

2022 ANNUAL MANAGEMENT PLAN

GULKANA HATCHERY I and II

Prince William Sound Aquaculture Corporation

This Annual Management Plan (AMP) plan is prepared to fulfill the requirements of 5 AAC 40.840. This plan must organize and guide the hatchery's operations, for each calendar year, regarding production goals, broodstock development, and harvest management of hatchery returns. Egg take through release details are included in planning for succeeding calendar years. Inseason assessments and project alterations by Prince William Sound Aquaculture Corporation (PWSAC) or Alaska Department of Fish and Game (ADF&G) may result in changes to this AMP in order to reach or maintain program objectives. PWSAC will notify the ADF&G private nonprofit (PNP) hatchery program coordinator in a timely manner of any departure from the AMP. The ADF&G PNP coordinator will advise as to whether an amendment, exception report, or other action is warranted. No variation or deviation will be implemented until an AMP amendment has been approved or waived by both the department and PWSAC. This policy applies to all hatchery operations covered under the AMP.

I. OPERATIONAL PLAN

1.1 Egg-take Goals by Species

Sockeye Salmon, Gulkana I: The maximum number of sockeye salmon eggs is 35.0 million. Broodstock requirements are 11,900 females, 7,100 males, and 43,000 additional fish for a total of 62,000 fish, assuming:

- a. 3,300 eggs/female
- b. 3:2 female to male spawning ratio
- c. 10% green/over-mature female at rack
- d. The total number reflects the number of fish needed in the last decade to make egg-take goal

Sockeye Salmon, Gulkana II: The maximum number of sockeye salmon eggs is 1.75 million. Broodstock requirements are 650 females, 350 males, and 2,200 additional fish for a total of 3,200 fish, assuming:

- a. 3,300 eggs/female
- b. 3:2 female to male spawning ratio
- c. 10% green/over-mature female at rack
- d. The total number reflects the number of fish needed in the last decade to make egg-take goal

This year's expected brood at Gulkana I and II are in section 3.3.

1.2 Broodstock Acquisition and Data Reporting

All data associated with egg take and broodstock collection will be provided to the department by November 1 each year. Data will be provided in electronic format (Excel file) and include all the categories presented in the template attached as Table 5. Data to be collected specifically includes

the numbers of green and over-ripe females from the broodstock and associated cost recovery. PWSAC planned egg takes are shown in Table 2 and egg-take schedules are shown in Table 3.
Sockeye Salmon, Gulkana I: August 15–October 15

Sockeye Salmon, Gulkana II: July 25–August 20

1.3 Egg-take Schedule

August 15 to September 5: 0.5–1.0 million/day
September 6 to September 15: 1.0–1.5 million/day
September 16 to October 5: 1.5–2.5 million/day
October 6 to October 15: 1.0–1.5 million/day.

1.4 Egg Transport and Carcass Disposal Plans

Sockeye Salmon, Gulkana I: Eggs taken at Gulkana I (GHI) will be fertilized and water hardened on site. The eggs will be hand-carried (approximately 75 yards) to one of the 134 tote incubators.

Broodstock carcasses will be either given to residents of the area (for dog food) or will be disposed of in the Gulkana River to ensure adequate nutrient input into Paxson Lake in accordance with Alaska Department of Environmental Conservation (DEC) requirements. If an additional broodstock carcass disposal log is required by ADF&G, all disposals will be logged on the carcass disposal form and reported to the department within 30 days after egg take and disposals are completed.

If insufficient broodstock are available at the GHI facility, a broodstock collection area will be established at the outlet of Summit Lake and/or Pup Lake (Pup Lake is downstream from Crosswind Lake).

Sockeye Salmon, Gulkana II: Eggs taken for Gulkana II (GHII) will be fertilized and water hardened at GHII from GHII broodstock, then transferred to GHII for seeding in one of twelve incubation boxes.

In light of recent low incubation survivals at GII, a portion or all of the eggs may be incubated at GI while operations are evaluated to improve survivals. All GII fry incubated at GI would be transported back to GII for release.

Broodstock carcasses will be disposed of in the Gulkana River in accordance with DEC requirements. If an additional broodstock carcass disposal log is required by ADF&G, all disposals will be logged on the carcass disposal form and reported to the department within 30 days after egg take and disposals are completed.

1.5 Incubation Plans

Hatchery Production Summary

Species	Facility	Green Eggs	Fry Released
Sockeye Salmon	Gulkana I	35,000,000	20,700,000
Sockeye Salmon	Gulkana II	1,750,000	1,300,000

The incubators at GHI are “tote”-style incubators. At GHII, all incubators are “Kitoi”-style incubators. Sockeye salmon survival from green egg to fry release is estimated to be 75%.

All eggs will be incubated at GHI and GHII during 2022.

1.6 Rearing and Release Plans

Sockeye Salmon, Gulkana I: Eggs will hatch in gravel substrate inside stream-side tote incubators. Outmigration from the incubators is volitional, with enumeration by electronic counters. Fry surviving from the 2021 egg take will be released at Crosswind Lake (10 million) and into Paxson Lake from the GHI site (up to 6 million). As the egg-take goal in 2021 was not met, it is unlikely that there will be any fry released into Summit Lake in 2022. Release numbers to Crosswind, Paxson and Summit lakes are adjusted due to egg-take shortage. Fry destined for Paxson Lake will be reared approximately 10-14 days. Fry destined for Crosswind Lake will be reared approximately 10-14 days until all have accumulated and ice melts on Crosswind for the aerial transport. Any fry to be released in Summit Lake will be reared approximately two to four weeks, which allows for a more desirable open-water release.

