

CITY OF UNALASKA
UNALASKA, ALASKA

RESOLUTION 2023-17

A RESOLUTION OF THE UNALASKA CITY COUNCIL AUTHORIZING FINANCIAL SUPPORT OF AERIAL SALMON SURVEYS DURING CALENDAR YEAR 2023 BY ALEUTIAN AERIAL LLC IN THE AMOUNT OF \$5,300 WITH FUNDING FROM FY24 COUNCIL PLANNED SPONSORSHIPS BUDGET

WHEREAS, in 2018 the Unalaska Native Fishermen Association (UNFA) provided funding to Aleutian Aerial for sockeye salmon surveys of three road system drainages of Morris Cove, Summer Bay and Iliuliuk Lake; and

WHEREAS, in 2019 the City of Unalaska joined with Ounalashka Corporation (OC) and the Unalaska Native Fishermen Association (UNFA) to financially support the same aerial salmon surveys; and

WHEREAS, in 2020 and 2021 the Qawalangin Tribe of Unalaska (Q-Tribe) joined the City, OC, and UNFA to financially support the aerial salmon surveys and an aerial survey of McLees Lake was also included; and

WHEREAS, in 2022 grant funding from the Alaska Sustainable Salmon Fund (AKSSF) covered four surveys at McLees Lake and again UNFA, OC, the City, and the Tribe covered surveys of the three roadside drainages; and

WHEREAS, Aleutian Aerial LLC has submitted a proposal to provide aerial drone salmon survey and is seeking funding support from the City of Unalaska; and

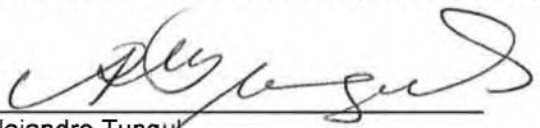
WHEREAS, there continues to be concerns that the lack of escapement estimates for sockeye salmon in local lake drainages could jeopardize future opportunities for subsistence and sport fishing; and

WHEREAS, ADFG has indicated that drone surveys are a reliable and cost-effective way to survey small river and lake systems; and

WHEREAS, the Unalaska City Council believes the aerial salmon surveys to be a benefit to the citizens of Unalaska to allow for continued subsistence and sport fishing seasons.

NOW THEREFORE BE IT RESOLVED that that the Unalaska City Council approves funding in the amount of \$5,300 to support aerial salmon surveys during calendar year 2023 to be performed by Aleutian Aerial LLC, with funding from the Council Planning Sponsorships line item in the FY24 budget.

PASSED AND ADOPTED by a duly constituted quorum of the Unalaska City Council on April 25, 2023.


Alejandro Tungul
Mayor Pro Tem

ATTEST:


Estkarlen P. Magdaong
Acting City Clerk



MEMORANDUM TO COUNCIL

To: Mayor and City Council Members
From: William Homka, Acting City Manager
Date: April 25, 2023
Re: Resolution 2023-17: Authorizing financial support of aerial salmon surveys during calendar year 2023 by Aleutian Aerial LLC in the amount of \$5,300, with funding from FY24 Council Planned Sponsorships Budget

SUMMARY: Andy Dietrick of Aleutian Aerial LLC has proposed to again perform aerial drone salmon surveys and has requested support from City Council. The passage of this resolution will approve City Council's financial support in the amount of \$5,300 for data collection services to support aerial lakeshore sockeye salmon escapement index calculations on three Unalaska roadside drainages (Morris Cove, Summer Bay, Unalaska) and McLees Lake. Aleutian Aerial also provided a proposal for an optional add-on survey at Volcano Bay for \$4,000. The data is provided to the Alaska Department of Fish and Game (ADFG) for use in their analysis.

PREVIOUS COUNCIL ACTION: The Unalaska City Council has provided funding for this project in prior years, as follows:

FY20 (2019): \$5,200
FY21 (2020): \$6,550
FY22 (2021): \$6,550
FY23 (2022): \$2,550

Council's Draft FY24 budget includes support for this effort in the amount of \$5,300 in the Council Planned Sponsorships Budget.

