and dates of adult Coho Salmon outplanted from Issaquah Hatchery to the Kelsey Creek and Coal Creek basins in 2013, 2014, 2019, 2021, and 2022.

Year	Stream	Dates planted	Planting location	Number of Coho planted
2013	Kelsey Creek	11/13-11/20	Reach A and 1	1,150
	Coal Creek	11/21	Reach 1	742
	West Tributary	11/13	Reach 2	100
2014	Kelsey Creek	10/23-10/24	Reach A and 1	643
	Coal Creek	10/30-11/7	Reach 1	1,573
2019	Coal Creek	11/4-11/14	Reach 1 and 2	1,049
2021	Coal Creek	11/3	Reach 2	598
2022	Coal Creek	11/16	Reach 2	636

2.4 SALMON WATCHERS PROGRAM

Volunteer Salmon Watchers have monitored over 20 different sites along Bellevue streams for salmon over the last decade, 15 of which are consistently surveyed every year. Many of these sites are in the Kelsey Creek and Coal Creek basins, although there are two additional sites on Lewis Creek and one on Vasa Creek. Between 2011 and 2019 Salmon Watchers surveyed for an average of 168.5 total hours. Volunteer numbers and hours between 2020 and 2022 were fewer than previous years due to limited recruitment and training opportunities during the Covid-19 pandemic. Between 2011 and 2022, Salmon Watchers made 5,898 site visits to Bellevue streams, during which they interacted with over 1,370residents. A total of 108 volunteers have participated in the program over the last twelve years (Table 2-5).

Table 2-5. Salmon Watcher volunteer numbers, hours, site visits, and total residents talked to between 2017 and 2022.

Year	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020	2021	2022	Total
Volunteers	33	31	27	21	25	23	23	25	24	14	18	21	108*
Volunteer Hours	205.8	296	183.7	129.7	119.6	114.7	161.9	176.1	128.9	55.98	91.65	82.28	1746
Site Visits	656	762	615	385	434	436	580	653	472	235	361	309	5898
Residents talked to	81	79	119	77	95	134	107	147	192	76	212	58	1377

*108 individual volunteers have submitted data between 2011-2022. Many volunteers return every year, so this total is the sum of individuals without duplications.

Kelsey Creek Basin: Salmon Watchers observed two live Sockeye Salmon in the Kelsey Creek basin in 2022. These were the first Sockeye Salmon observed by volunteers in the area since

2013. Very few spawning salmon have been recorded in Kelsey Creek, its tributaries, or Mercer Slough since 2019 although Chinook Salmon, Coho Salmon, Cutthroat Trout and unidentified fish have been observed in the past (Table 2-6).

Coal Creek Basin: Salmon Watchers reported 182 live Coho Salmon in Coal Creek during the 2022 season. This high number was a direct result of the outplanting event that occurred in November. No other fish were recorded this year, although Chinook Salmon and unidentified salmonids have been frequently seen by volunteers in past years (Table 2-6).

Lake Sammamish Tributaries: Salmon Watchers make additional observations in Lewis Creek and Vasa Creek. No live fish were seen in Lewis Creek in 2022 (Table 2-7). No live fish of any species have been recorded in Vasa Creek, but Lewis Creek supports a population of Lake Sammamish kokanee in some years. In 2021, 14 kokanee were reported in Lewis Creek.

Table 2-6. Salmon Watcher live fish observations in the Lake Washington Tributaries (Kelsey Creek Basin and Coal Creek Basin) between 2011 and 2022. Light gray shading indicated years that Coho Salmon adults were outplanted from the Issaquah Hatchery.

Salmon Watcher Live Fish Observations												
Year	**2011**	**2012**	**2013**	**2014**	**2015**	**2016**	**2017**	**2018**	**2019**	**2020**	**2021**	**2022**
Greater Kelsey Basin & Mercer Slough (Kelsey, West Trib, Richards Creek and Mercer Slough)												
Chinook	1	10	14	0	0	0	12	1	0	0	1	0
Coho	0	0	91	40	0	1	2	0	0	0	0	0
Sockeye	0	1	1	0	0	0	0	0	0	0	0	2
Trout	4	1	8	3	0	0	0	3	0	0	0	0
Kokanee	1	0	0	0	0	0	0	0	0	0	0	0
Unidentified	1	5	17	1	0	0	4	9	0	0	1	0
Total	**7**	**17**	**131**	**44**	**0**	**1**	**18**	**13**	**0**	**0**	**2**	**2**
Coal Creek												
Chinook	0	9	1	0	3	0	10	0	13	0	6	0
Coho	0	14	2	20	1	31	2	4	300	1	74	182
Sockeye	4	36	2	0	0	1	2	0	0	0	0	0
Trout	0	0	0	0	0	0	0	0	0	0	0	0
Kokanee	0	0	0	0	0	0	0	0	0	0	0	0
Unidentified	1	7	0	0	8	13	12	1	37	4	12	0
Total	**5**	**66**	**5**	**20**	**12**	**45**	**26**	**5**	**350**	**5**	**92**	**182**

Table 2-7. Salmon Watcher live fish observations in Lake Sammamish Tributaries. No value indicates no site visits occurred.

Year	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020	2021	2022
Lewis Creek - sites located in City of Issaquah												
Kokanee	*Volunteer data managed by King County prior to 2017*						0	1	0	0	14	0
Vasa Creek												
Kokanee	0	0	0	0	0	0	0		0*		0*	

*Only one observation was recorded (a single site visit conducted) each of these years.