In 2022, the feasibility of a late large program on Paxson released fish will continue to be trialed. A portion of the fry will be held back and reared up to 2 grams in size. It will take an anticipated 8 weeks to reach 2 grams, which means these fish will be released around late July or into August. This will reduce the amount of time in the wild that they are exposed to predation and lake rearing. This should ultimately help to improve overall survivals and aid in meeting return targets.

Sockeye Salmon, Gulkana II: Eggs will hatch in gravel substrate incubators and the resulting fry will be fed prior to release. Outmigration from incubators is volitional, with enumeration by electronic counters. An estimated 1.3 million fry will be released from the 2021 egg take at the site. Fry from GHI may be used to cover a shortfall if the green-to-fry survival is lower than anticipated at the GHII facility to reach the 1.3 million fry release goal.

PWSAC’s anticipated 2022 releases are shown in Table 4.

1.7 Fry Transport Methods

Fry from the incubation site will be air dropped at Crosswind Lake by a Thrush aircraft with a 500-gallon, oxygen-supported tank with approximately 1.0 million fry per load. Fry will be transported to Summit Lake in a 300-gallon fish stocking tank with approximately 330,000 fry per load and will be primarily released into Gunn Creek, or may be released directly into Summit Lake via boat transports.

1.8 Permitted Capacity

Gulkana Hatchery was issued PNP Hatchery Permit #42 in 2000. It is currently permitted to incubate 36.75 million sockeye salmon eggs.

Fish Transport Permit Summary

FTP Number	Expiration Date	Purpose
SOCKEYE SALMON		
96A-0034	4/30/26	Allows transfer and release of 10 million fry from GHI into Crosswind Lake.
96A-0038	4/30/26	Allows transfer and release of 6 million fry from GHI into Paxson Lake.
96A-0039	4/30/26	Allows transfer and release of 6 million fry from GHI into Summit Lake.
97A-0048	7/17/30	Allows egg take and incubation of 35 million East Fork Gulkana River stock sockeye salmon eggs at the GHI location.
97A-0049	7/17/30	Allows egg take, incubation, and resultant release of 1.75 million East Fork Gulkana River stock sockeye salmon eggs at GHII.
16A-0054	4/30/30	Allows the egg take of 35 million East Fork Gulkana River stock sockeye salmon eggs at the Summit Lake adult weir location. Eggs will be incubated at the GHI location.
16A-0055	4/30/30	Allows the egg take of 35 million East Fork Gulkana River stock sockeye salmon eggs at the Pup Lake adult weir location (downstream from Crosswind Lake). Eggs will be incubated at the GHI location.
20J-1023	8/1/2030	Allows 1.75 million green eggs to be transported from GHII to GHI, incubated and reared over winter at GHI, and transported back to GHII before release.

II. DONOR STOCK MANAGEMENT

The hatchery sockeye salmon runs will be sufficient to meet broodstock goals for 2022 and no donor stock management is anticipated. It is recognized that the broodstock in the brood collection area is a mixture of natural and hatchery-spawned fish. Hatchery escapement is managed in the commercial fishery months earlier and management cannot take further action if a shortfall of broodstock occurs.

2.1 Fish Collection Techniques

Sockeye Salmon, Gulkana I: Fish are captured by dip net and seine at the hatchery site or from adjacent springs. A weir is installed annually at the Summit Lake and Pup Lake (downstream from Crosswind Lake) outlets for otolith mark recovery. In the event of a broodstock shortfall, either or both of these weirs will be used to capture the necessary broodstock.

Sockeye Salmon, Gulkana II: A weir in the Gulkana River is used to hold fish while dip nets, seines, and snagging gear are used to capture fish from behind the weir for the egg take. Enhanced returns that enter the hatchery site stream are captured by dip net and seine.

III. HATCHERY RETURN MANAGEMENT

PWSAC operates five facilities: Armin F. Koernig Hatchery (AFK), Cannery Creek Hatchery (CCH), GH, Main Bay Hatchery (MBH), and Wally Noerenberg Hatchery (WNH). The corporation generates revenues for annual operations from a 2% enhancement tax and from the sale of hatchery-produced salmon returning to the facilities.

In 1997, the PWSAC Board of Directors (BOD) elected to have corporate cost recovery based upon revenue goals specific to the seine and gillnet salmon fisheries rather than a goal of harvesting a fixed percentage of the returning adults. This results in each gear group paying for enhanced production from which they benefit. PWSAC calculates these revenue goals by allocating production costs between the seine-caught and gillnet-caught salmon fisheries.

On March 22, 2022, the PWSAC BOD approved the annual corporate budget for Fiscal Year 2022 detailing potential sources of revenue and expenditures. The pink salmon cost-recovery revenue goal is \$8,946,974. The WNH chum and MBH sockeye salmon cost-recovery will utilize and aggregate management strategy with a revenue goal of \$8,476,123. Additional revenue may be generated through PWSAC's raceway fish sales during its egg take full utilization program.

PWSAC uses preseason assumptions for the number of returning fish, price per pound, and average adult weight to calculate the total projected value of the returning hatchery-produced salmon. Based on these assumptions, PWSAC estimates that approximately 39% of the total run will be required to meet the revenue goal in the Fiscal Year 2023 financial plan.