BACKGROUND: On April 6, 2023, Aleutian Aerial emailed a proposal and request for financial support for the aerial drone salmon surveys. The surveys will assist ADFG in their analysis. This request is included in your packet, as is a letter of support from ADFG and ADFG's report regarding the 2022 surveys.

The funding requested from the City for 2023 surveys is \$5,300, with an optional add-on for a survey of Volcano Bay for \$4,000.

To proceed with the project, Aleutian Aerial requests commitments from all four funding entities by May 15, 2023. Staff has prepared a resolution should Council wish to provide financial support. If council decides to include funding for a survey of Volcano Bay, the resolution will need to be amended.

DISCUSSION: The passage of this resolution will approve City Council's financial support in the amount of \$5,300 for aerial drone salmon surveys of the road system drainages of Morris Cove, Summer Bay, and Iliuliuk Lake as well as McLees Lake. The plan is for the City's contribution to be combined with the contributions of the Q-Tribe, UNFA and OC. This information will be provided to the Alaska Department of Fish and Game for analysis.

The lack of salmon escapement on the local lake drainages has been a concern of the local residents who participate in subsistence and sport fishing activities. ADFG has faced budget constraints that have impacted their ability to perform the needed survey work. Continued participation in the drone salmon surveys will help provide needed information to ADFG on the status of the local drainages.

ALTERNATIVES: Council may choose to:

1. Provide funding of \$5,300;
2. Increase funding by \$4,000 for a total of \$9,300 to include Volcano Bay;
3. Choose to support a different amount; or
4. Choose not to support this project; or
5. Defer a decision to a later date.

FINANCIAL IMPLICATIONS: The Draft FY24 Council Planned Sponsorships line item contains sufficient funding to cover the \$5,300 contribution. If council chooses to fund at a different amount, that is a relatively simple change to make as the FY24 budget has not yet been adopted by Council.

PROPOSED MOTIONS:

If Council wants to include funding for a survey of Volcano Bay: "I move to amend Resolution 2023-17, to add \$4,000 for a survey of Volcano Bay, for a total of \$9,300."

To adopt an amended resolution: "I move to adopt Resolution 2023-17 as amended."

If no change is desired: "I move to adopt Resolution 2023-17."

ATTACHMENTS:

1. [Aleutian Aerial Proposal for 2023 Salmon counting with unoccupied aircraft on local roadside drainages and Volcano Bay \(April 6, 2023\)](#)
2. [Letter of Support from ADFG \(April 4, 2023\)](#)
3. [Memo from ADFG regarding 2022 Indexed Escapement of Salmon using Drone Surveys at McLees Lake and Unalaska Road-system Lakes](#)



ALEUTIAN AERIAL

*Professional, Scientific, and Technical Services
in the Aleutian Islands and beyond.*

Aleutian Aerial LLC
PO Box 210111
Auke Bay, Alaska 99821
907.957.1680
andy@aleutianaerial.com

April 6, 2023

To: City of Unalaska City Council

Re: 2023 Salmon counting with unoccupied aircraft on local roadside drainages and Volcano Bay

Aleutian Aerial LLC (Aleutian Aerial) is pleased to provide a proposal for data collection services to support aerial lakeshore sockeye salmon escapement index calculations on three Unalaska roadside drainages (Morris Cove, Summer Bay, Unalaska) and an optional add-on survey at Volcano Bay. Aleutian Aerial utilizes small unoccupied aircraft systems (sUAS) to collect high-resolution video which is turned over to the Alaska Department of Fish and Game (ADF&G) for analysis and reporting. All data collection is performed by a FAA Part 107 certified remote pilot. Aleutian Aerial will provide all personnel and equipment for data collection for this project.