3. SUMMARY

3.1 CHINOOK SALMON USE

The Lake Washington Watershed is inhabited by two of the twenty-two distinct Chinook Salmon populations that make up the Puget Sound Chinook Evolutionary Significant Unit (ESU) (Ruckleshaus et al. 2006), the Sammamish Chinook Salmon population and the Cedar Chinook Salmon population. The Sammamish population primarily spawns in lower Issaquah Creek, Big Bear Creek, and Cottage Lake Creek. Figure 3-2 shows the numbers of naturally spawning Chinook Salmon adults that were observed in the Sammamish River basin between 2000 and 2022. Most (92% in 2022) naturally spawning Chinook Salmon in the Sammamish basin are hatchery-origin spawners (WDFW Salmon Conservation Online Reporting Engine (SCORE)). The Cedar River Chinook Salmon population spawns in the Cedar River and its tributaries, and most naturally spawning adults (74% in 2022) are natural-origin fish (Figure 3-3, WDFW SCORE). Most Chinook Salmon adults entering the Lake Washington basin return to the Issaquah Hatchery (Figures 3-1, 3-3, 3-4).

Overall, Chinook and Coho salmon abundance in the North Pacific has been negatively affected by climate change (Irvine and Fukuwaka 2011) and returns of natural-origin Chinook Salmon have declined in the last 50 years throughout the greater Puget Sound region (Losee et al. 2019). The declining seasonal returns to Bellevue streams are reflective of these regional trends. In 2022, the Sammamish Chinook Salmon population and the Issaquah Hatchery had slightly higher Chinook Salmon returns compared to the last ten years while returns to the Cedar River remained relatively stable (Figure 3-1).

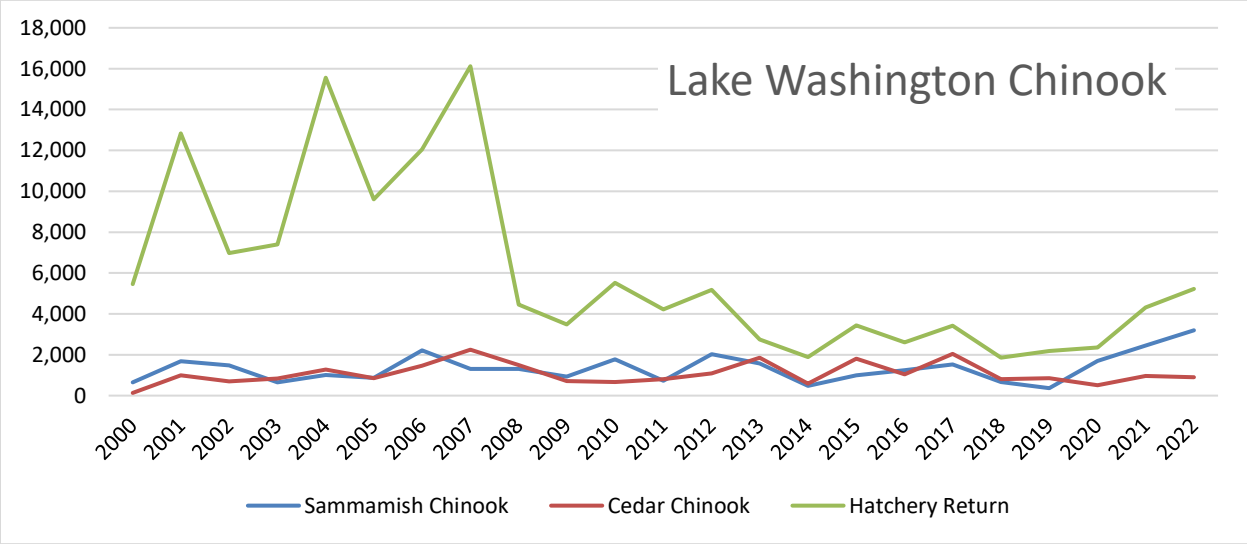

Figure 3-1. Adult Chinook Salmon returns to the Lake Washington Watershed.

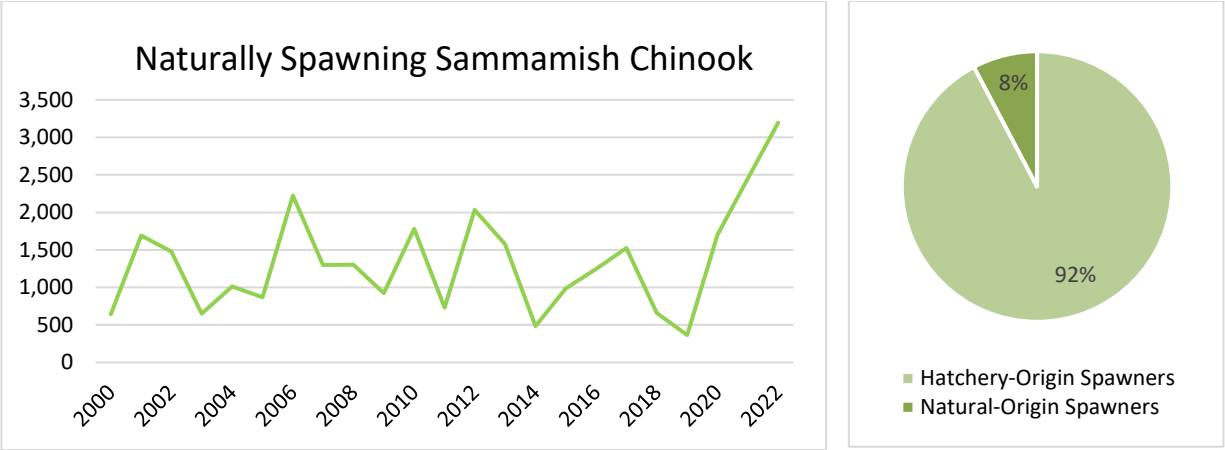

Figure 3-2. Abundance of naturally spawning Chinook Salmon and percent Natural-Origin and Hatchery-Origin spawners in the Sammamish River basin.