Hatchery escapement means all fish that escape the common property fishery and includes two categories of escapement (a) the number of brood to meet production objectives and (b) the number of hatchery produced fish taken for the hatchery harvest requirement, to be used to pay for the hatchery's reasonable operating and capital costs (5 AAC 40.990(6)).

Pink Salmon Returns: The AFK, CCH, and WNH pink salmon runs will be managed collectively through openings and closures of respective hatchery subdistricts. Managing the enhanced pink salmon runs in aggregate may result in site-specific CPF contribution rates being above or below the approximate target of a 59% CPF pink salmon harvest.

WNH Chum and MBH Sockeye Salmon Runs: The WNH chum salmon and MBH sockeye salmon runs will be managed collectively through openings and closures of respective hatchery subdistricts. The collective management will be managed concurrently for the WNH chum and MBH sockeye salmon revenue goal. Managing the returns in aggregate may result in site-specific CPF contribution rates being above or below the approximate targets of 48% and 87% for the WNH chum and MBH sockeye salmon harvest, respectively.

The AFK Hatchery and Port Chalmers remote release chum salmon runs are expected to have a 100% CPF harvest.

Reduction of CPF opportunity in hatchery subdistricts may be necessary to ensure hatchery escapement objectives are met. PWSAC will work closely with local ADF&G management biologists to achieve the seine and gillnet fisheries revenue goals as rapidly as possible to allow for an orderly and consistent CPF.

3.1 Probable Hatchery Fish Migration Routes and Timing

Sockeye salmon stocks from both GHI and II coincide with wild stock run timing. The peak enhanced sockeye salmon return coincides with some Copper River Delta and some Upper Copper River wild stocks. Management priority is to sustain wild stock yield and diversity. The harvest of hatchery-produced sockeye salmon is based on the forecasted return and management of wild stocks. Therefore, hatchery stocks will be harvested at the same rate as wild stocks.

Sockeye salmon returns from the three release sites for GHI fry occur throughout the commercial fishery and escapement timing. Returns from the GH II release site occurs throughout the early and middle segments of the escapement period. Each release site has demonstrated somewhat different timing as determined by coded-wire-tag recoveries in the commercial fishery and historical timing data. Gulkana I and II sockeye salmon are intermingled with other stocks of sockeye salmon and other species of salmon to such an extent that no targeted harvest can occur within the commercial fishery or mainstream inriver fisheries. However, harvests can occur at terminal return points, especially Summit and Crosswind Lakes where the fish are segregated from any natural stocks.

Harvest management is limited to development of daily timing and abundance data for each enhanced stock release group, which, when used in conjunction with natural stock timing data, ensures protection of natural-stock components of the return.

Based on tag and otolith mark recoveries in commercial harvest areas, returning hatchery fish migrate through the Copper River commercial fishery in two surges, where GHII fish overlap early upriver and Delta wild stocks. Gulkana I returns coincide with the lower Delta wild stocks and the later component of the upriver wild stocks. Hatchery and lower Delta stocks are present in the commercial catch from the beginning of the commercial fishing season (mid-May). These fish are possibly milling in the deep waters offshore of the Copper River Delta and are harvested by commercial fisherman offshore. See Figure 1 for a map of the Copper River watershed.

3.2 Special Harvest Area

The Crosswind Special Harvest Area (SHA) was established in accordance with 5 AAC 40.005 and consists of the waters of Dog Creek west of approximately 145°52.83'W long downstream to a weir located at approximately 62°34.70'N lat, 145°53.7'W long (Figure 2). All longitude and latitude coordinates are based on the North American Datum of 1983. PWSAC may construct a weir or series of weirs to conduct a cost-recovery harvest. Seines, traps, or dip nets may also be used to harvest cost-recovery fish in the SHA. PWSAC, or its contractor, may harvest sockeye salmon during periods established by emergency order (EO). All other species must be allowed free upstream or downstream passage.

The intent for developing this SHA is to limit the return of surplus hatchery-produced sockeye salmon into Crosswind Lake, provide local economic opportunity, and provide state residents with a source of salmon. There is negligible salmon spawning habitat at Crosswind Lake and no natural production escapement goal has been established. This SHA will prevent most of the returning sockeye from migrating into the system while providing benefits to both PWSAC and state residents.

In order to provide state residents with the opportunity to use excess production from Crosswind Lake, PWSAC, or its contractor, may, at their discretion, give away up to 30 sockeye salmon per household to residents who come to the site and request fish. PWSAC will work with the Divisions of Sport and Commercial Fisheries area management biologists for harvest record requirements as applicable.

If PWSAC is unable to harvest the surplus hatchery-produced sockeye salmon in the SHA, they will, under authority of ADF&G, destroy all sockeye salmon in excess of broodstock and escapement needs. Disposal of these fish is undesirable; however, allowing them to escape into Crosswind Lake is also problematic. Excess destroyed sockeye salmon will be left in the stream below the weir in the SHA.

3.3 Hatchery Returns

Sockeye Salmon, Gulkana I: PWSAC’s historical records indicate that >70% of the returning Gulkana adults are 5-year olds. In 2021, the Gulkana Hatchery run was low for all age classes. The sibling relationship between 4-year-old fish last year and 5-year-old fish this year indicates lowered expected survivals at all locations.