Background:

This project began in 2018 with funding from the Unalaska Native Fishermen's Association (UNFA). The goal was to perform aerial surveys to determine sockeye salmon escapement indexes on local streams. UNFA funded the data collection and ADF&G provided biologist' support to analyze and report on the data. ADF&G supports using sUAS technology for this type of salmon counting.

In 2019, the project was continued with ongoing support from UNFA and additional support from the Ounalashka Corporation (OC) and the City of Unalaska.

In 2020, the project was supported by a total of 4 funding agencies: UNFA, OC, City of Unalaska, and the Qawalangin Tribe (Tribe). ADF&G continued to support the project with biologist time for data collection recommendations, data analysis and reporting. A big addition to the 2020 survey was including McLees Lake (which had a weir in operation after two years without any weir data).

In 2021, the project continued with another year of paired weir and shoreside spawning-bed counts for the McLees Lake location. Also in 2021, significant stream mileage was added to the survey by including inlet and outlet streams on all the drainages.

In 2022, grant funding from the Alaska Sustainable Salmon Fund (AKSSF) covered four surveys at McLees Lake and again UNFA, OC, the City, and the Tribe covered surveys of the three roadside drainages. Due to project scheduling challenges in 2022, there was only opportunity to plan for and execute two surveys on each of the roadside drainages, a reduction from the usual four recommended by ADF&G.

For 2023, grant funding for four surveys of the McLees Lake system is in its second and final year from AKSSF. ADF&G supports returning to the normal four surveys of each roadside drainage and would also desire one survey of the Volcano Bay system. (See attached letter of support from ADF&G.)

Site Logistics:

Aleutian Aerial is familiar with the complicated site logistics of working in the Aleutian Islands. Seasonally based in Unalaska/Dutch Harbor, Aleutian Aerial is capable of taking advantage of flight weather windows and lighting conditions as they are presented by Mother Nature. Specific sites for this project include the nearshore waters and inlet/outlet streams of Unalaska Lake, Summer Bay Lake, and Morris Cove Lake. There is also an optional add-on of the waters and streams of the Volcano Bay drainage.

Execution of Work and Schedule of Costs:

Aleutian Aerial has the financial and technical resources, capability, and in-house capacity to successfully perform this video data collection. Data collection using sUAS will be performed during a target window of August 15 to September 20. Timing is based on direction provided by ADF&G biologists. The primary sUAS used will be a DJI Matrice 300. The camera sensor and lenses have the capability of capturing 45-megapixel still images and 4K (60 frames per second) video. Flight heights are generally 50 – 80 feet above lake level with variable speed depending on the salmon volume encountered. Polarized lenses will also be used to aid in seeing individual salmon underwater. Flights start at the same point on the lakeshore each lap and travel the perimeter with the camera pointed 50-90 degrees down from horizontal depending on optimal visibility into the water. Generally, you can see the entire nearshore spawning area in one field of view. In areas where shallows extend far out from shore, flight height is increased and a grid pattern is flown using rocks or unique features on the lake bed to keep the biologist oriented and prevent double counting or missing fish.

The following rates are applicable to this project:

- **Roadside drainages:** Project execution including all field logistics, drone and support equipment, aerial media acquisition, quality check, and creation of deliverables for analysis by ADF&G biologists. Daily weather monitoring and forecasting during the project period and collaboration with ADF&G biologists for data quality assurance. 4 laps on each system. Morris Cove Lake, Summer Bay Lake, Unalaska Lake.

Total for Roadside drainage surveys: \$21,200

Seeking multiple funding sources. Based on 4 contributing entities, this request to the City of Unalaska is \$5,300.