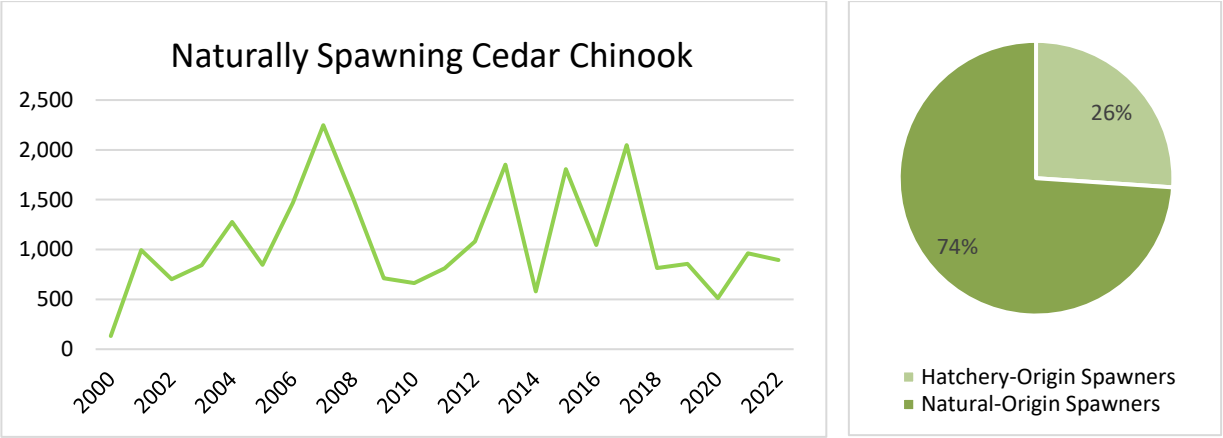

Figure 3-3. Abundance of naturally spawning Chinook Salmon and percent Natural-Origin and Hatchery-Origin spawners in the Cedar River basin.

The number of Chinook Salmon spawning in Kelsey Creek and Coal Creek is affected by the size of the overall Chinook Salmon return (hatchery and natural-origin combined) to Lake Washington and is influenced by the physical characteristics of each stream basin (such as physical barriers to adult migration and water quality impairments). The relatively large Chinook Salmon escapements to the Kelsey Creek basin between 2004 and 2007 were influenced by large overall returns of Chinook Salmon to the Lake Washington Watershed during those years (Table 2-1, Figure 3-1). There were no Coal Creek basin professional surveys conducted between 2004 and 2007, although Salmon Watchers observed six Chinook Salmon in the Coal Creek basin during that time. Carcass surveys from 2006 and 2007 (years when carcass sample sizes were greatest) indicated that approximately 80% of the Chinook Salmon spawning throughout the Kelsey Creek basin were hatchery-origin fish, likely from the Issaquah Hatchery program. The lack of Chinook Salmon spawning activity in the Kelsey Creek basin since 2007 may be influenced by lower overall Lake Washington Watershed returns from 2008 to 2017, however habitat and water quality conditions are more likely inhibiting Chinook Salmon utilization.

Degraded water quality, altered hydrology (including stream channel modifications), dense mats of aquatic vegetation in Mercer Slough, and beaver activity in lower Kelsey Creek in years with low September stream flow during the adult migration period are likely preventing Chinook Salmon from entering Kelsey Creek (Figure 3-4).

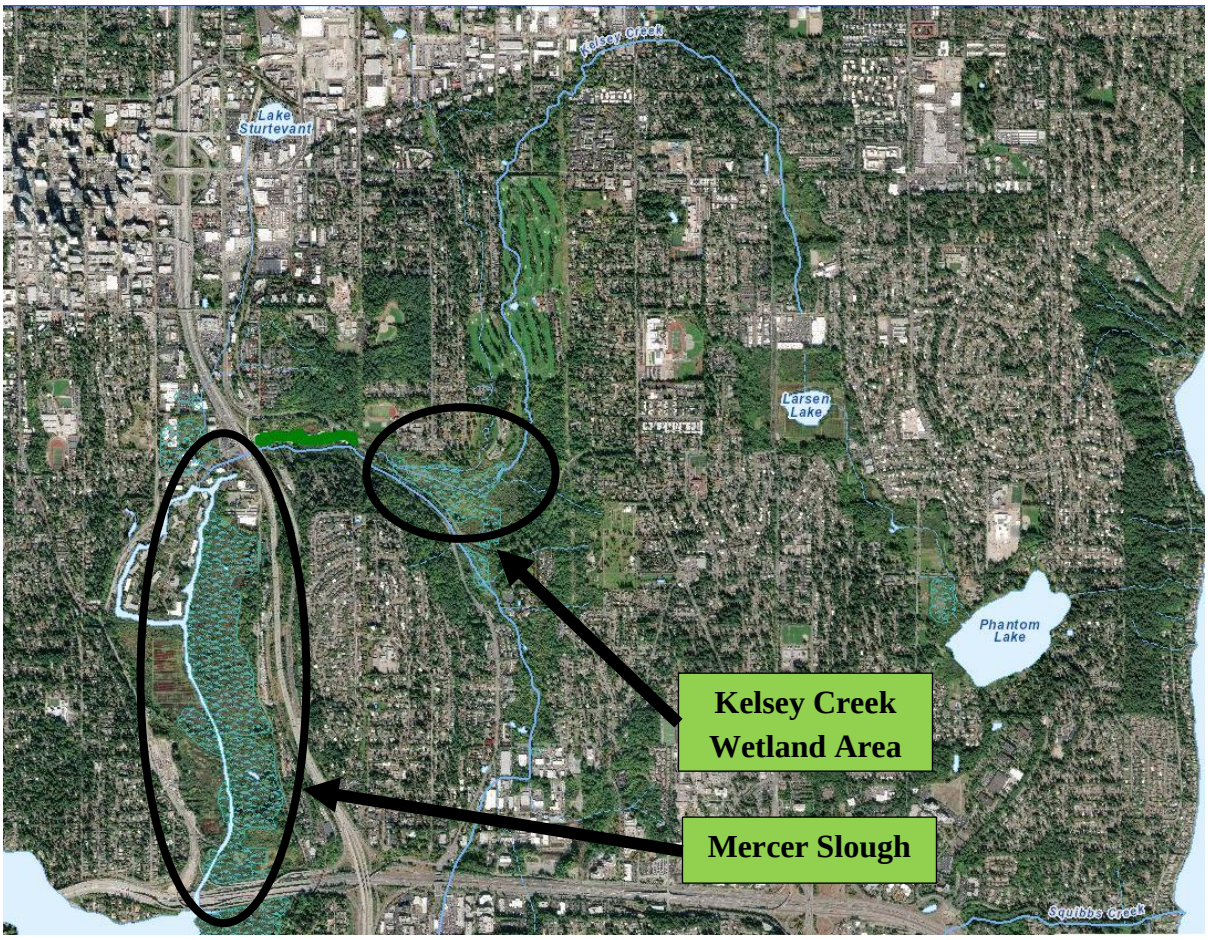

Figure 3-4. Aerial view of Mercer Slough and the lower Kelsey Creek wetlands, areas that may be inhibiting Chinook Salmon migration to upstream spawning areas in some years.