As a result, PWSAC’s anticipated 2022 adult run of GHI stock is 119,400 fish, assuming a 0.0% fry to adult survival at Summit Lake, 0.79% at Paxson, and 1.92% at Crosswind (Table 1).

Sockeye Salmon Projected Run Summary

Total Run	Broodstock	CPF Harvest and Escapement
119,400	19,000	100,400
% of Total	16%	84%

Sockeye Salmon Projected Run, Age-Composition Summary

Nursery Lake	BY	Fry Released	Anticipated Fry-Adult Survival	Anticipated Total BY Return	Return Age	2022 Projected Run	% of Total
Crosswind Lake	2017	4,252,400	2.54%	108,146	Age-5	81,000	99%
	2018	8,427,130	0.04 %	3,382	Age-4	1,000	1%
					Total	82,000	100.0%

Paxson Lake	2017	4,601,371	0.95 %	43,833	Age-5	33,100	88%
	2018	5,782,935	0.30%	17,496	Age-4	4,300	12%
					Total	37,400	100.0%

Summit Lake	2017	0	0%	0	Age-5	0	0%
	2018	0	0%	0	Age-4	0	0%
					Total	0	100.0%

Historical average return age composition: 76% age-5 and 24% age-4.

Sockeye Salmon, Gulkana II: PWSAC’s anticipated 2022 adult run of GHII stock is 10,000 fish, assuming a 0.80% fry to adult survival (Table 1).

Sockeye Salmon Projected Return Summary

Total Run	Broodstock	CPF Harvest and Escapement
10,000	1,000	9,000
% of Total	10%	90%

Sockeye Salmon Projected Run, Age-Composition Summary

Nursery Lake	BY	Fry Released	Anticipated Fry-Adult Survival	Anticipated Total BY Return	Return Age	2022 Projected Run	% of Total
Paxson Lake	2017	1,361,093	0.94%	12,766	Age-5	9,800	98%
	2018	257,064	0.28%	708	Age-4	200	2%
					Total	10,000	100.0%

Historical average return age composition: 77% age-5 and 23% age-4.

3.4 Separation of Brood and Sales Fish

Historically, only brood fish have been harvested by the Gulkana Hatchery operator. Under ADF&G management, hatcheries were operated through general fund appropriations and were not subject to or permitted to conduct cost-recovery operations. Since PWSAC has managed the Gulkana Hatchery, facility operating and capital costs have been met through the 2% enhancement tax and through cost recovery revenues made by the sale of MBH sockeye salmon and WNH chum salmon. In an effort to avoid excess fish entering Crosswind Lake, a special harvest area (SHA) has been designated to allow the hatchery operator the opportunity to harvest the returning adults. Although no directed management is required to meet the adult return objectives, the fish that incidentally escape into the Crosswind Lake drainage and are harvested for sale will be considered cost-recovery fish.

3.5 Cost Recovery of Hatchery Fish

No cost recovery harvest will occur in the Copper River District due to the mixed-stock fishery. However, cost recovery harvest may occur within the designated SHA for Gulkana, which provides a harvest opportunity on fish returning to Crosswind Lake.

3.6 Special Management Strategies

Mixed-stock, mixed-species management occurs in the commercial, sport, personal use, and subsistence fisheries. Commercial harvest rates cannot be increased due to the potential to overharvest natural stocks. Commercial harvest interception of 60% is anticipated. Since hatchery fish may be able to withstand a higher harvest rate than wild stocks, the upriver harvest rate for hatchery fish may differ from downriver exploitation rate.

3.6.1 On and Off-Station Returns (Crosswind, Summit, Hatchery Site)

Off-station returns will occur at Crosswind and Summit Lake, with the only on-station return occurring at the hatchery facility. No special management strategy is required since the locations of the returns are above the commercial fishery.

3.6.2 Wild and Hatchery Stock Management

Hatchery and wild stocks are intermingled in all fisheries in the Copper River, as well as at the Miles Lake sonar. Recoveries of otolith-marked fish are presently being used to estimate numbers and timing of the enhanced stock for inseason management. Managing for wild stock escapement is the priority in the commercial fishery, which could result in excessive escapement of the enhanced stock return to the hatchery and lake stocking sites.

3.7 Commercial Harvests

The commercial harvest occurs at the mouth of the Copper River. The outer boundary of the Copper River District, as described in 5 AAC 24.301, is a line three miles due south of a line from Pinnacle Rock to Hook Point. There are 535 commercial drift gillnet permits in Area E. Only driftnets 150 fathoms or less may be fished in the Copper River District. Openings are by EO only.

3.8 Sport Fish Harvest

The current estimated sockeye salmon harvest in the Gulkana River is less than 1,500 fish, with the majority caught prior to arrival of GHI and II stocks. Sport fishermen on the Gulkana River harvest less than five percent of the Gulkana River sockeye salmon escapement. Due to this early season effort, a lesser percentage of these fish would be hatchery-produced. To encourage participants of this fishery to fish later in the season, SHAs will almost certainly be needed on the Gulkana River to fully utilize available fish. From 1988 through 1990, Paxson Lake, Summit Lake, and Gunn Creek were open to sport fishing of sockeye salmon during times when hatchery returns were available. In 1991, additional area was opened, and Crosswind Lake is already open to sport harvest. In 2000, the West Fork Gulkana sport limit was increased from 3 to 6 salmon

after August 1 to target hatchery surplus. However, these management accommodations have failed to attract sport anglers to target these hatchery stocks due to difficult access to the fishing locations and the late timing of the returns.