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- *Optional add-on for Volcano Bay survey: As noted in the letter of support from ADF&G, biologists are interested in data on the Volcano Bay system. This would be for a single survey of the system and include all items as described for the Roadside drainages for one lap of the Volcano Bay system. Transportation costs and contractor risk of not getting quality data are high for a Volcano Bay survey and thus is reflected in a higher cost for a single survey. Cost estimate is for all tasks, including transportation. Contractor retains option to cancel survey at no cost to customer due to weather or other circumstances out of our control.*

Total for Volcano Bay system single survey: \$16,000

If optional add-on for Volcano Bay is chosen, it would also be from multiple funding sources. Based on 4 contributing entities, the optional add-on request to the City of Unalaska would be an additional \$4,000.

Exclusions:

Any condition outside the control of Aleutian Aerial and any item of work not specified in this proposal.

Assumptions:

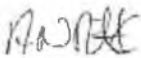
- Flight weather windows are out of the control of Aleutian Aerial.
- Aleutian Aerial will operate sUAS under FAA Part 107 rules in the Class G airspace in and around Unalaska/Dutch Harbor during data collection.
- Any land use permissions required (except for licenses/certifications related to flight operations) are the responsibility of the funding organizations.
- Image acquisition will be done using a camera sensor capable of recording 4K, 60 fps video, on a professional grade sUAS platform.
- Photo/video media deliverables will be in common formats and delivered on an external hard drive to ADF&G in Kodiak.
- Aleutian Aerial agrees to process and deliver media to ADF&G during the course of the project so data quality can be reviewed.

This proposal is offered and limited to the terms specified. A notice-to-proceed must be received by each of the 4 funding entities no later than May 15, 2023.

Please feel free to contact me if you have any questions or comments regarding this proposal.

Thank you for considering Aleutian Aerial for data collection on Unalaska's salmon streams.

Sincerely,



Andy Dietrick
Owner, Aleutian Aerial LLC
andy@aleutianaerial.com
907.957.1680



THE STATE
of **ALASKA**
GOVERNOR MICHAEL J. DUNLEAVY

Department of Fish and Game

DIVISION OF COMMERCIAL FISHERIES
Westward Region Office
351 Research CT
Kodiak, Alaska 99615
Phone: 907.486.1848
Fax: 907.486.1841

April 4, 2023

Unalaska Native Fishermen's Association,
Ounalashka Corporation,
City of Unalaska,
and the Qawalangin Tribe of Unalaska
Unalaska, Alaska 99685

Re: Letter of Support, Aleutian Aerial LLC
2023 Unalaska Roadside Lake Salmon Drone Surveys

Dear Leaders of Unalaska:

As the Assistant Area Management Biologist for the Alaska Peninsula and Aleutian Islands, I support Aleutian Aerial LLC's proposal for funding drone surveys of Morris Cove, Summer Bay, Unalaska (Iliuliuk), and Volcano Bay Lakes this upcoming summer.

If awarded, Aleutian Aerial LLC would continue to provide high quality drone survey footage of important subsistence salmon runs on the island. Since Aleutian Aerial LLC bases in Unalaska during the peak of the salmon run, they can conduct multiple surveys on good weather days which allows ADF&G to make accurate population estimates. Without this drone footage, ADF&G is typically only able to conduct one fixed-wing aerial survey of Unalaska streams every 1 to 2 years.

It is also worth noting that for 2023, ADF&G and Aleutian Aerial LLC have been awarded funding from the Alaska Sustainable Salmon Fund to continue drone surveys at McLees Lake. Along with reducing the funding request from Unalaska organizations, the tagging study we plan to run for this project will further refine the accuracy of all drone surveys and serve as a backup tool in case the McLees Lake weir is unable to procure funding in the future.

ADF&G supports increasing roadside surveys from two per summer in 2022, back to four per summer as in previous years. Having more surveys spread out during the run should mitigate surveys with subpar conditions and increase the odds that ideal survey conditions align with the peak of the run. Adding a survey of Volcano Bay would be beneficial as subsistence harvest there has increased significantly in recent years and ADF&G has only been able to survey the system three times over the last decade.

