2024 ANNUAL MANAGEMENT PLAN

GULKANA HATCHERY I and II

Prince William Sound Aquaculture Corporation

This Annual Management Plan (AMP) is prepared to fulfill the requirements of 5 AAC 40.840. This plan must organize and guide the hatchery's operations regarding production goals, broodstock management, and harvest management of hatchery returns. The plan must be developed with consideration of the hatchery's production cycle. The production cycle begins with adult returns, that lead to egg takes and end with fish releases. Action may be taken outside of the management plan if allowed under the hatchery permit or modified by emergency order. In-season 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 and 7,100 males for a total of 19,000 fish, assuming:

a. 3,300 eggs/female
b. 2:1 female to male spawning ratio, minimum (may be closer to 3:2 depending on male availability)
c. 10% green/over-mature female at rack

Sockeye Salmon, Gulkana II: The maximum number of sockeye salmon eggs is 1.75 million. Broodstock requirements are 650 females and 350 males for a total of 1,000 fish, assuming:

a. 3,300 eggs/female
b. 2:1 female to male spawning ratio
c. 18% green/over-mature female at rack

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 returns are expected at Summit Lake and/or Pup Lake (Pup Lake is downstream from Crosswind Lake) and 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.

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 2024.

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. Surviving fry from the 2023 egg-take will be released into Paxson Lake from the GHI site (up to 6 million). As the egg-take goal in 2023 was not met, it is unlikely there will be any fry released into Summit Lake in 2024. Release numbers to Crosswind, Paxson, and Summit lakes are adjusted due to the egg-take shortage. Fry destined for Paxson Lake will be reared for approximately 10–14 days. Fry destined for Crosswind Lake will be reared for approximately 10–14 days until all are accumulated and ice melts on Crosswind for the aerial transport. Any fry released in Summit Lake will be reared approximately two to four weeks, allowing for a more desirable open-water release.

In 2024, the feasibility trial of a late large program on Paxson released fish will continue. 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 1.1 million fry will be released from the 2023 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 1.1 million fry release goal.

PWSAC's anticipated 2024 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 GHI x 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 GHII x Gulkana River stock sockeye salmon eggs at GHII.
16A-0054	4/30/30	Allows the egg take of 35 million GHI x 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 GHI x 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 2024 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 when hatchery returns are expected at these locations. In the event of a broodstock shortfall, either or both 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 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 8, 2024, the PWSAC BOD approved the annual corporate budget for Fiscal Year 202454 detailing potential sources of revenue and expenditures. The pink salmon cost-recovery revenue goal is $8,523,164. The WNH chum and MBH sockeye salmon cost-recovery revenue goals are $4,535,009 and $1,500,000 respectively. 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 54% of the total run will be required to meet the revenue goal in the Fiscal Year 2025 financial plan.

Hatchery escapement means all fish that escape the common property fishery. 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 37% 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 43% and 70% 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 GHII 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 in-river 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. GHII fish overlap early upriver and Delta wild stocks. Gulkana I returns coincide with the Delta wild stocks and the later component of the upriver wild stocks. Hatchery and 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 the processor with the cost recovery licensing agreement, 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 the processor with the cost recovery licensing agreement, 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 2023, 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 2024 adult run of GHI stock is 62,800 fish, assuming a 0.33% at Paxson and 0.54% at Crosswind (Table 1).

Sockeye Salmon Projected Run Summary

Total Run	Broodstock	CPF Harvest and Escapement
62,800	19,000	43,800
% of Total	**30%**	**70%**

Sockeye Salmon Projected Run, Age-Composition Summary

Nursery Lake	BY	Fry Released	Anticipated Fry-Adult Survival	Anticipated Total BY Return	Return Age	2024 Projected Run	% of Total
Crosswind Lake	2019	8,912,385	0.58%	51,426	Age-5	37,000	82%
	2020	6,306,358	0.44%	27,591	Age-4	8,000	18%
					Total	**45,000**	**100.0%**
Paxson Lake	2019	5,498,985	0.37%	20,127	Age-5	14,500	81%
	2020	4,757,837	0.25%	11,974	Age-4	3,300	19%
					Total	**17,800**	**100.0%**
Summit Lake	2019	0	NA	0	Age-5	0	0%
	2020	0	NA	0	Age-4	0	0%
					Total	**0**	**0%**

Historical average return age composition: 72% age-5 and 28% age-4.