3.9 Subsistence and Personal Use Harvests

Subsistence: Gear is limited to fish wheels and dip nets (plus rod and reel under federal subsistence regulations) in the Glennallen Subdistrict of the Upper Copper River District and drift gillnets in the Copper River District. Currently, fish wheel and dipnet fishermen in the Glennallen Subdistrict are allocated 61,000–82,500 of the upriver sockeye salmon escapement while actual harvests have ranged from 52,000–108,000 sockeye salmon. In all but 4 years hatchery contribution to the Chitina Subdistrict personal use and Glennallen Subdistrict subsistence fisheries has been combined and has ranged from 3–22% since 2008. In 2013, 2014, 2019, and 2020 hatchery contribution sampling was done in both the Chitina and Glennallen subdistricts with hatchery sockeye contributing 21%, 24%, 2%, and 10% respectively during those years to the subsistence fishery. The subsistence fishery tends to occur concurrently with fish availability throughout the season. Escapement goals at the Miles Lake sonar station include sufficient wild stock sockeye salmon to satisfy this harvest without jeopardizing the spawning escapement.

Personal Use: Gear is limited to dip nets (plus fish wheel and rod and reel under federal subsistence regulations) in the Chitina Subdistrict (below Chitina-McCarthy Bridge). Current allocations allow for the harvest of 100,000 to 150,000 salmon in this subdistrict. Since 2008 harvest in the Chitina Subdistrict personal use and Glennallen Subdistrict subsistence fisheries has included a combined 7,500–68,000 hatchery produced sockeye salmon. In 2013, 2014, 2019, and 2020 hatchery contribution sampling was done separately in both the Chitina and Glennallen subdistricts with hatchery sockeye contributing 10,300, 28,900, 8,000, and 3,600 fish respectively during those years to the personal use fishery. However, effort in the dipnet fishery is concentrated on the early portion of the run with an average of 17% of all effort concentrated during the weeks hatchery fish are most prevalent in the fishery.

3.10 Avoidance of Nontarget species

Gulkana I: No nontarget species issues.

Gulkana II: No nontarget species issues.

IV. EVALUATION STUDIES

4.1 Otolith Recovery in Returning Adults

The recovery of otolith-marked fish from the 2022 runs of Gulkana Hatchery sockeye salmon will be directed at collecting from the commercial fishery, personal use fishery, Glennallen Subdistrict subsistence fishery, hatchery harvests, and broodstock. Otolith mark data will be used by ADF&G and PWSAC to measure fishery contribution and marine survival of salmon. ADF&G will provide PWSAC preliminary otolith mark-recovery data from fishery samples by December 1 each year, and any additional otolith data from straying studies and other projects by April 1 each year.

Similarly, PWSAC will provide ADF&G independently-collected otolith mark-recovery data by April 1 each year. These data are to be the individual specimen otolith-mark results.

4.2 Nursery Lake Monitoring

Outmigrating juvenile sockeye salmon will be sampled and evaluated from Summit and Crosswind lakes daily from approximately May 20 through July 15. In 2022, it is intended to investigate and, if possible, establish and operate a smolt monitoring station at the outlet of Paxson Lake following ADFG recommendation. The samples will provide information on the quantity and condition of the juvenile sockeye salmon, which helps to indicate the potential for over or under-utilization. Zooplankton will be sampled and evaluated from Summit, Paxson, and Crosswind lakes at approximately three-week intervals from June–September. The samples provide information on quantity of the juvenile sockeye salmon food source, which helps to indicate the potential for over or under-utilization. Raw data from both of these projects will be provided to ADF&G in a timely manner as specified in sections 5.3 and 5.4 of the Gulkana Hatchery Basic Management Plan (BMP).

4.3 Otolith Marking

PWSAC began otolith marking in 2000. During the spring outmigration period (March–May 2022), 100% of sockeye salmon production will be otolith-marked. All the fry will receive the same otolith mark by exposing them to 3,000 ppm strontium chloride solution for a 24-hour duration. 1.0 million fish will have a mark of Sr:E2 for a late large program. Multiple marks to differentiate between nursery lakes may be possible in the future should the otolith-marking system be completely developed. The table below summarizes the 2021 strontium chloride otolith mark assignment by the ADF&G Mark, Tag, and Age Lab (MTAL). Voucher samples are collected and submitted along with data per the ADF&G MTAL sampling protocol.

Species	Number of Fry	SrCl Otolith Mark	Intended Release Location
Sockeye Salmon	10,000,000	HS1	Crosswind Lake
Sockeye Salmon	5,000,000	HS1	Paxson Lake
Sockeye Salmon	1,000,000	HS2	Paxson Lake
Sockeye Salmon	6,000,000	HS1	Summit Lake

V. ATTACHMENTS

FIGURE 1. Gulkana River Drainage

FIGURE 2. Copper River Commercial Fishery Management Areas

TABLE 1. 2022 PWSAC Hatchery Return Forecast Summary

TABLE 2. 2022 Planned Egg Takes

TABLE 3. 2022 PWSAC Hatchery Egg-take Schedules

TABLE 4. 2022 PWSAC Estimated Salmon Releases

TABLE 5. 2023 PWSAC Estimated Salmon Releases

TABLE 6. Egg-take Data Template for Each Species at Each Hatchery

VI. APPROVAL

Recommendation for Approval: Gulkana Hatchery Annual Management Plan, 2022

Geoff Clark, PWSAC, General Manager 6/9/2022

Mark Somerville, Area Management Biologist, Division of Sport Fish 6/11/2022

Jeremy Botz, Area Management Biologist, Division of Commercial Fisheries 6/10/2022