3.2 SOCKEYE SALMON USE

As with Chinook Salmon, the Kelsey Creek and Coal Creek basins provide spawning and rearing habitat for Sockeye Salmon, but do not support self-sustaining populations. Two populations of Sockeye Salmon inhabit the Lake Washington Watershed; a relatively small (1,000-5,000 spawners per year) population that spawns in tributaries to the Sammamish River (Big Bear, Little Bear, Cottage Lake, and North Creeks) and a larger population (10,000-100,000 spawners per year) that spawns in the Cedar River and its tributaries. In addition to the two naturally spawning populations, a hatchery program established in 1991 annually releases between 2 to 20 million Sockeye Salmon hatchery fry into the Cedar River. Most adult Sockeye Salmon returning to the Lake Washington Watershed are natural-origin fish from the Cedar River; adult hatchery-

origin Sockeye Salmon from the Cedar Hatchery are a close second in terms of abundance, and natural-origin Sockeye Salmon returning to the Sammamish River tributaries are a distant third. Historically, between 500 and 5,000 Sockeye Salmon spawned in shallow-water areas with cold water upwelling around Lake Washington (primarily around Mercer Island), however Sockeye Salmon have not been observed spawning along the Lake Washington lakeshore in recent years.

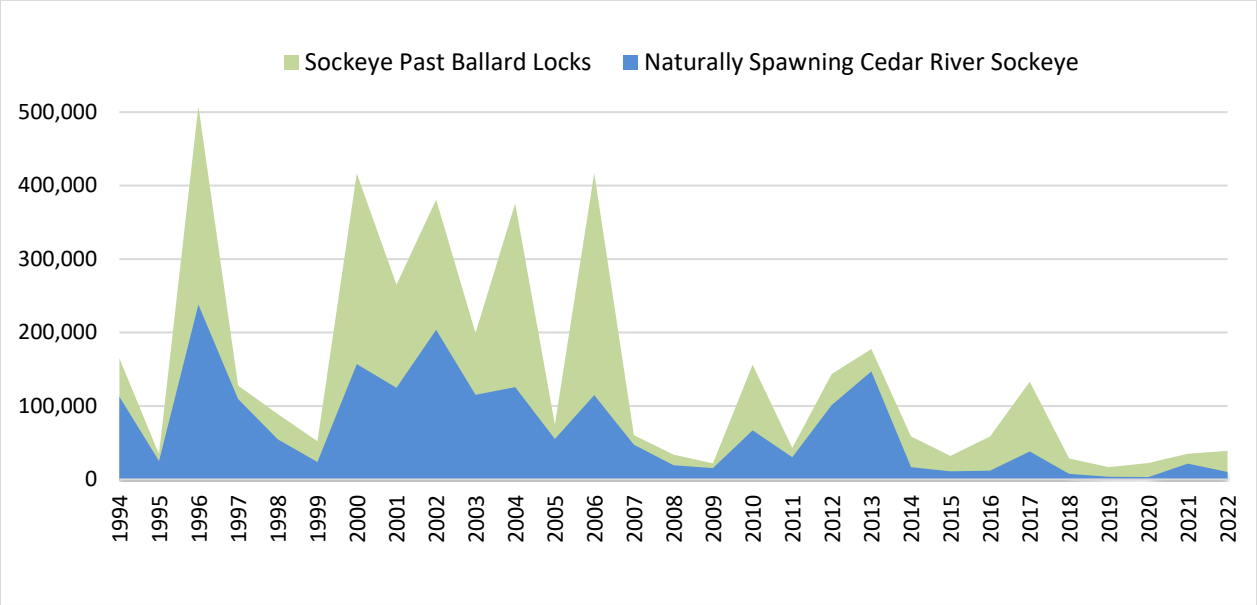

Figure 3-5. Number of Sockeye Salmon adults counted passing through the Ballard Locks (green), and the number of naturally spawning Sockeye Salmon adults observed in the Cedar River (blue).

Sockeye Salmon that use Kelsey and Coal Creeks for spawning are likely adult fish from the Cedar River populations (both natural and hatchery-origin) that strayed into Bellevue streams. Years with higher levels of Sockeye Salmon spawning activity in Kelsey and Coal Creek are likely associated with years when there are large overall Sockeye Salmon returns to Lake Washington. Relatively large numbers of Sockeye Salmon were observed in Kelsey Creek in 2000 and 2006 (Table 2-1), years when there were high overall returns to Lake Washington (Figure 3-5). However, years with high overall Sockeye Salmon returns to Lake Washington do not always translate into increased Sockeye Salmon spawning in Bellevue streams, indicating that local conditions (habitat and water quality conditions or barriers to migration) throughout the Kelsey Creek or Coal Creek basins may also affect the number of returning Sockeye Salmon. In 2002 and 2004, large numbers of Sockeye Salmon returned to Lake Washington, yet relatively small numbers of Sockeye Salmon were observed in the Kelsey Creek basin.

