
**Alaska Department of Fish and Game Report to the Kodiak-
Aleutian Islands Subsistence Regional Advisory Council: Buskin
River Sockeye Salmon Fishery and Stock Assessment Project
Update through December 31, 2021**

**By
Mark Witteveen**



January 2022

Alaska Department of Fish and Game

Division of Sport Fish

INTRODUCTION

The Buskin River drainage, located on Kodiak Island approximately 2 miles southwest from the city of Kodiak, traditionally supports the single largest subsistence salmon fishery within the Kodiak/Aleutian Islands Region. The fishery occurs in nearshore marine waters adjacent to the river mouth and targets several species of salmon, although sockeye salmon typically comprise about 70% of the total subsistence harvest (Table 1). Between 2016 and 2020, federally qualified subsistence users harvested an average of 2,742 Buskin River sockeye salmon, which accounted for 34% of the total federal subsistence sockeye salmon harvest reported for Kodiak Island (Table 2).

During 2008 and 2009, low sockeye salmon escapement on the Buskin and closure of the subsistence fishery prompted subsistence users to fish elsewhere, however, participation and harvests have increased significantly since then, corresponding with rebounding sockeye salmon returns to the Buskin River drainage (Table 3). During 2018, the Buskin River sockeye salmon run was well below average and virtually no subsistence harvest occurred. In 2019 and 2020, the sockeye salmon run rebounded; however, it was still lower than previous years. During 2021, the sockeye salmon was the lowest on record and escapement failed to meet the lower end of the goal despite subsistence, sport, and commercial fisheries closures. Historically, 40 to 50% of the sockeye salmon harvest in the Kodiak area has come from the Buskin fishery and half of all permit holders in the region report fishing the Buskin area.

Table 1.- Buskin River drainage reported subsistence salmon harvest by species, 2016-2020^a.

Year	Permits	Reported Subsistence Harvest									
		<u>Chinook</u>		<u>Sockeye</u>		<u>Coho</u>		<u>Pink</u>		<u>Chum</u>	
		No. Fish	% of Total	No. Fish	% of Total	No. Fish	% of Total	No. Fish	% of Total	No. Fish	% of Total
2016	255	15	<1%	4,743	89%	496	9%	96	2%	8	<1%
2017	242	11	<1%	4,916	93%	300	6%	60	1%	6	<1%
2018	108	1	<1%	473	29%	1,107	69%	26	2%	0	0%
2019	111	4	<1%	836	62%	340	25%	145	11%	31	0%
2020	163	8	<1%	1,620	64%	760	30%	152	6%	4	0%
Average	281	17	<1%	3,891	67%	865	28%	106	4%	8	<1%

^a Source: ADF&G Division of Commercial Fisheries, Kodiak. 2021 data unavailable.

Table 2.- Kodiak Area reported federal subsistence harvest of sockeye salmon by location, 2016-2020^a.

Location	2016	2017	2018	2019	2020	2016-2020 avg.
Buskin River	4,743	4,916	473	836	1,620	2,742
Old Harbor/Sitkalidak	473	298	20	67	73	234
Alitak Bay	201	495	204	262	125	349
Karluk	679	107	152	72	2,245	562
Larsen Bay/Uyak Bay	680	410	866	504	533	656
Uganik Bay	336	277	245	291	44	312
Afognak Bay	4,282	1,882	483	1,026	1,329	1,816
Remainder Afognak Island	2,008	2,050	1,392	1,094	1,971	1,815
Total	13,402	10,435	3,835	4,152	7,940	7,953

^a Source: ADF&G Division of Commercial Fisheries, Kodiak. 2021 data unavailable.

Table 3.- Federal subsistence harvest locations in the Kodiak Area by number of permits fished, 2016-2020^a.