Jeff Estensen, Regional Supervisor, Division of Sport Fish 6/12/2022

Bert Lewis, Regional Supervisor, Division of Commercial Fisheries 6/10/2022

Ethan Ford, Regional Resource Development Biologist, Div. of Commercial Fisheries 6/13/2022

Lorraine Vercessi, PNP Hatchery Program Coordinator, Div. of Commercial Fisheries 6/15/2022

The 2022 Gulkana Hatchery Annual Management Plan is hereby approved:

Tom Taube, Deputy Director, Division of Sport Fish 6/21/2022

Peter Bangs, Assistant Director, Division of Commercial Fisheries 6/22/2022

Figure 1. Gulkana River Drainage

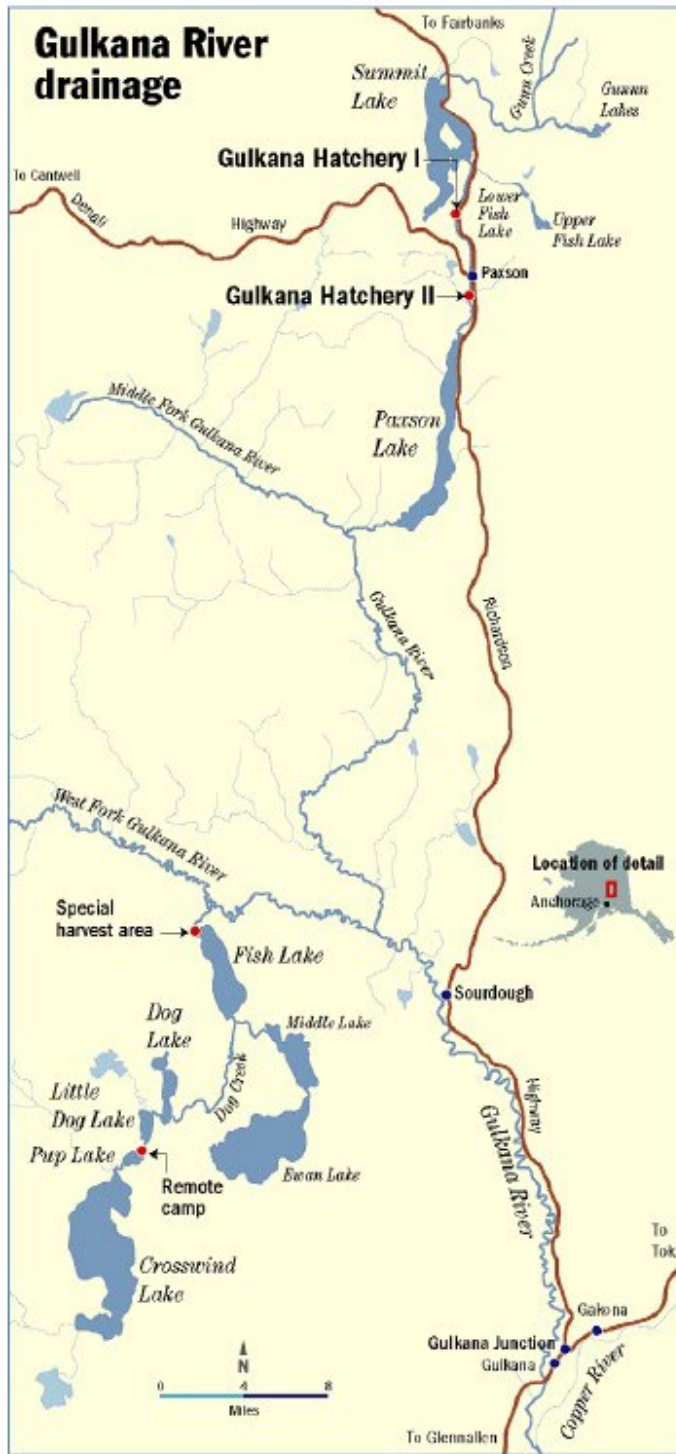


Figure 2. Copper River Commercial Fishery Management Areas

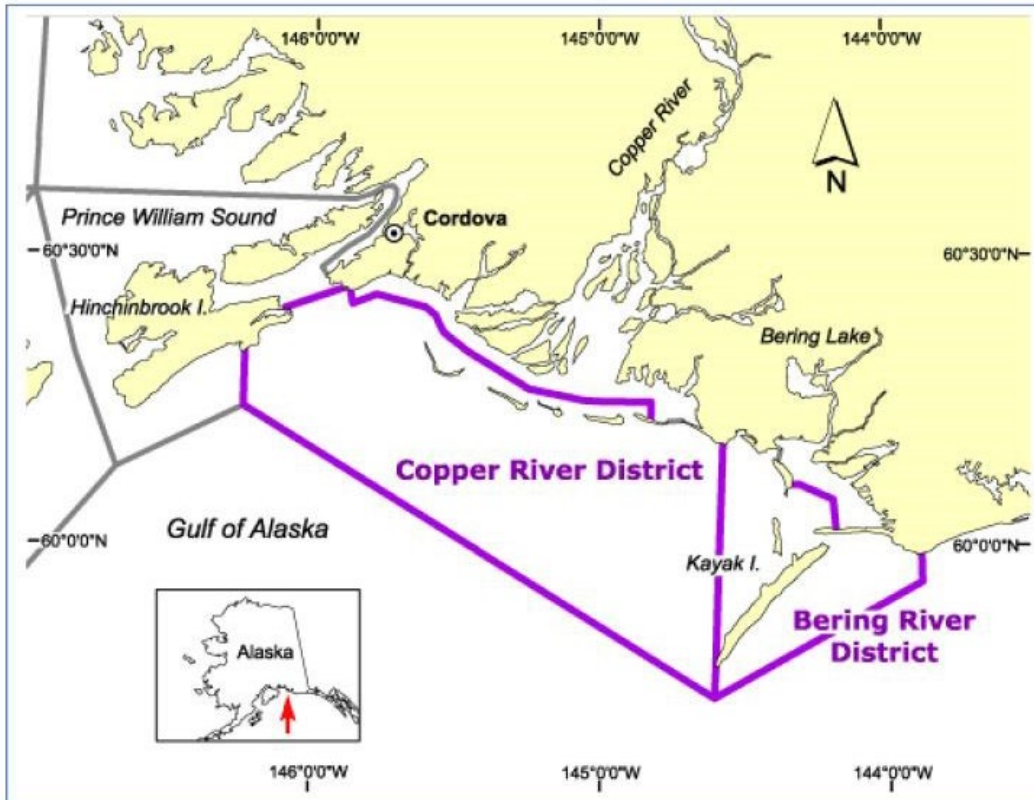


TABLE 1. 2022 PWSAC Hatchery Return Forecast

**PRINCE WILLIAM SOUND AQUACULTURE CORPORATION
2022 HATCHERY RETURN FORECAST**

SITE/ LOCATION	SPECIES	RUN TIME	ADULT RETURN ESTIMATE			EST. MARINE SURVIVAL
			LOW	POINT	HIGH	

RETURNS TO THE HATCHERIES

AFK	PINK	JUL 19 - SEP 05	1,500,000	2,600,000	3,600,000	1.95%
	CHUM	JUN 1 - JUL 27	290,000	360,000	440,000	1.87%

CCH	PINK	JUL 23 - SEP 07	1,500,000	3,000,000	4,600,000	2.79%

WNH	PINK	JUL 19 - SEP 05	1,200,000	2,700,000	4,200,000	3.06%
	CHUM	JUN 1 - JUL 27	2,210,000	2,480,000	2,750,000	3.14%
	COHO	AUG 01 - SEP 20	85,000	138,000	191,000	4.55%

MBH	COGHILL SOCKEYE	JUN 15 - AUG 01	745,000	841,000	938,000	8.55%

GH - Fry to Adult
Survival