Sincerely,

Tyler Lawson
Alaska Department of Fish and Game
Alaska Peninsula & Aleutian Islands
Assistant Area Management Biologist
351 Research Ct, Kodiak, AK 99615
907-486-1882



MEMORANDUM

DATE: April 3, 2023

TO: Unalaska Native Fishermen's Association,
the Ounalashka Corporation, the City of
Unalaska, and the Qawalangin Tribe of
Unalaska

THROUGH: Matt Keyse, Area
Management Biologist, South Alaska
Peninsula and Aleutian Islands, Division of
Commercial Fisheries, Region IV

Tyler Polum, Area Management Biologist,
Kodiak and Alaska Peninsula/Aleutian
Islands, Division of Sport Fish, Region IV

FROM: Tyler Lawson, Assistant Area
Management Biologist, South Alaska
Peninsula and Aleutian Islands, Division
of Commercial Fisheries, Region IV

PHONE: (907) 486-1882

SUBJECT: 2022 Indexed Escapement of
Salmon using Drone Surveys at McLees
Lake and Unalaska Road-system Lakes

Since 2018, indices of salmon escapement from drone surveys have been completed for subsistence sockeye salmon *Oncorhynchus nerka* runs into Summer Bay, Morris Cove, and Iliuliuk (Unalaska) Lakes (Figure 1; Tables 1-3). Additionally, 2022 was the third year a comparison was made between McLees Lake weir salmon counts and indices of escapement from drone surveys (Figure 1; Table 4). While not a primary objective, indices of escapement for coho salmon *O. kisutch* and pink salmon *O. gorbuscha* were opportunistically included in surveys (Tables 1-4). In 2022, the Unalaska Native Fishermen's Association, the Ounalashka Corporation, the City of Unalaska, and the Qawalangin Tribe of Unalaska provided funding to contract Aleutian Aerial LLC to conduct drone aerial salmon surveys in the Summer Bay, Morris Cove, and Iliuliuk drainages. Additionally, the Alaska Sustainable Salmon Fund (AKSSF) provided grant funding for drone surveys of McLees Lake and a mark-recapture study. The Alaska Department of Fish and Game (ADF&G) contributes to efforts by reviewing surveys and providing indices of escapement.

Ideally, drone surveys are performed when viewing conditions are optimal and interference such as glare from the sun and waves on the water's surface are minimized. Compared to fixed-wing surveys, drone video has the added benefits of allowing the reviewer to slow down, rewind, and zoom in on footage to provide a more accurate count. Additionally, salmon species can usually be differentiated from other species and reviewers are able to observe fish utilizing different parts of lakes and streams.

Video files from drone surveys were sent to the ADF&G Division of Commercial Fisheries Kodiak office to be analyzed by management biologists postseason. Standardized methodology used for traditional aerial

surveys flown with a fixed-wing aircraft were used to calculate indices of escapement from drone video footage (Fox et al. 2022). The indexed total escapement for sockeye and coho salmon is the peak escapement count of live fish and carcasses. Due to a relatively short stream life, the indexed total escapement of pink salmon is calculated by assuming a 21-day stream life so that any stream counts 21 days or more prior to the peak count are added to the total count (Fox et al. 2022). Survey dates in 2022 did not occur during the peak run timing for coho salmon, so estimates are minimum estimates. Survey data were entered into the ADF&G aerial survey database and escapement data will be published in the 2023 Annual Management Report of the Aleutian Islands and Atka-Amlia Islands Management Areas.

Before discussing 2022 results, it is pertinent to discuss how weather and water visibility impacted indices. During the peak of the 2022 sockeye salmon run on Unalaska Island, survey conditions in all lakes were the poorest observed since drone surveys began in 2018. Heavy rainfall in August led to increased sedimentation and decreased water visibility. The best days available to survey during the peak of the run were mostly cloudy and moderately windy. Consequently, indices for sockeye salmon in 2022 are considered minimum estimates as it was not possible to see and count fish on salmon redds and other parts of lake systems where large numbers of sockeye salmon have been counted in previous years (Figure 2). Thus, caution is urged when attempting to make a comparison of 2022 sockeye salmon indices to previous years. Conversely, visibility in inlet and outlet streams was considerably better and fish were enumerated in those parts of the systems with more success.

