

2023 ANNUAL MANAGEMENT PLAN

ARMIN F. KOERNIG HATCHERY

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. 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

Pink Salmon: The pink salmon egg-take goal is 190 million eggs. Anticipated broodstock requirements to achieve the egg-take goal are approximately 199,000 females and 159,000 males, and 40,000 additional fish (to account for an assumed 10% loss to sea lion predation) for a total of 398,000 fish, assuming:

- (a) Average fecundity of 1,345 eggs/female
- (b) 56% historic 5 odd-year female %
- (c) 15% holding mortality
- (d) 15% green/over-mature spawners

If the required broodstock for pink salmon egg-take goal at AFK is not available for returning fish to the hatchery, PWSAC will consult with ADF&G staff to implement broodstock collection in order to conduct an egg-take at WNH to collect up to 162 million additional green eggs in order to reach the AFK goal. After eyeing at WNH, eggs will be transferred to AFK for rearing and release.

If the required broodstock for pink salmon egg-take goal at Wally Noerenberg Hatchery (WNH) is not available for returning fish to the hatchery, PWSAC will consult with ADF&G staff to implement broodstock collection in order to conduct an egg-take at Armin F. Koernig Hatchery (AFK) to collect up to 148 million additional green eggs in order to reach the WNH goal. After eyeing at AFK, eggs will be transferred to WNH for rearing and release.

1.2 Broodstock

The expected broodstock collection schedule for pink salmon is derived from historical run timing curves for Armin F. Koernig (AFK) Hatchery. The run curve is an aggregate of all odd years' (2011-2021) Special Harvest Areas (SHA) hatchery harvests and Port San Juan Subdistrict commercial fishery catch data from ADF&G's annual management reports, harvest data provided by area managers, and preliminary in-season estimates. The adult return summary includes the projected total return, hatchery escapement schedule, and fish available for common property fishery harvest (Table 3).

To ensure that run timing is proportionally represented in broodstock, a hatchery escapement schedule that includes the broodstock acquisition schedule will be implemented based on run timing percentages by date in the AMP tables to establish a hatchery escapement goal by week. These goals will be measured according to the total number of fish estimated in the hatchery SHAs.

If in-season catch data indicate the run is earlier or later than the historical run curve would suggest, PWSAC will consult with the department prior to altering the hatchery escapement schedule, accordingly, to match the actual run.

The hatchery escapement exclusion zone (HEEZ), outlined in section 3.4, protects potential broodstock fish staging directly in front of the hatchery from being harvested in the commercial common property fishery (CCPF). These fish include those that will eventually become broodstock along with those needed to ensure a high quality, efficient, and successful egg collection process.

Any fish collected beyond those utilized as broodstock will be sold for cost recovery to fund PWSAC's salmon fisheries enhancement program. Historically, PWSAC has carried forward revenues from the hatchery raceway fish sales and full-utilization programs to the following year as a reduction in the cost-recovery revenue goal calculation. This provides benefits to the CCPF with an increased PWSAC salmon harvest and potentially an earlier timed CCPF.

Broodstock fish will be collected by volitional entry through the fishway leading to the brood holding pond and raceways located just above the tidal influence at the hatchery.

1.3 Egg-Take Schedule and Data Reporting

Ultimately, the egg-take schedule depends upon broodstock recruitment and the maturation rate of the broodstock in salt and fresh water. The table below summarizes an anticipated egg-take schedule based on the average historical egg-take percent completion (1997–2022). All data associated with egg take and broodstock collection will be provided to the department by November 1. Data will be provided in electronic format (Excel file) and include all categories presented in the template attached as Table 7. Data to be collected specifically includes the numbers of green and overripe females from the broodstock and associated cost recovery.

Anticipated Egg-take Schedule

| Percent Complete | Pink Salmon |
|------------------|--------------|
| 25% | September 5 |
| 50% | September 9 |
| 75% | September 12 |
| 100% | September 17 |

A complete listing of all PWSAC hatchery egg-take schedules is shown in Table 4. PWSAC egg-take goals are shown in Table 2.

1.4 Egg Transport and Broodstock Carcass Disposal Plans

Approximately 22 million green chum salmon eggs will be collected at WNH and will be transported to AFK when they reach the eyed stage of development. These approximately 20 million eyed chum salmon eggs will be incubated, reared, and released at AFK.

If the required broodstock for pink salmon egg-take goal at WNH is not available for returning fish to the hatchery, then PWSAC will conduct an egg-take at AFK to collect up to 148 million additional green eggs in order to reach the WNH goal. After eyeing at AFK, eggs will be transferred to WNH for rearing and release.