3.3 COHO SALMON USE

Naturally spawning Coho Salmon are not well monitored in the Lake Washington Watershed. Historically, Kelsey Creek and its tributaries were a major producer of Coho Salmon (Report 1948), but populations have declined significantly with increased land use. Infrequent spawning surveys of the basin between 1976 and 1981 found between 3 and 80 returning adult Coho Salmon (Scott et al. 1986, WDFW unpublished data set 1976-1981). Valley Creek, a tributary to Kelsey Creek, particularly contributed to the productivity of the Kelsey Creek basin as a whole. Spawning surveys in 1981 found more Coho Salmon spawners per river mile in Valley Creek compared to Kelsey Creek (Morrice and Johnson 1982). Another study in 1981 found 50 times as many juvenile Coho Salmon per square meter in Valley Creek as the mainstem of Kelsey Creek (Scott et al 1986).

Less information is known about the historical Coho Salmon populations in Coal Creek. Coal tailings from the coal mining in the basin significantly decreased existing fish populations in the late 1800s (Report 1948). Coho Salmon were transplanted from the Issaquah Hatchery in the mid-1940s to help restore a natural run (Report 1948) and from 1994-1997 between 9,000 and 13,800 juvenile Coho Salmon were planted by WDFW (Kerwin 2001). Broadly, wild populations of Coho Salmon have declined significantly throughout the Puget Sound (Losee et al 2019). Natural Lake Washington Coho Salmon escapement peaked at over 30,000 in 1970 (Fresh [c.1990]), however fish counts at the Ballard Locks indicate that in recent years 85-90% of adult Coho Salmon entering the Lake Washington system are hatchery-origin fish returning to Issaquah Hatchery (Figure 3-6). Coho Salmon that utilize habitat throughout the Kelsey and Coal Creek basins are likely a combination of hatchery-origin adults from the Issaquah Hatchery program and small numbers of naturally spawned fish from these basins.

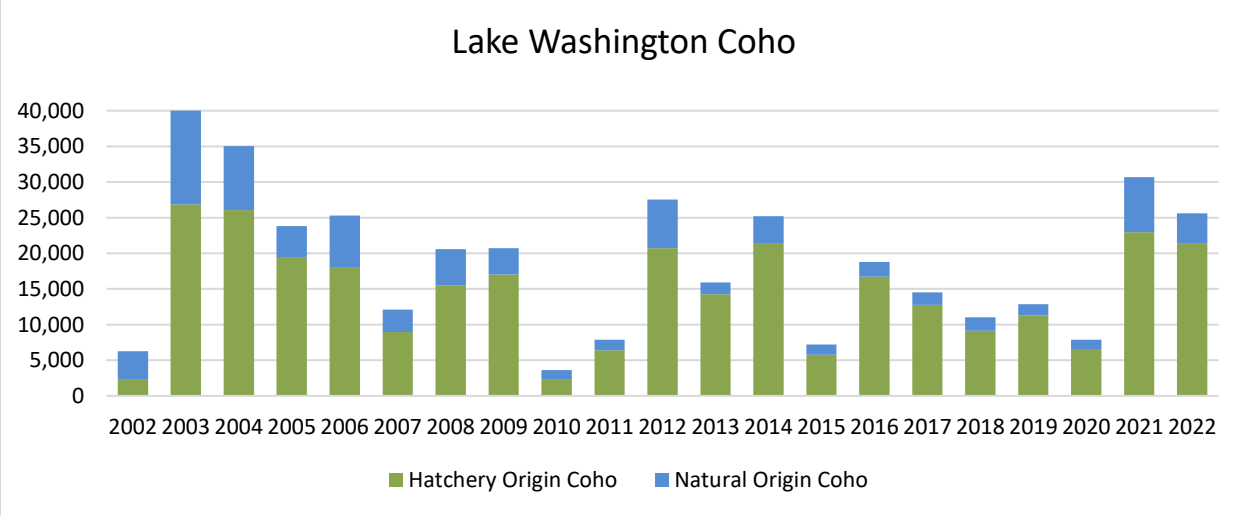

Figure 3-6. Lake Washington Coho Salmon returns (Natural-Origin and Hatchery-Origin) based on fish counts at Ballard Locks from 2002 through 2022.

Bellevue streams may be supplemented by the release of small numbers of Coho Salmon fry raised from eggs donated by the Issaquah Hatchery in partnership with educational Salmon in the Classroom programs and private individuals. Most allocations are marginal; about 200 eggs for classroom programs and 5,000 eggs for two private incubation projects, one located in Reach 7 of Kelsey Creek and second located near the mouth of Coal Creek. It is expected that these educational Coho Salmon fry releases typically experience poor survival to adulthood. Hatchery-origin Coho Salmon fry released from these sites are not marked and therefore any returning adults would be counted as natural-origin fish.

In 2013, 2014, 2019, 2021, and 2022 the City of Bellevue worked with the Muckleshoot Indian Fisheries staff to release adult Coho Salmon from the Issaquah Hatchery to the Kelsey and Coal Creek basins. There was poor spawning success for fish released to the Kelsey Creek basin (Table 3-1).

Table 3-1. Total number of outplanted male, female, and jack Coho Salmon in Kelsey Creek per year and their spawning success (number of redds/number of females).

Kelsey						
Year	**Females**	**Males**	**Jacks**	**Male + Female Total**	**Redds**	**Spawning Success**
2013	NA	NA	NA	1150	123	NA
2014	294	349	0	643	0	0.0%

In comparison, releases in Coal Creek had spawning success rates (the proportion of females that built redds) that ranged between 21.4% and 44.0% over the five years that outplanting occurred (Table 3-2). The higher-than-average adult Coho Salmon returns to Bellevue streams (especially Coal Creek) observed in 2016 and 2017 were likely a result of the hatchery Coho Salmon adult outplanting that occurred in 2013 and 2014 (Table 2-4).

Table 3-2. Total number of outplanted male, female, and jack Coho Salmon in Coal Creek per year and their spawning success (number of redds/number of females).

Coal						
Year	**Females**	**Males**	**Jacks**	**Male + Female Total**	**Redds**	**Spawning Success**
2013	NA	NA	NA	742	152	NA
2014	540	1032	1	1572	173	32.0%
2019	533	516	NA	1049	114	21.4%
2021	263	335	50	598	108	41.1%
2022	248	285	103	533	109	44.0%

This suggests Bellevue streams are capable of producing natural-origin Coho Salmon through good in-gravel survival and juvenile rearing, and that the practice of using adult transplants from

Issaquah Hatchery may be an effective tool for augmenting Coho Salmon returns in these streams in future years.