Sockeye Salmon, Gulkana II: PWSAC's anticipated 2024 adult run of GHII stock is 5,000 fish, assuming a 0.92% fry to adult survival (Table 1).

Sockeye Salmon Projected Return Summary

Total Run	Broodstock	CPF Harvest and Escapement
5,000	1,000	4,000
% of Total	**20%**	**80%**

Sockeye Salmon Projected Run, Age-Composition Summary

Nursery Lake	BY	Fry Released	Anticipated Fry-Adult Survival	Anticipated Total BY Return	Return Age	20243 Projected Run	% of Total
Paxson Lake	2019	463,170	1.10%	5,106	Age-5	3,800	76%
	2020	1,162,869	0.41%	4,8185	Age-4	1,200	24%
					Total	**5,000**	**100.0%**

Historical average return age composition: 75% age-5 and 25% 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, with the only on-station return occurring at the hatchery facility. No special management strategy is required because the return locations 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 in-season 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 seaward boundary of the Copper River District, as described in 5 AAC 24.301, is a line between coordinates that are approximately three miles due south of Pinnacle Rock and 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 Copper River inriver goal and actual harvests have ranged from 52,000–108,000 sockeye salmon. In all but 6 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, 2020, 2021, and 2022 hatchery contribution sampling was done in both the Chitina and Glennallen subdistricts with hatchery sockeye contributing 14,951 (18%), 15,800 (18%), 2,275 (2%), 4,921 (10%), 4,700 (8%), and 698 (1%) fish 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 4,000–68,000 hatchery produced sockeye salmon. In 2013, 2014, 2019, 2020, 2021, and 2022 hatchery contribution sampling was done separately in both the Chitina and Glennallen subdistricts with hatchery sockeye contributing 27,839 (18%), 28,900 (21%), 8,000 (5%), and 3,600 (4%), 12,100 (8%), and 3,400 (2%) 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 2024 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. Detailed otolith recovery objectives and timelines are established through a cooperative agreement between PWSAC and ADF&G, annually. 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 with preliminary otolith mark-recovery data from commercial fishery samples by December 1 each year ADF&G will provide PWSAC with otoliths subsampled from weekly collections in the Chitina Subdistrict personal use salmon dipnet and Glennallen Subdistrict subsistence salmon fisheries.. PWSAC will process, prepare for reading, and have otoliths read and the otolith mark-recovery data returned to ADF&G by December 31. Similarly, PWSAC will provide ADF&G with 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

Out-migrating juvenile sockeye salmon may be sampled and evaluated from Summit and Crosswind lakes daily from approximately May 20 through July 15. 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 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 2024), 100% of sockeye salmon production will be otolith-marked. All 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 2024 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. Planned otolith marks may

change with confirmation from the North Pacific Anadromous Fish Commission Mark Coordinator for Alaska.

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. 2024 PWSAC Hatchery Return Forecast Summary
TABLE 2. 2024 Planned Egg Takes
TABLE 3. 2024 PWSAC Hatchery Egg-take Schedules
TABLE 4. 2024 PWSAC Estimated Salmon Releases
TABLE 5. 2025 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, 2024

Geoff Clark, PWSAC, General Manager 4/25/2024

Mark Somerville, Area Management Biologist, Division of Sport Fish 4/9/2024

Jeremy Botz, Area Management Biologist, Division of Commercial Fisheries 4/25/2024

Jeff Estensen, Regional Supervisor, Division of Sport Fish 4/25/2024

Bert Lewis, Regional Supervisor, Division of Commercial Fisheries 4/29/2024

Ethan Ford, Regional Resource Development Biologist, Div. of Commercial Fisheries 4/29/2024

Lorraine Vercessi, PNP Hatchery Program Coordinator, Div. of Commercial Fisheries 4/29/2024

The 2024 Gulkana Hatchery Annual Management Plan is hereby approved:

Tom Taube, Deputy Director, Division of Sport Fish 4/30/2024

Forrest Bowers, Operations Manager, Division of Commercial Fisheries 5/2/2024

Figure 1. Gulkana River Drainage

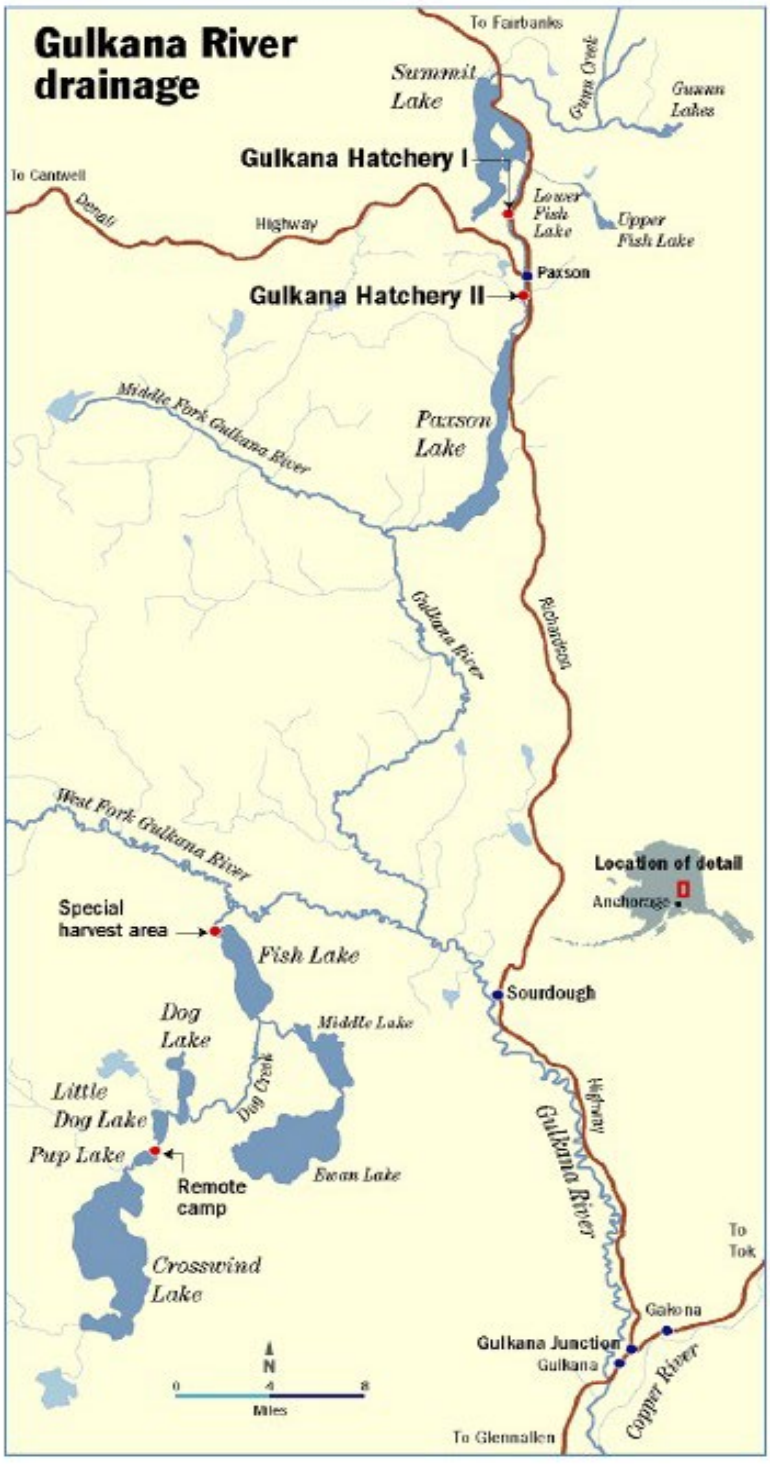

Figure 2. Copper River Commercial Fishery Management Areas

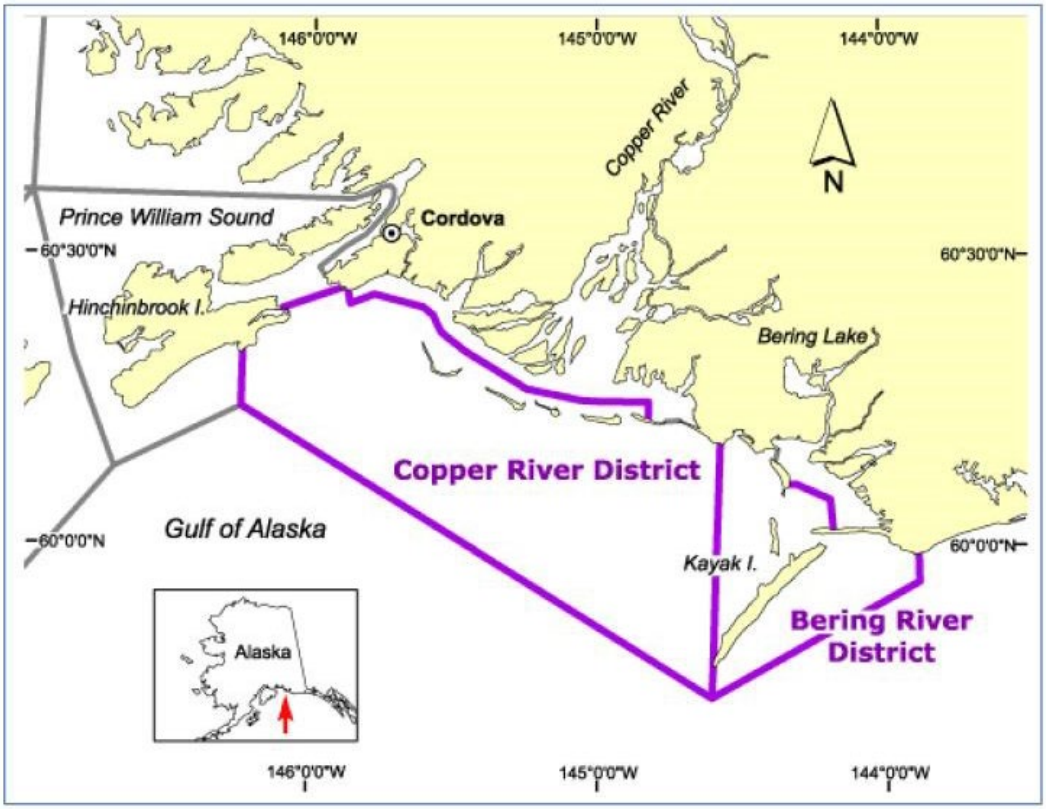

TABLE 1. 2024 PWSAC Hatchery Return Forecast

PRINCE WILLIAM SOUND AQUACULTURE CORPORATION
2024 HATCHERY RETURN FORECAST

SITE/ LOCATION	SPECIES	RUN TIME	ADULT RETURN ESTIMATE LOW	POINT	HIGH	EST. MARINE SURVIVAL
RETURNS TO THE HATCHERIES						
AFK	PINK	JUL 19 - SEP 05	1,300,000	2,800,000	4,300,000	1.61%
	CHUM	JUN 1 - JUL 27	200,000	240,000	270,000	1.27%
CCH	PINK	JUL 23 - SEP 07	1,500,000	4,100,000	6,700,000	2.42%
WNH	PINK	JUL 19 - SEP 05	900,000	3,300,000	5,700,000	2.44%