Location	2016	2017	2018	2019	2020	2016-2020 avg.
Buskin River	255	242	108	109	163	175
Old Harbor/Sitkalidak	13	15	8	3	6	9
Alitak Bay	4	6	6	6	2	5
Karluk Village	10	5	4	3	18	8
Larsen Bay/Uyak Bay	14	16	18	12	22	16
Uganik Bay	18	16	20	17	2	15
Afognak Bay	115	79	50	66	71	76
Remainder Afognak Island	56	35	34	17	36	36
Total Number issued	1,798	1,429	1,289	1,205	1,324	1,409

^a Source: ADF&G Division of Commercial Fisheries, Kodiak. 2021 data unavailable.

In 2000, in order to ensure sustained sockeye salmon production over time, a stock assessment study was initiated by Alaska Department Fish and Game (ADF&G) on the Buskin River. It was funded by the United States Fish and Wildlife Service, Office of Subsistence Management with the goal to establish a Biological Escapement Goal (BEG) for the sockeye salmon run on the Buskin River. The BEG is based on a population model which incorporates annual escapement and harvest figures with the age composition of annual returns to estimate the total production of each year of spawning (known as a brood table). Samples of male to female ratios, average length and age classes are collected each year over the course of the run from the escapement and the subsistence harvest. The current escapement goal range is set at 5,000 - 8,000 sockeye salmon and is used for management of the subsistence, sport, and commercial fisheries to ensure a sustained yield from the population. An annual sockeye salmon escapement objective for Catherine and Louise lakes (reported as Lake Louise) has not yet been established.

Sockeye salmon escapements are annually enumerated through inseason counts of adult fish migrating into the drainage. A salmon counting weir located on Buskin River has been operated by ADF&G for this purpose since 1985. In 2002, a second weir was installed on a tributary stream flowing into the Buskin River from Catherine and Louise lakes.

2021 PROGRESS REPORT

ESCAPEMENT

Through September 29, the count of sockeye salmon at the Buskin River was 2,330 fish. This is the lowest escapement on record and well below the escapement goal range of 5,000 to 8,000 fish (Figure 1). The Buskin River weir, located at the outlet of Buskin Lake, was operational on May 17 and was removed on August 4. A weir associated with a separate project was installed in the lower portion of the river on August 1 and sockeye salmon continued to be counted through September 29. The 2021 run was very late compared the average of the past 5 years (Figure 2).