Coho Salmon are considered an important sentinel species for stormwater and water quality in urban streams (Spromberg and Scholz 2011). Observations of Coho Salmon pre-spawn mortality and impaired swimming ability (loss of equilibrium, circular surface swimming, gaping, and immobility) have been linked to urban areas with more roads and impervious surfaces (Feist et al. 2018). These symptoms can affect as much as 90% of the returning fall run in urbanized areas (Spromberg and Scholz 2011). Recently, researchers from the Center for Urban Waters in Tacoma, the University of Washington, and Washington State University were able to identify that a chemical biproduct of automobile tires leaching onto roadways is the source of the observed Coho Salmon mortality (Tian et al. 2020). Proper filtration of stormwater through soil systems can mitigate the effects of the pollutants (Spromberg et al. 2016) but these mitigation strategies are not widely used at this time. Investigating options to improve water quality and stream habitat in Bellevue streams may be vital to improving the success of Coho Salmon returns in the future.

3.4 COASTAL CUTTHROAT TROUT AND KOKANEE USE

Coastal Cutthroat are common in Bellevue streams, particularly the Kelsey Creek basin where they have been found to be the most prevalent salmon species that spawn in the basin (Scott et al. 1986). Spawning surveys are not well documented for Cutthroat Trout, and their exact use of Bellevue streams is not well known. However, they are considered to be abundant in Lake Washington and have a great enough population to support year-round sport fisheries. Their presence and overlapping run time with Coho Salmon may also have inflated past assessments of Coho Salmon redds and may be worth further investigation.

The 1946 Washington Department of Game surveys reported the Kokanee run in Coal Creek as “excellent” and documented a “poor” run in Mercer Slough (Garlick 1946), but there is very little information about Kokanee spawning in Bellevue streams since that time. It is widely considered that the one prevalent Lake Washington/Lake Sammamish Kokanee population has been reduced from three historic runs, to one exceptionally small population that exclusively spawns in Lake Sammamish tributaries (Berge and Higgins 2003). A spawning pair discovered in Coal Creek Reach A in 2020 was exceptional and is important to note.

3.5 COMPARISONS WITH SALMON WATCHER OBSERVATIONS

Salmon Watcher data is generally consistent with professional salmon spawning surveys but allows for a greater observation area. This is particularly true now that professional spawning surveys have ceased in the Kelsey Creek basin with the adoption of a new EMP Implementation

Plan. Data collected by volunteers is a cost-effective way to continue to observe the basin and may help determine if future professional surveys should resume. In several cases, Salmon Watchers have observed fish presence that the professional surveys did not record. One example is the kokanee returns observed in Lewis Creek (stream site 327), a known spawning location of the remaining population in Lake Sammamish. Another important Salmon Watcher observation was made upstream of the professional survey reaches in West Tributary in 2018. While those fish were not positively identified to species, reported behavior and timing suggest that they were likely Coho Salmon. In Coal Creek, the timing of Salmon Watcher observations generally matches professional survey observations, but species identification has not always been consistent. Chinook, Sockeye and Coho salmon may all be present concurrently in Coal Creek and volunteers can have difficulty differentiating between them. Salmon Watchers are also more likely to report a sighting as an unknown species. However, general descriptions and comparisons to the professional spawning surveys can inform the most likely identification, making this information valuable.

3.6 RECOMMENDATIONS

Maintaining and restoring streams and riparian corridors is an increasingly difficult task in urban stream systems like the Kelsey and Coal Creek basins. Sustaining and restoring natural stream processes that support salmon life stages maintains public interest and inspires people to work toward preserving this important natural resource. The following recommendations, used in conjunction with on-going stream environmental monitoring, will help maintain and enhance interest in restoring naturally producing salmon and restoring salmon spawning and rearing habitat in Bellevue streams.

- Continue support of Bellevue Utilities Environmental Monitoring Program.

- Support and implement projects, programs and policies identified in the fourth coming City Watershed Improvement Plan (2023) and forthcoming Watershed Management Plan to help improve the health of Bellevue Streams.

- Continue monitoring adult salmon returns in Coal Creek using professional weekly surveys, and in the Greater Kelsey Creek Watershed using volunteer programs and/or streamside property owner observations.

- Monitor conditions in Mercer Slough and the Kelsey Creek fish ladder to ensure there is unimpeded fish passage during the adult migration season (mid-August through October).

- Encourage property owner best management practices for overall watershed health, with specific emphasis on streamside properties (i.e. riparian plantings, eliminating use of pesticides/herbicides, discourage riprap/velocity increasing bank armoring, cleaning up after pets, keep pets out of streams, limit access points to reduce disturbance/erosion, etc.).

- Encourage invasive species management, community awareness, and control efforts, specifically for reducing the spread of New Zealand Mudsnails and knotweed, but also for other new and emerging non-native species (e.g. Asian Clawed Frog).

- Continue to release Coho Salmon adults from the Issaquah Hatchery to the Coal Creek basin to encourage natural spawning and smolt production.

- Provide outreach opportunities for the general public about salmon utilization of Bellevue streams, how they can contribute to the success of salmon and reduce the effects of urbanization on our streams and watersheds.

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5. APPENDIX

Table 5-1. Volunteer observers who reported data during the 2011-2022 seasons.