	CHUM	JUN 1 - JUL 27	2,490,000	2,820,000	3,160,000	3.77%
	COHO	AUG 01 - SEP 20	32,000	62,000	157,000	3.70%
MBH	COGHILL SOCKEYE	JUN 15 - AUG 01	765,000	864,000	961,000	8.27%
GH	CROSSWIND LAKE SOCKEYE		39,000	45,000	51,000	0.54%
	PAXSON LAKE - GI SOCKEYE		15,200	17,800	20,500	0.33%
	PAXSON LAKE - GII SOCKEYE		4,400	5,000	5,700	0.92%
	SUMMIT LAKE SOCKEYE		0	0	0	0.00%

RETURNS TO REMOTE RELEASE LOCATIONS

PORT CHALMERS	CHUM	JUN 1 - JUL 27	**790,000**	**920,000**	**1,050,000**	**2.59%**
CORDOVA	COHO	AUG 01 - SEP 20	**100**	**1,400**	**2,800**	**1.39%**
WHITTIER	COHO	AUG 01 - SEP 20	**100**	**1,400**	**2,800**	**1.39%**
CHENEGA	COHO	AUG 01 - SEP 20	**1,000**	**1,900**	**4,700**	**3.70%**
CHENEGA	CHINOOK	MAY 25 - JULY 10	**520**	**650**	**780**	**1.49%**