If the required broodstock for pink salmon egg-take goal at AFK is not available for returning fish to the hatchery, then PWSAC will conduct an egg-take at WNH to collect up to 162 million additional green eggs in order to reach the AFK goal. After eyeing at WNH, eggs will be transferred to AFK for rearing and release.

During egg-take, PWSAC may sell broodstock carcasses and inviable eggs if a market is available. The carcass of a salmon from which milt or eggs are extracted for lawful use as broodstock may be disposed of in accordance with Alaska Department of Environmental Conservation (DEC) requirements. If carcasses are not sold, inviable eggs and carcasses will be disposed of in accordance with Alaska 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 | Green Eggs | Eyed Eggs | Fry Released |
|-------------|--------------|----------------|--------------|
| Pink Salmon | 190,000,000 | 179,600,000 | 171,600,000 |
| Pink Salmon | *148,000,000 | 139,900,000 | ** |
| Chum Salmon | 0 | *** 20,000,000 | 19,100,000 |

* Up to 148 million pink salmon green eggs will be collected at AFK and transferred to WNH at the eyed-egg developmental stage.

** Fry release provided in WNH AMP

*** Approximately 20 million chum salmon eggs will be transferred from WNH at the eyed-egg developmental stage.

The above table was generated with the following assumptions:

- 1) 94.5% and 91.5% survival from green to eyed for pink and chum salmon respectively; and
- 2) 96.0% survival from eyed stage to emergent; and
- 3) 99.5% survival from emergence to release.

All eggs will be incubated at AFK. 100% of the pink and chum salmon eggs incubated at AFK during the fall incubation period will be thermally otolith-marked at the eyed stage. See section 4.1 for more details.

1.6 Rearing and Release Plans

Pink Salmon: Pink salmon fry will emerge non-volitionally from incubators and pass via separate flume into saltwater rearing pens. The saltwater net pen rearing complex consists of 12 rearing pens that each are 15.2 m x 15.2 m x 4.6 m. Maximum loading densities will be 11 kg/m³.

Approximately 174.91 million pink salmon will be released at AFK in 2023. Based on the predicted outmigration curve and zooplankton bloom timing, all pink salmon fry will be reared for an average of 30 days and released in two groups into the zooplankton bloom.

Chum Salmon: Chum salmon fry will emerge non-volitionally from incubators and pass via separate flume into saltwater rearing pens. The saltwater net pen rearing complex consists of ten, 12.2m x 12.2m x 3.0m rearing pens. Maximum loading densities will be 11 kg/m³.

Approximately 19.5 million chum salmon will be released at AFK in 2023. Based on the predicted outmigration curve and zooplankton bloom timing, all chum salmon fry will be reared for an average of 12 weeks in saltwater net pens and released together in one group at a target size of 1.8 grams. PWSAC estimated salmon releases are shown in Table 5.

1.7 Fry Transport Methods

No AFK pink salmon fry will be transported off-station for release.

1.8 Permitted Capacity

AFK Hatchery was issued PNP Hatchery Permit #2 in 1975. It is permitted to incubate 190 million pink salmon eggs and 34 million chum salmon eggs. All permitted releases are from the AFK Hatchery facility.

Fish Transport Permit Summary

| FTP Number | Expiration Date | Purpose |
|--------------------|------------------------|--|
| PINK SALMON | | |
| 96A-0041 | 6/30/2031 | Allows 190 million pink salmon egg take, incubation, and release of resultant fish at AFK (of ancestral stocks Larsen, Ewan, and Galena creeks). |

| | | |
|----------|-----------|---|
| 16A-0058 | 4/30/2026 | Allows for backup 162 million pink salmon egg take at WNH, transport to AFK for incubation and release. |
|----------|-----------|---|

CHUM SALMON

| | | |
|----------|-----------|--|
| 15A-0051 | 6/30/2025 | Allows for 34 million chum salmon egg take at WNH, transport from WNH to AFK, and incubation, rearing, and release in Sawmill Bay (AFK). |
|----------|-----------|--|

II. DONOR STOCK MANAGEMENT - N/A

III. HATCHERY RETURN MANAGEMENT

PWSAC operates five facilities: AFK, Cannery Creek Hatchery (CCH), Gulkana Hatchery (GH), Main Bay Hatchery (MBH), and WNH. The corporation generates revenues for annual operations from a 2% salmon 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 9, 2023, the PWSAC BOD approved the annual corporate budget for Fiscal Year 2024 detailing potential sources of revenue and expenditures. The pink cost-recovery revenue goal is \$9,290,767. The WNH chum and MBH sockeye salmon cost-recovery revenue goals are \$5,381,694 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 21% of the total run will be required to meet the revenue goal in the Fiscal Year 2024 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: AFK, CCH, and WNH pink salmon runs will be managed collectively through openings and closures of nearby subdistricts and/or hatchery management areas. Managing the enhanced pink salmon runs in aggregate may result in site-specific CCPF contribution rates being above or below the approximate target of 84% CPF pink salmon harvest.