Peggy Albin	Audrey Gao	Ed Niblock
Marisol Asselta	Preston Glidden	Steve Palmen
April Atwood	Laurie Gogic	Betty Peltzer
Kathleen Auld	Doug Greaves	Cindy Reed
Ruth Bacha	Ron Green	David Reitz
Hilary Barnes	Faye Haas	Kevin Ruuhela
Diane Bell	Erica Halford	Phil Sandifer
Bryan Bendix	Cameron Haslam	Martha Schindler
Marilyn Blue	Evelyn Heath	Henry Shirinyan
Tom Blue	Jana Hindman	Neil Skilton
Cindy Boyer	Neal Hines	Tim Skilton
Richard Brashen	Jeff Hsia	Mary Smith
Joe Carrol	Bev Jennings	Scott Smouse
Heather Chaney	Jeremy Jones	John Spilker
Eric Chaney	Kevin Jones	Brent Spurgeon
James Chaney	Leah Juhle	Catherine Spurgeon
Michael Chaney	Tatsu Komada	John Stephenson
Kellene Collins	Janusz Komorowski	Becky Stephenson
Kate Conant	Tommy Kraft	Gregg Takamura
Paul Cooper	Debra Kumar	Surys Tewari
Nancy Daar	Dylan Larrivee	Roshni Tewari
Karen Dawson	Jim Laughlin	Lew Thorson
Harriet Dempsey	Rich Leighton	Gazel Tan
Lisa Denbeste	Ken Mackey	Krys Tierney
Tianmin Ding	Kurt Manning	Kay Tokuda
Siyao Ding	Alina Marshall	Gary Tribble
Carol Druse	Maria Marshall	Carla Trsek
Greg Druse	Lynn McKay	Calvin Wang
Harry Dursch	Krys McMahon	Leslie Waters
Art Eash	Jim McRoberts	Nancy Weisel
Ilya Elkin	Jeff Mendenhall	Barb Williams
Gary Emerson	Dave Mickelson	Steve Williams
Kelly Fine	Chris Mitchell	Gregg Wilson
Ernie Frankenberg	Mary Alice Moran	Karen Winter
Hon Cheung Fung	Danny Murray	Kyoko Yoshikawa
Jeannette Gaines	Anna Murray	Jon Aaron Yurchak

Table 5-2. Counts of live, dead, and redds for Chinook Salmon in Bellevue streams for years 1999-2022.

Bellevue Streams Chinook		AUG	SEPTEMBER				OCTOBER					NOVEMBER				DECEMBER				JANUARY		TOTALS
		Week 35	Week 36	Week 37	Week 38	Week 39	Week 40	Week 41	Week 42	Week 43	Week 44	Week 45	Week 46	Week 47	Week 48	Week 49	Week 50	Week 51	Week 52	Week 1	Week 2	
Live	1999					11		69	31													111
	2000				0	1	4	4	3	2	1	2	0	0	0	0	0					17
	2001						4	1	1	1	2	0	0	0	0	0	0	0	0			9
	2002			0	1	4	0	5	3	2	0	1	0	0	0	0	0					16
	2003					0	0	0	1	0	0	0	0	0	0	0	0	0	0			1
	2004			0	2	0	0	2	2	9	2	3	0	0	0	0						20
	2005		0	3	2	2	11	2	3	2	2	0	0	0	0	0	0	0				27
	2006				12	29	10	35	51	31	0		0	0	0		0					168
	2007		5	3	15	17	55	72	23	22	9	0	0	0	0	0	0	0				221
	2008					6	9	2	6	2	0	0	0	0	0	0	0	0	0			25
	2009	0	0	1	3	0	3	2	2	0	0	0	0	0	0	0	0	0	0	0		11
	2010			0	0	0	0	1	0	1	0	0	0	0	0	0	0	0	0	0	0	2
	2011		0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0			0
	2012			0	0	0	0	0	5	3	4	5	0	0	2	0	0	0	0			19
	2013			1	0	1	6	0	0	0	0	0	1	0	0	0	0	0	0	0		9
	2014			0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0		1
	2015		0	0	0	0	1	0	5	4	0	0	0	0	0	0		0	0	0		10
	2016		0	0	0	1	0	1	2	6	2	1	0									13
	2017		0	0	0	0	4	8	6	4	0	0	0		0	0	0	0	0	0		22
	2018		0	0	0	0	0	0	0	0	0	0	0									0
	2019		0	1	0	6	8	4	0	2	0	0	0	0	0	0	0	0	0			21
	2020		0	0	0	0	8	1	2	0	0	0	0	0	0	0	0	0	0		0	11
	2021		0	0	0	3	12	18	8	0	0	0	0	0	0	0	0	0				41
	2022			0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0			0
Carcass	1999					5		39	73													117
	2000				0	0	1	3	2	3	3	1	0	0	0	0	0					13
	2001						0	0	0	0	0	0	0	0	0	0	0	0	0			0
	2002			0	1	1	0	0	4	6	0		0	0	0	0	0					12
	2003					0	0	0	0	3	1	2	0	0	0	0	0	0	0			6
	2004			0	2	2	4	0	5	22	8	37	8	0	0	0						88
	2005		0	1	2	0	13	8	9	2	1	1	0	0	0	0	0	0				37
	2006				23	18	17	22	84	37	17		1	0		1	0						220
	2007		1	0	5	7	15	18	64	24	16	4	1	0	0	0	0	0				155
	2008					6	4	20	2	2	1	2	0	1	0	0	0	0	0			38
	2009	0	0	0	1	1	4	5	3	0	1	0	0	0	0	0	0	0	0	0		15
	2010			0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	1
	2011		0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0			1
	2012			0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0			1
	2013			0	0	0	2	0	1	0	0	0	0	0	0	0	0	0	0	0		3
	2014			0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0		0
	2015		0	0	0	0	0	0	1	1	0	0	0	0	1	0		0	0	0		3
	2016		0	0	0	0	1	0	0	0	3	0	0									4
	2017		0	0	0	0	1	5	6	6	0	0	0		0	0	0	0	0	0		18
	2018		0	0	1	0	0	1	0	0	0	0	0									2
	2019		0	0	0	7	0	0	0	0	2	0	0	0	0	0	0	0	0			9
	2020		0	0	0	0	2	5	0	1	1	0	0	0	0	0	0	0	0		0	9
	2021		0	0	0	1	1	9	4	0	0	0	0	0	0	0	0	0				15
	2022			0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0			0
Redd	1999					1		45	30													76
	2000											1										1
	2001						1	0	1	0	1	0	1	0	0	0	0	0	0			4
	2002			0	0	0	0	1	1	3	0	0	0	0	0	0	0					5
	2003					0	0	0	0	0	0	0	0	0	0	0	0	0	0			0
	2004			0	0	0	0	1	3	10	1	2	0	0	0	0						17
	2005		0	0	0	0	3	4	5	2	0	0	0	0	0	0	0	0				14
	2006				4	10	14	12	36	12	2		0	0	0		0					90
	2007		0	0	0	4	9	34	15	12	3	0	0	0	0	0	0	0				77
	2008					0	4	2	0	2	0	0	0	0	0	0	0	0	0			8
	2009	0	0	0	0	0	0	0	0	2	1	0	0	0	0	0	0	0	0	0		3
	2010			0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	1
	2011		0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0			0
	2012			0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0			1
	2013			0	0	0	1	0	1	0	0	0	1	0	0	0	0	0	0	0		3
	2014			0	0	0	2	0	0	0	0	0	0	0	0	0	0	0	0	0		2
	2015		0	0	0	0	0	0	1	1	0	0	0	0	0	0		0	0	0		2
	2016		0	0	0	0	2	0	2	2	1	0	0									7
	2017		0	0	0	0	1	1	1	2	0	0	0		0	0	0	0	0	0		5
	2018		0	0	0	0	0	0	0	0	0	0	0									0
	2019		0	0	0	2	4	0	0	0	1	0	0	0	0	0	0	0	0			7
	2020		0	0	0	0	3	0	0	0	0	0	0	0	0	0	0	0	0		0	3
	2021		0	0	0	1	0	2	0	0	0	0	0	0	0	0	0	0				3
	2022			0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0			0