TOTAL PWSAC RETURNS

PINK	**3,700,000**	**10,200,000**	**16,700,000**	**2.16%**
CHUM	**3,480,000**	**3,980,000**	**4,480,000**	**2.54%**
COHO	**33,200**	**66,700**	**167,300**	**3.70%**
CHINOOK	**520**	**650**	**780**	**1.49%**
SOCKEYE -SOUND, MBH	**765,000**	**864,000**	**961,000**	**8.27%**
SOCKEYE - GH,COPPER RIVER	**58,600**	**67,800**	**77,200**	**0.60%**

TABLE 2. 2024 Planned Egg-Takes.

PRINCE WILLIAM SOUND AQUACULTURE CORPORATION

2024 EGG-TAKE GOALS

SPECIES	HATCHERY	ORGINAL 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	3,750,000
		POWER CREEK	CDV	250,000
			TOTAL	4,000,000
CHINOOK	WALLY NOERENBERG	WJHSFH	WNH	50,000
			TOTAL PWSAC	731,200,000

TABLE 3. 2024 PWSAC Hatchery Egg-Take Schedules

PRINCE WILLIAM SOUND AQUACULTURE CORPORATION

2024 EGG-TAKE SCHEDULE

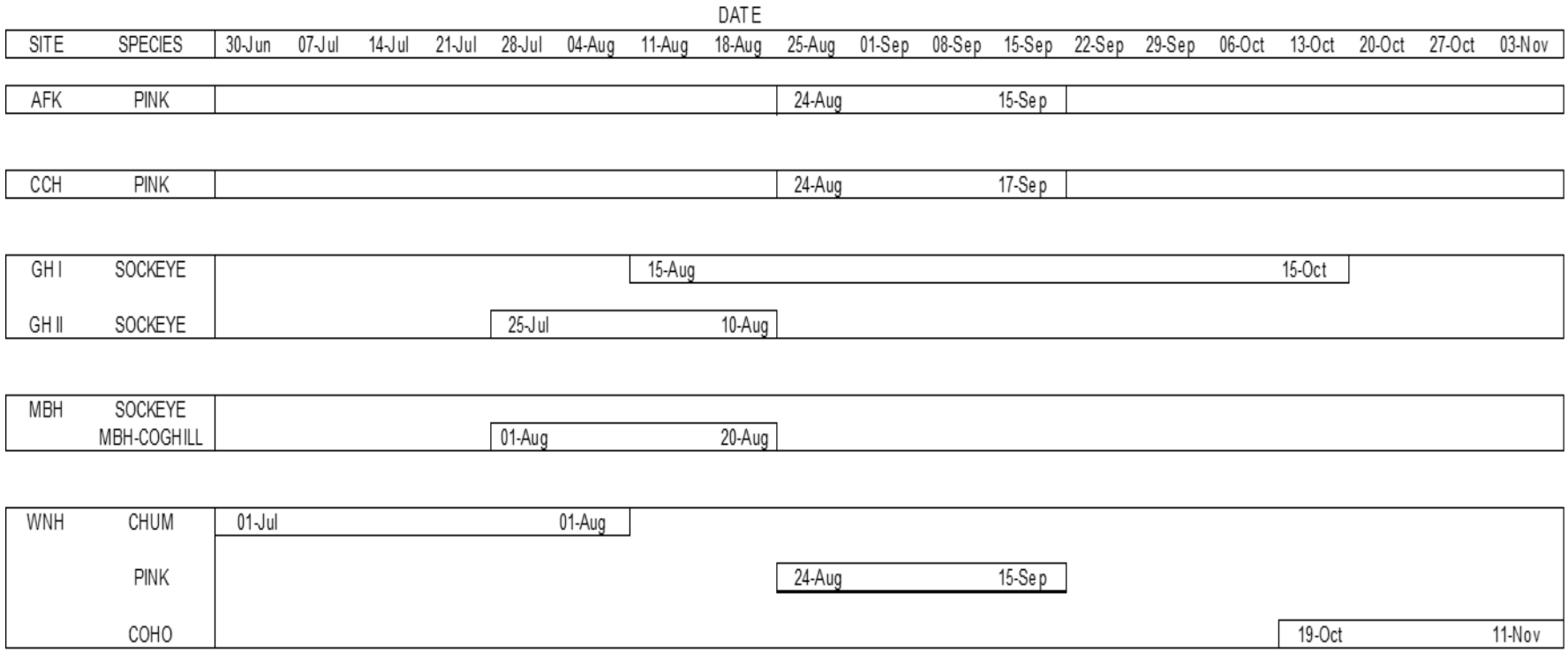

TABLE 4. 2024 PWSAC Estimated Salmon Releases

PRINCE WILLIAM SOUND AQUACULTURE CORPORATION

2024 ANTICIPATED SALMON RELEASES

SPECIES	HATCHERY	ORGINAL DONOR STOCK	BROOD YEAR	RELEASE LOCATION	ESTIMATED FRY/ SMOLT RELEASE
CHUM	WALLY NOERENBERG	WELLS RIVER	2023	WNH	73,600,000
			2023	PORT CHALMERS	41,100,000
			2023	AFK	19,400,000
				TOTAL	134,100,000
SOCKEYE	MAIN BAY	COGHILL LAKE	2022	MBH	5,500,000
	GULKANA I	GULKANA RIVER	2023	PAXSON LAKE	4,900,000
		GULKANA RIVER	2023	SUMMIT LAKE	0
		GULKANA RIVER	2023	CROSSWIND LAKE	3,700,000
	GULKANA II	GULKANA RIVER	2023	PAXSON LAKE	1,100,000
				TOTAL	15,200,000
PINK	ARMIN F. KOERNIG	LARSEN, EWAN, GALENA	2023	AFK	173,700,000
	CANNERY CREEK	CANNERY CREEK	2023	CCH	171,000,000
	WALLY NOERENBERG	LARSEN, EWAN, GALENA	2023	WNH	135,600,000