GH	CROSSWIND LAKE SOCKEYE	75,000	82,000	89,000	1.92%
	PAXSON LAKE - GI SOCKEYE	32,900	37,400	41,800	0.79%
	PAXSON LAKE - GII SOCKEYE	9,200	10,000	10,800	0.80%
	SUMMIT LAKE SOCKEYE				

RETURNS TO REMOTE RELEASE LOCATIONS

PORT CHALMERS	CHUM	JUN 1 - JUL 27	240,000	280,000	320,000	1.16%
CORDOVA	COHO	AUG 01 - SEP 20	0	0	0	No Release
WHITTIER	COHO	AUG 01 - SEP 20	2,200	3,600	5,000	4.55%
CHENEGA	COHO	AUG 01 - SEP 20	1,400	2,300	3,200	4.55%
CHENEGA	CHINOOK	MAY 25 - JULY 10	420	540	670	1.49%

TOTAL PWSAC RETURNS

PINK	4,200,000	8,300,000	12,400,000	2.60%
CHUM	2,740,000	3,120,000	3,510,000	2.06%
COHO	88,600	143,900	199,200	4.55%
CHINOOK	420	540	670	1.49%
SOCKEYE -SOUND, MBH	745,000	841,000	938,000	8.55%
SOCKEYE - GH,COPPER RIVER	117,100	129,400	141,600	1.17%

TABLE 2. 2022 Planned Egg Takes.

PRINCE WILLIAM SOUND AQUACULTURE CORPORATION

2022 EGG-TAKE GOALS

SPECIES	HATCHERY	ORIGINAL DONOR STOCK	EGG-TAKE LOCATION	EGG-TAKE GOAL
CHUM	WALLY NOERENBERG	WELLS RIVER	WNH	153,000,000
SOCKEYE	MAIN BAY	COGHILL LAKE	MBH	12,400,000
	GULKANA I	GULKANA RIVER	GHI	35,000,000
	GULKANA II	GULKANA RIVER	GHII	1,750,000
			TOTAL	49,150,000
PINK	ARMIN F. KOERNIG	LARSEN, EWAN, GALENA	AFK	190,000,000
	CANNERY CREEK	CANNERY CREEK	CCH	187,000,000
	WALLY NOERENBERG	LARSEN, EWAN, GALENA	WNH	148,000,000
			TOTAL	525,000,000
COHO	WALLY NOERENBERG	Corbin Creek	WNH	4,000,000
CHINOOK	WALLY NOERENBERG	WJHSFH	WNH	50,000
			TOTAL PWSAC	731,200,000