Surveys flown by Aleutian Aerial LLC on the Unalaska road-system lakes in 2022 occurred on August 23 and 29. McLees Lake surveys took place between July 10 and August 24 (Table 5).

In 2022, the total indexed escapement in Iliuliuk (Unalaska) Lake was 115 sockeye salmon and 35,080 pink salmon (Table 1). As previously mentioned, the ability to see into sockeye salmon redds in many parts of Iliuliuk Lake were greatly hampered by survey conditions. Pink salmon, especially in the inlet and outlet streams, were much easier to count and the peak count represents the largest escapement since 31,500 pink salmon were indexed in 1996 (Fox et al. 2022).

Total indexed escapement in Summer Bay Lake was 760 sockeye salmon and 5,180 pink salmon (Table 2). Pink salmon abundance in 2022 was similar to recent indices for the Summer Bay drainage (Fox et al. 2022).

Total indexed escapement in Morris Cove Lake was 27 sockeye salmon and 590 pink salmon (Table 3). This is the largest number of pink salmon observed since 3,500 pink salmon were indexed in 1984 (Fox et al. 2022).

Estimated escapement at the McLees Lake outlet weir was 14,015 sockeye salmon, compared to an indexed total escapement of 4,150 sockeye salmon from drone surveys (Table 4).

With the AKSSF funding awarded in 2022, ADF&G initiated a mark-recapture study of sockeye salmon at McLees Lake. Mark Witteveen, with the ADF&G Division of Sport Fish, trained technicians in the mark-recapture tagging protocol (Witteveen and Evans 2020). Between June 19 and July 26, weir technicians inserted disc tags in 263 sockeye salmon at the weir and the tags were later observed and counted during Aleutian Aerial LLC's drone surveys. Based on the number of sockeye salmon marked at the weir, the total number of salmon counted during each drone survey, and the number of tagged fish counted during each

survey, Chapman's (1951) version of a Peterson 2-event mark-recapture model was used to estimate abundance.

During the first two surveys of McLees Lake, no tagged fish were observed so it was not possible to estimate abundance (Table 6). Surveys on August 8 and August 24 estimated sockeye salmon abundances of 31,743 and 47,645 for an average of 38,777 sockeye salmon (Table 6). Approximately 500 sockeye salmon were staging downstream from the weir in the outlet of McLees Lake when the weir was pulled on July 29 and more fish were seen jumping in Reese Bay. However, the large difference in weir vs mark-recapture estimates is likely better explained by poor visibility in the lake inhibiting the ability to count fish and tags. The highest number of tagged sockeye salmon observed during a survey was 28, which is a relatively low recovery rate (11%). Similar studies performed on Kodiak Island coho salmon show a tag recovery rate of 30-60% (M. Witteveen, Fishery Biologist, ADF&G, Kodiak, personal communication). We are hopeful that a return to more typical lake conditions in 2023 will allow for a higher tag recovery rate.

Although 2022 was a challenging year for counting sockeye salmon in Unalaska Island lakes, ADF&G is optimistic that future surveys will provide conditions more suitable for counting sockeye salmon. The remote location and unpredictable weather of this region has always made it difficult to perform aerial surveys. In 2023, Aleutian Aerial LLC and ADF&G are seeking to increase roadside surveys back up to 4 surveys during the run within each system as done in previous years. Having more surveys spread out during the run should mitigate surveys with subpar conditions and increase the odds that ideal survey conditions align with the peak of the run.