				TOTAL	480,300,000
COHO	WALLY NOERENBERG	CORBIN CREEK	2022	WNH	1,000,000
		MILE 18	2022	CORDOVA	97,000
		MILE 18	2022	WHITTIER	100,000
		CORBIN CREEK	2022	CHENEGA	50,000
				TOTAL	1,247,000
CHINOOK	WALLY NOERENBERG	SHIP CREEK	2022	CHENEGA	45,900
				GRAND TOTAL	630,892,900

TABLE 5. 2025 PWSAC Estimated Salmon Releases

PRINCE WILLIAM SOUND AQUACULTURE CORPORATION

2025 ANTICIPATED SALMON RELEASES

SPECIES	HATCHERY	ORGINAL DONOR STOCK	BROOD YEAR	RELEASE LOCATION	ESTIMATED FRY/ SMOLT RELEASE
CHUM	WALLY NOERENBERG	WELLS RIVER	2024	WNH	73,200,000
			2024	PORT CHALMERS	40,800,000
			2024	AFK	19,400,000
				TOTAL	133,400,000
SOCKEYE	MAIN BAY	COGHILL LAKE	2023	MBH	11,080,000
	GULKANA I	GULKANA RIVER	2024	PAXSON LAKE	6,000,000
		GULKANA RIVER	2024	SUMMIT LAKE	4,700,000
		GULKANA RIVER	2024	CROSSWIND LAKE	10,000,000
	GULKANA II	GULKANA RIVER	2024	PAXSON LAKE	1,300,000
				TOTAL	33,080,000
PINK	ARMIN F. KOERNIG	LARSEN, EWAN, GALENA	2024	AFK	171,600,000
	CANNERY CREEK	CANNERY CREEK	2024	CCH	168,800,000
	WALLY NOERENBERG	LARSEN, EWAN, GALENA	2024	WNH	133,600,000
				TOTAL	474,000,000
COHO	WALLY NOERENBERG	CORBIN CREEK	2023	WNH	3,100,000
		POWER CREEK	2023	CORDOVA	100,000
		CORBIN CREEK	2023	WHITTIER	100,000
		CORBIN CREEK	2023	CHENEGA	50,000
				TOTAL	3,350,000
CHINOOK	WALLY NOERENBERG	SHIP CREEK	2023	CHENEGA	45,900
				GRAND TOTAL	643,875,900

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	MthDay	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
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									0	#DIV/0!											#DIV/0!	#DIV/0!	0	0
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