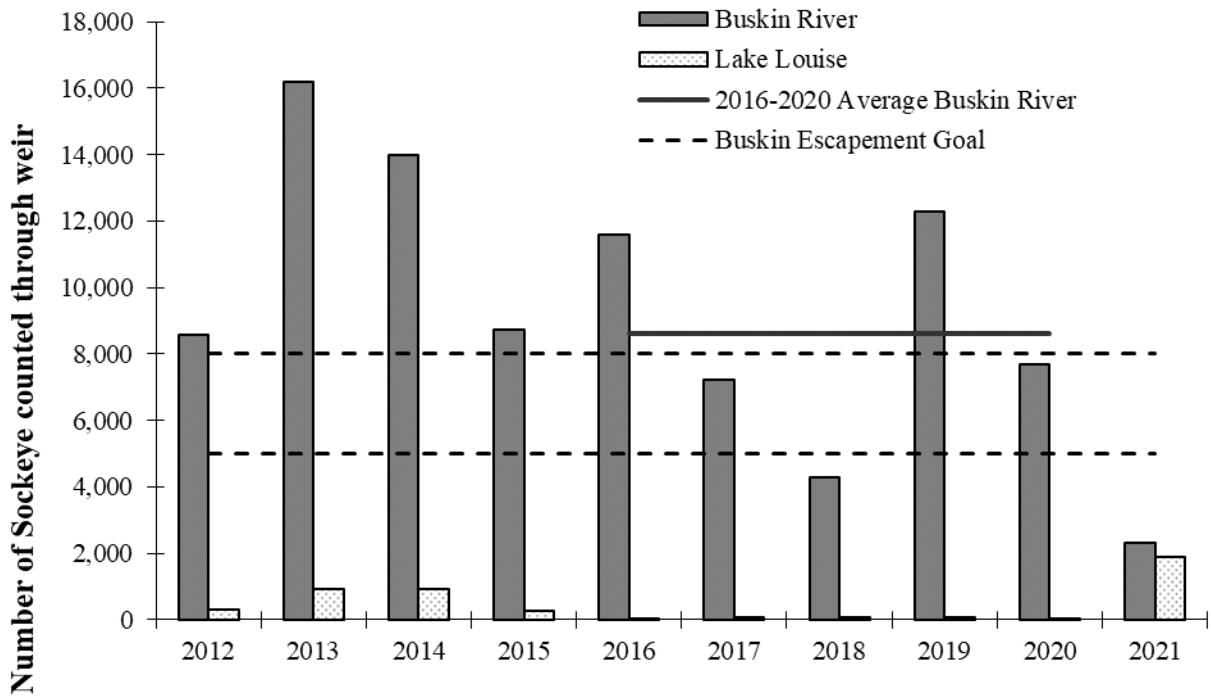


Figure 1.- Buskin River and Lake Louise sockeye salmon escapement, 2012-2021.

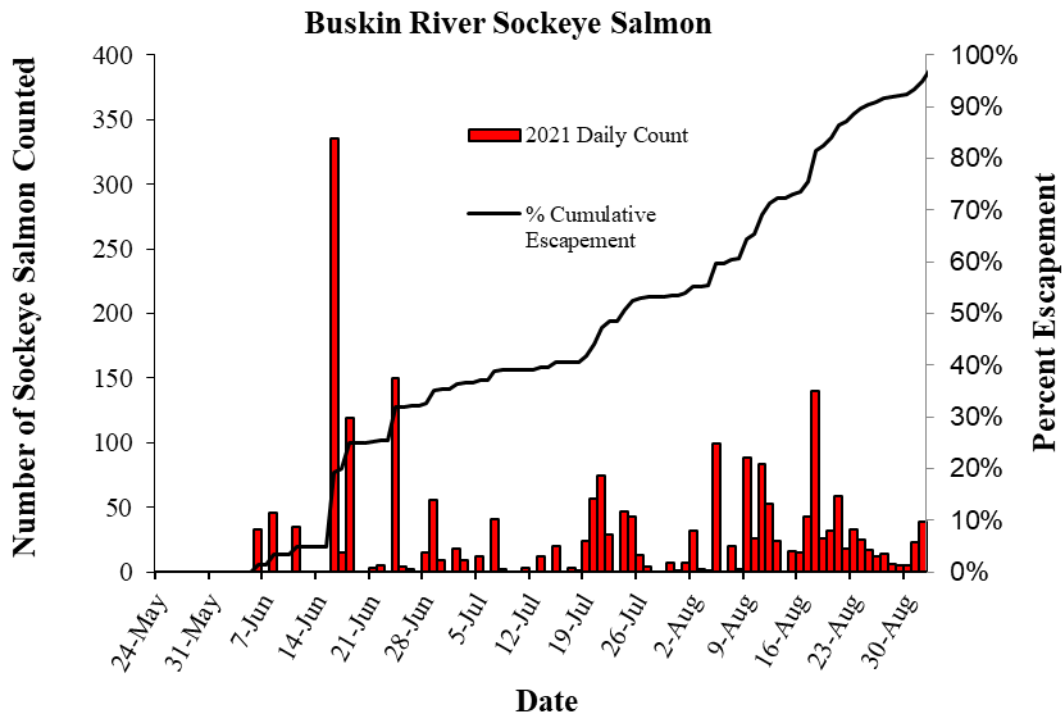


Figure 2.- Daily and cumulative sockeye salmon weir counts into Buskin Lake through September 1, 2021.

The Lake Louise tributary weir was located approximately one-eighth mile upstream of the Buskin River confluence, below the Chiniak Highway. The weir was installed on June 1 and was in operation until September 13. The total Lake Louise weir count was 1,896 sockeye salmon (Figure 3), 1,355 fish of which passed on September 1. This escapement is the highest on record with a recent 5-year average of 101. Similar to other years, the majority of the escapement occurred during high water events.

Emergency orders were issued in 2021 closing Buskin River sockeye salmon for subsistence, sport, and commercial fishing.