REFERENCES CITED

- Chapman, D. G. 1951. Some properties of the hypergeometric distribution with applications to zoological censuses. University of California Publications in Statistics 1:131-160.
- Fox, E. K. C., T. D. Lawson, and M. D. Keyse. 2022. 2022 South Alaska Peninsula salmon annual management report and 2021 subsistence fisheries in the Alaska Peninsula, Aleutian Islands, and Atka-Amlia Islands management areas. Alaska Department of Fish and Game, Division of Commercial Fisheries, Fishery Management Report No. 22-32, Anchorage.
- Witteveen, M. J., and D. G. Evans. 2020. Operational Plan: Kodiak road system coho salmon stock assessment and escapement monitoring, 2020. Alaska Department of Fish and Game, Regional Operational Plan ROP.SF.2A.2020.15, Anchorage.

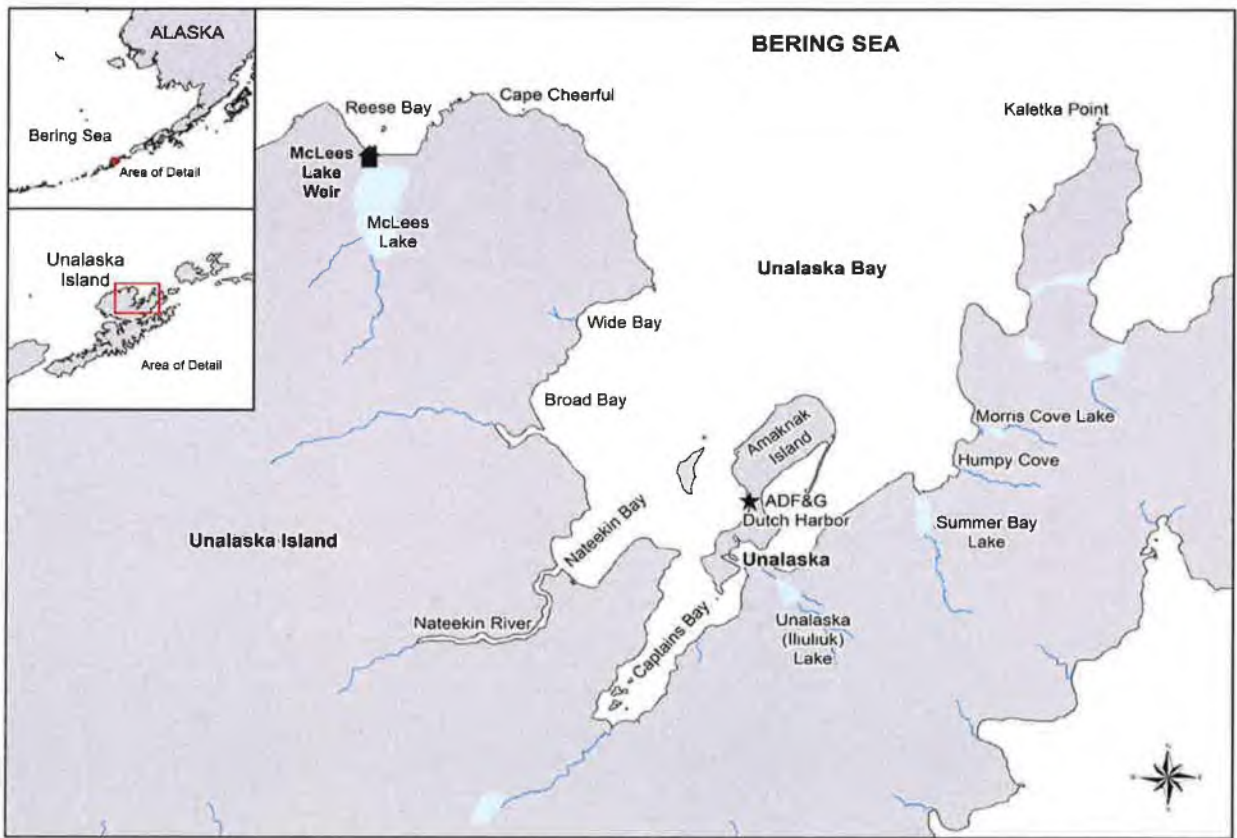


Figure 1.– Map of Unalaska Island showing the location of McLees Lake, Unalaska (Iliuliuk) Lake, Summer Bay Lake, and Morris Cove Lake.