TABLE 3. 2022 PWSAC Hatchery Egg-Take Schedules

PRINCE WILLIAM SOUND AQUACULTURE CORPORATION

2022 EGG-TAKE SCHEDULE

		DATE																			
SITE	SPECIES	30-Jun	07-Jul	14-Jul	21-Jul	28-Jul	04-Aug	11-Aug	18-Aug	25-Aug	01-Sep	08-Sep	15-Sep	22-Sep	29-Sep	06-Oct	13-Oct	20-Oct	27-Oct	03-Nov	
AFK	PINK									24-Aug			15-Sep								
CCH	PINK									24-Aug			17-Sep								
GH I GH II	SOCKEYE								15-Aug									15-Oct			
	SOCKEYE																				
							25-Jul			10-Aug											
MBH	SOCKEYE MBH-COGHILL																				
								01-Aug					20-Aug								
WNH	CHUM	01-Jul						01-Aug													
	PINK																				
	COHO												24-Aug		15-Sep						
																			19-Oct		11-Nov

TABLE 4. 2022 PWSAC Estimated Salmon Releases

PRINCE WILLIAM SOUND AQUACULTURE CORPORATION

2022 ANTICIPATED SALMON RELEASES

SPECIES	HATCHERY	ORIGINAL DONOR STOCK	BROOD YEAR	RELEASE LOCATION	ESTIMATED FRY/ SMOLT RELEASE
CHUM	WALLY NOERENBERG	WELLS RIVER	2021	WNH	73,300,000
			2021	PORT CHALMERS	41,700,000
			2021	AFK	19,400,000
SOCKEYE	MAIN BAY	COGHILL LAKE	2020	MBH	11,000,000
	GULKANA I	GULKANA RIVER	2021	PAXSON LAKE	4,700,000
			2021	SUMMIT LAKE	0
			2021	CROSSWIND LAKE	3,300,000
	GULKANA II	GULKANA RIVER	2021	PAXSON LAKE	1,300,000
			TOTAL	20,300,000	
PINK	ARMIN F. KOERNIG	LARSEN, EWAN, GALENA	2021	AFK	172,100,000
	CANNERY CREEK	CANNERY CREEK	2021	CCH	169,800,000
	WALLY NOERENBERG	LARSEN, EWAN, GALENA	2021	WNH	133,200,000
			TOTAL	475,100,000	
COHO	WALLY NOERENBERG	CORBIN CREEK	2020	WNH	2,900,000
		MILE 18	2020	CORDOVA	100,000
		CORBIN CREEK	2020	WHITTIER	100,000
		MILE 18	2020	CHENEGA	50,000
					TOTAL
CHINOOK	WALLY NOERENBERG	SHIP CREEK	2020	CHENEGA	38,000
			GRAND TOTAL	632,988,000	

TABLE 5. 2023 PWSAC Estimated Salmon Releases

PRINCE WILLIAM SOUND AQUACULTURE CORPORATION

2023 ANTICIPATED SALMON RELEASES

SPECIES	HATCHERY	ORIGINAL DONOR STOCK	BROOD YEAR	RELEASE LOCATION	ESTIMATED FRY/ SMOLT RELEASE
CHUM	WALLY NOERENBERG	WELLS RIVER	2022	WNH	73,300,000
			2022	PORT CHALMERS	41,700,000
			2022	AFK	19,400,000
			TOTAL		134,400,000
SOCKEYE	MAIN BAY	COGHILL LAKE	2021	MBH	11,080,000
	GULKANA I	GULKANA RIVER	2022	PAXSON LAKE	6,000,000
			2022	SUMMIT LAKE	4,700,000
			2022	CROSSWIND LAKE	10,000,000
	GULKANA II	GULKANA RIVER	2022	PAXSON LAKE	1,300,000
TOTAL		33,080,000			
PINK	ARMIN F. KOERNIG	LARSEN, EWAN, GALENA	2022	AFK	171,600,000
	CANNERY CREEK	CANNERY CREEK	2022	CCH	168,800,000
	WALLY NOERENBERG	LARSEN, EWAN, GALENA	2022	WNH	133,600,000
TOTAL		474,000,000			
COHO	WALLY NOERENBERG	CORBIN CREEK	2021	WNH	3,000,000
		MILE 18	2021	CORDOVA	100,000
		MILE 18	2021	WHITTIER	100,000
		CORBIN CREEK	2021	CHENEGA	50,000
TOTAL		3,250,000			
CHINOOK	WALLY NOERENBERG	SHIP CREEK	2021	CHENEGA	45,900
GRAND TOTAL		644,775,900			

TABLE 6. Egg-take Data Template For Each Species at Each Hatchery

Table 7.																										
Egg Take Data for each species at each hatchery																										
Brood Year	Mth	Day	Date	Hatchery	Species	Stock	Lot #	Egg Grams	Eggs/gram	Green Eggs	Act Fecundity	Sample Fecundity	Fertility	Good Female	Grn Female	Bad Female	Mort Female	Good Male	Mort Male	Excess Male	% Green	% Bad	aily Female	Daily Males	Daily Total	
										0	#DIV/0!											#DIV/0!	#DIV/0!	0	0	
										0	#DIV/0!												#DIV/0!	#DIV/0!	0	0
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