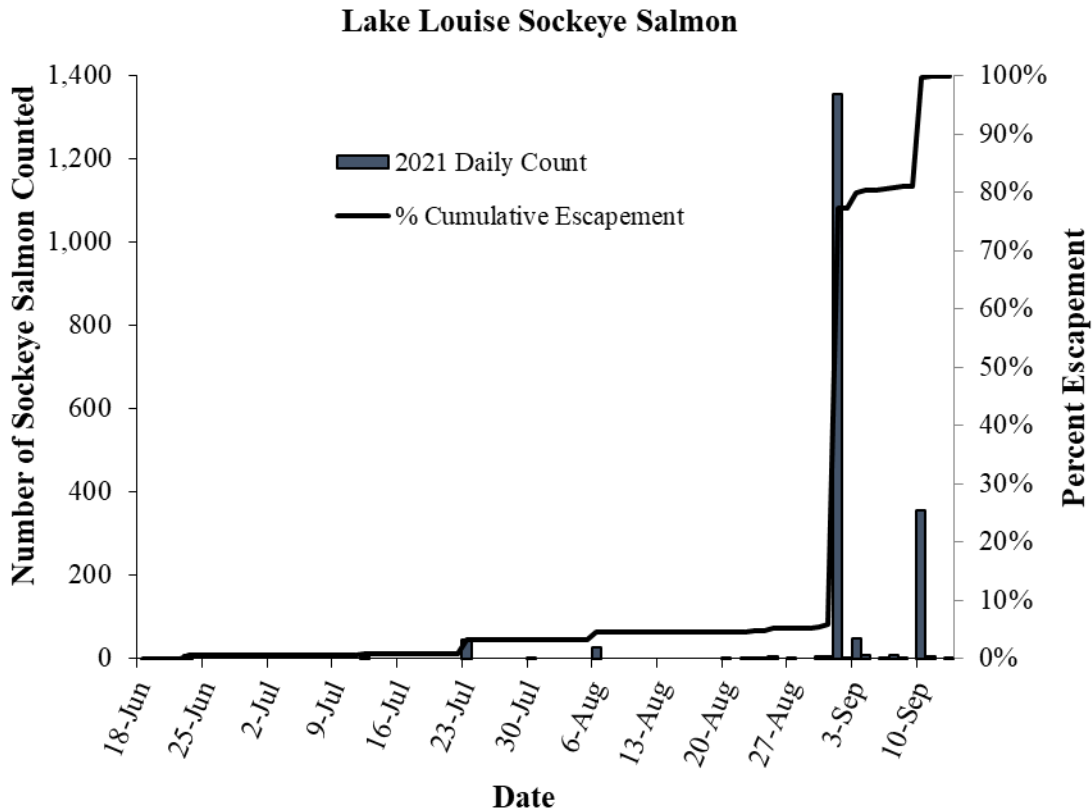


Figure 3.- Daily sockeye salmon weir counts into Lake Louise through September 13, 2021.

STOCK ASSESSMENT- 2021 RESULTS

Samples and data collected from the 2021 season were analyzed during the fall of 2021. Due to social distance requirements for COVID-19, as well as a very short time that the subsistence fishery was open, subsistence harvests were not sampled. Escapement sampling goals were generally not achieved for the Buskin Lake weir due to low fish numbers with a total of 222 fish sampled. Lake Louise sampling goals were also largely not met and the number of samples collected were too small to establish age compositions. A large proportion of the escapement was sampled until September 1 when 1,355 fish passed. This escapement occurred during flooding conditions, precluding effective sampling.

The 2021 Buskin River sockeye salmon escapement was primarily composed of age-1.3 fish at 54.3% of the escapement followed by age-1.2 (24.6%), age-2.3 (13.1%), and age-2.2 (6.5%). Female sockeye salmon averaged 492 mm (mid-eye to tail-fork), only slightly smaller than the 2016-2020 average of 494 mm. Similarly, males on average were 509 mm which was slightly below the recent five-year average size of 512 mm.