Figure 2.– Comparison of survey conditions in Unalaska Lake on September 10, 2021 (left) where sockeye salmon can be clearly identified and counted and Aug 23, 2022 (right). Culverts are circled in red for orientation.

Table 1.— Total indexed salmon escapements by species and year for Iliuliuk (Unalaska) Lake drone surveys.

Year	Sockeye Salmon	Pink Salmon	Coho Salmon ^b
2018	583	605 ^a	21
2019	350	25 ^a	0
2020	815	1,550 ^a	0
2021	540	515 ^a	0
2022	115 ^c	35,080	0

Table 2.— Total indexed salmon escapements by species and year for Summer Bay Lake drone surveys.

Year	Sockeye Salmon	Pink Salmon	Coho Salmon ^b
2018	3,622	4,105 ^a	201
2019	2,575	4,090 ^a	415
2020	4,507	7,454 ^a	33
2021	1,580	4,522	50
2022	760 ^c	5,180	0

Table 3.— Total indexed salmon escapements by species and year for Morris Cove Lake drone surveys.

Year	Sockeye Salmon	Pink Salmon	Coho Salmon ^b
2018	315	7 ^a	0
2019	376	0 ^a	0
2020	106	354 ^a	0
2021	41	97	17
2022	27 ^c	590	20

Table 4.— Total indexed salmon escapements by species and year for McLees Lake.

Year	Drone Survey Index Sockeye	Fixed-wing Survey Index Sockeye	Weir Count Sockeye	Drone Survey Index Pink ^a	Drone Survey Index Coho ^b
2020	2,428 ^d	—	5,037	0	0
2021	13,170	6,010	16,173	306	150
2022	4,150 ^c	—	14,015	5	1

^a Pink salmon estimates are minimum estimates, as the surveyed area did not include all habitat used by pink salmon or were conducted prior to the peak of the run.

^b Coho salmon estimates are minimum estimates, as surveys concluded prior to when coho salmon runs peak.

^c Minimum estimate due to abnormally poor viewing conditions in the lake where most sockeye spawn.

^d Surveys did not include inlet streams where some sockeye salmon spawn.

Table 5.— Dates of drone surveys and counts of salmon in 2022.

Date	Morris Cove Lake	Summer Bay Lake	Unalaska (Iliuliuk) Lake	McLees Lake
7/10/2022	—	—	—	621 sockeye salmon
7/26/2022	—	—	—	1 sockeye salmon
8/8/2022	—	—	—	3,486 sockeye salmon
8/23/2022	27 sockeye salmon, 561 pink salmon	760 sockeye salmon, 5,180 pink salmon	115 sockeye salmon, 24,870 pink salmon	—
8/24/2022	—	—	—	4,150 sockeye salmon, 5 pink salmon, 1 coho salmon
8/29/2022	12 sockeye salmon, 590 pink salmon, 20 coho salmon	599 sockeye salmon, 4,640 pink salmon	96 sockeye salmon, 35,080 pink salmon	—

Table 6.— Summary of 2022 McLees Lake sockeye salmon mark-recapture project.

Date	Cumulative number of sockeye salmon tagged at weir	Indexed total of sockeye salmon from drone survey	Number of disc tags observed during drone survey	Estimated abundance of sockeye salmon
7/10/2022	182	621	0	—
7/26/2022	263	1	0	—
8/8/2022	263	3,486	28	31,743
8/24/2022	263	4,150	22	47,645
Average ^a	263	3,818	25	38,777

^a Includes 8/8 and 8/24 surveys