Color indicates a survey was performed.

Table 5-3. City of Bellevue anadromous salmonid spawning ground survey implementation information (1999-2022).

Year	Kelsey Creek	West Tributary	Richards Creek	Coal Creek	Data Format	Surveyor	Reporting Agency
1999	X				Excel	?	
2000	X		X		Excel	?	
2001	X	X	X	X	SGS / Excel	Taylor Assoc.?	
2002	X	X	X		Excel	Watershed Co.	Watershed Co.
2003	X	X	X		Excel	Watershed Co.	Watershed Co.
2004	X	X	X		Excel	Watershed Co.	Watershed Co.
2005	X	X	X		Excel	Watershed Co.	Watershed Co.
2006	X	X	X		Excel	Watershed Co.	Watershed Co.
2007	X	X	X		Excel	Watershed Co.	Watershed Co.
2008	X	X	X	X	Excel	Watershed Co.	Watershed Co.
2009	X	X	X	X	Excel	Watershed Co.	Watershed Co.
2010	X	X	X	X	SGS / Excel	WDFW	
2011	X	X	X	X	SGS / Excel	WDFW	Anchor QEA
2012	X	X	X	X	SGS / Excel	WDFW	
2013	X	X	X	X	SGS / Excel	WDFW	
2014	X	X	X	X	SGS / Excel	WDFW	
2015	X	X	X	X	SGS / Excel	WDFW	
2016	X	X	X	X	SGS / Excel	WDFW	
2017	X	X	X	X	SGS / Excel	WDFW	WDFW
2018	X	X	X	X	SGS / Excel	WDFW	
2019	X	X	X	X	SGS / Excel	WDFW	WDFW
2020	X	X	X	X	SGS / Excel	WDFW	WDFW
2021	X	X	X	X	SGS / Excel	WDFW	Bellevue/WDFW
2022				X	SGS / Excel	WDFW	WDFW

Source: WDFW Spawning Ground Survey (SGS) database, Anchor 2012, The Watershed Company 2008.

Table 5-4. Survey Reach Descriptions.

Stream	Reach	Reach Description	RM Start	RM Stop
Kelsey Creek	Trestle	I-405 to 121st Ave SE	1.9	2.0
Kelsey Creek	Wetland	Lake Hills Connector to Kelsey Creek Farm	2.2	2.4
Kelsey Creek	Reach A	Kelsey Creek Farm to footpath on right.	3.0	3.2
Kelsey Creek	Reach 1	Foot path on right to Kelsey Creek Park footbridge.	3.2	3.4
Kelsey Creek	Reach 2	Footbridge to third bridge on golf course.	3.4	3.6
Kelsey Creek	Reach 3	Third golf course bridge to first cement weir/pump house on river left.	3.6	3.8
Kelsey Creek	Reach 4	First cement weir to brown bridge with stone posts.	3.8	4.0
Kelsey Creek	Reach 5	Brown bridge with stone posts to NE 8th St culvert.	4.0	4.4
Kelsey Creek	Reach 6	NE 8th St (at 132nd) to Valley Creek/140th Ave NE.	4.4	5.1
Kelsey Creek	Reach 7	Valley Creek/140th Ave NE to 148th Ave NE.	5.1	5.8
Richards Creek	Confluence	Confluence with Kelsey Creek to intersection of Lake Hills Connector Rd and Richards Rd.	0.0	0.3
West Tributary	Reach 1	Confluence with Kelsey Creek to first footbridge in Kelsey Creek Park.	0.0	0.3
West Tributary	Reach 2	First footbridge to second footbridge.	0.3	0.5
West Tributary	Reach 3	Second footbridge to golf course boundary.	0.5	0.7
West Tributary	Reach 4	Golf course southern boundary to northern boundary.	0.7	0.9
West Tributary	Reach 5	Private property to NE 8th St.	0.9	1.3
Coal Creek	Reach A	Skagit Key to I-405 culvert.	0.0	0.6
Coal Creek	Reach 1	I-405 (119th Ave SE) to Coal Creek Parkway.	0.7	2.2
Coal Creek	Reach 2	Coal Creek Parkway to first footbridge on left (second tributary on the left when walking upstream).	2.2	2.4
Coal Creek	Reach 2b	First footbridge to third footbridge.	2.4	3.5