SUBSISTENCE USER INTERVIEWS

In response to a priority information need identified by the Kodiak/Aleutians Region Subsistence Advisory Council (RAC), verbal interviews are typically taken on the fishing grounds or at the boat launches with Buskin River subsistence users. In 2021, due to concerns of social distancing because of the COVID-19 virus, as well as very little subsistence fishing effort prior to the fishery being closed, no interviews were conducted and no samples were collected.

CAPACITY BUILDING

Since 2003, the Buskin River project has been a vehicle for fisheries-based education and development of career interests for young subsistence users through establishment of a high school intern program. During this internship, students gain knowledge of the principles involved in fisheries management and research while obtaining field experience in fisheries data collection methods and techniques. The intern program annually employs two top qualified students who work on the Buskin project under supervision of ADF&G staff between June 1 and July 31. The high school intern program has had outstanding success, to the extent that at least five former interns are currently employed with ADF&G as seasonal Fish and Wildlife Technicians or Fisheries Biologists, and 21 of 33 former interns have returned to work for the Department at some point.

CONCLUSION

The 2020 season was slightly below average but had a very high proportion of age 1.3 fish. With lower-than-normal normal numbers of age 1.2 and 2.2 fish, the sibling relationships for forecasting were near the lower end of the ranges of data where uncertainty was the greatest. Despite indications of a nearly average run for 2021, the run failed to develop. In addition to the 2021 run being the lowest on record, the timing was atypical. Fish did not return in any large numbers or in large pulses during the time frame of this project, but escapement continued during August and was counted through the coho salmon enumeration project through a weir located lower in the watershed.

Additionally, many fish passed through the Lake Louise weir in early September that may or may not have been enumerated through the lower coho salmon weir, depending on their run timing. Sockeye salmon were observed holding in the lower reaches of Devil's Creek (a tributary of the Buskin River with a waterfall that is a migration barrier). It is likely that these fish were destined for Lake Louise, but due to the low water conditions of the Lake Louise tributary, they held in Devil's Creek since it is likely cooler and contains more oxygen. When large rains occurred, it is likely that these fish backed out of the Devil's creek tributary and passed the Lake Louise weir with higher water conditions. The fish observed passing the Lake Louise weir had likely spent a variable amount of time in the fresh water as indicated by the variability in their coloration, so it is possible that some had been in fresh water for a while and were not enumerated by the lower coho weir. However, it is probable that many fish counted through the lower weir that were attributed to Buskin Lake actually migrated up through Lake Louise and the actual Buskin Lake escapement is lower than the reported 2,330 fish. In the worst-case scenario that all fish counted through the lower weir were destined for Lake Louise, the estimated Buskin Lake escapement would be 1,389 sockeye salmon.

Age composition during 2021 was generally similar to other recent seasons and the average size of fish was close to the most recent 5-year average. Age-1.3 fish were in larger proportion than most other years; however, they are often the largest contributor to escapement. There were no obvious indications of why the 2021 run was so low. Further, determining the size of the 2022 run is difficult. Since forecasting is often based on sibling relationships and that all ages of the 2021 run were unprecedentedly low, it seems to follow that the 2022 run will be below average as well.

It is important to note that the Buskin River sockeye salmon run size has been on a decreasing trend over the past 20 years or so. The causal factors for this decline is unknown and further investigation would be beneficial.

This season is the last year in the current funding cycle and funding for next season is currently unknown. If the next cycle is funded, sockeye salmon scale measurements will be taken which will hopefully shed light on the causal factors of recent poor runs.

Annual implementation of the Buskin River sockeye salmon weir project, made possible with funding from the Fisheries Research Monitoring Program, has been essential for inseason management that is necessary to sustain the health of the Buskin River sockeye salmon stock while providing maximum harvest opportunity for subsistence users. Continuation of this project will allow for additional analysis of run productivity to aid in the ongoing assessment of sockeye salmon returns to the Buskin River. It will also aid in refining the BEG concurrent with triennial Board of Fisheries meetings, as in the 2011 cycle when the goal was changed as a direct result of this project.