WNH Chum and MBH Sockeye Salmon Runs: WNH chum salmon and MBH sockeye salmon runs will be managed collectively through openings and closures of nearby hatchery subdistricts. The collective management will be managed concurrently for the WNH chum salmon revenue goal. Managing the runs in aggregate may result in site-specific CPF contribution rates being above or below the approximate targets of 56% and 86% for 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. ADF&G will manage the AFK Hatchery remote release site in accordance with 5 AAC 24.370(e)(2)(A).

Reductions 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 goal as rapidly as possible to allow for an orderly and consistent CPF.

3.1 Hatchery Fish Migration Routes and Timing

AFK pink salmon donor stocks were selected for adults who mature in the time period August 15 to September 15. Timing in the CPF for such fish is expected to be from approximately July 20 to August 25, with a peak occurring mid-August. The probable approach routes of AFK Hatchery fish are shown in Figure 1.

Despite the large area encompassing the Southwestern District, most purse seining is concentrated in the straits and passes that make up the primary migration corridors. Several key areas have been identified where catches with high concentrations of AFK Hatchery-produced pink salmon occur. Primary interception points of AFK Hatchery fish are to the south - Point Elrington, Fox Farm, Capes Junken, Puget, and Squirrel Bay areas - and to the east and north - Latouche Passage, Shelter Bay, Point Helen, and Snug Harbor areas. Port San Juan Subdistrict (Evans Point south to Crab Bay) is also an important interception area. Undoubtedly, some AFK Hatchery fish are caught at the other four heavily fished areas: Point Countess, Chenega Point, east Chenega Shore, and east Latouche Shore fisheries. Additionally, CPF harvest of AFK Hatchery fish can be expected in the southern part of the Montague District, the Eshamy gillnet district, and as far north as Esther Island in the Coghill District.

3.2 Special Harvest Area

The SHA is used by the hatchery operator to harvest hatchery fish for cost recovery. The terminal harvest area (THA), or outer Sawmill Bay, is normally closed to commercial and subsistence fishing and provides a buffer between the hatchery SHA and open waters of the Southwestern District except during subsistence only openers. In the event of a commercial opening of the SHA and the THA in Sawmill Bay, a 500-yard closure will be in effect in front of O'Brien Creek and Anderson Creek unless modified by Executive Order. All latitude and longitude coordinates are based on the North American Datum of 1983.

Harvest of salmon by sport anglers and personal use fishermen in the SHA is managed by the ADF&G Division of Sport Fish in accordance with regulations as provided in 5 AAC 47-5 AAC

75. Emergency orders may be issued to liberalize or restrict sport fisheries based on achievement of broodstock goals.

The SHA consists of the waters of Sawmill Bay west of 148°01.95'W long.

The THA consists of the waters of Sawmill Bay north and west of a line from 60°03.66'N lat., 147° 59.11'W long. to 60°02.77'N lat., 148°01.00'W long. to 60°02.76'N lat., 148°01.66'W long., excluding the SHA.

3.3 Hatchery Returns to the Special Harvest Area

Pink Salmon: The anticipated 2023 adult return of pink salmon to AFK Hatchery is 6,800,000 fish assuming a 3.97% marine survival (5 odd-year average), from the BY21 fry release of 171.1 million (Table 1). Assuming a hatchery broodstock goal of approximately 398,000 fish and approximately 698,000 pink salmon sold for cost recovery, the total hatchery escapement will be 16% of the run.

Pink Salmon Projected Return Summary

| Total Return | Hatchery Escapement | | | CPF Harvest¹ |
|---------------------|----------------------------|----------------------|--------------|--------------------------------|
| | Broodstock | Cost Recovery | Total | |
| 6,800,000 | 398,000 | 698,000 | 1,096,000 | 5,704,000 |
| % of Total | 6% | 10% | 16% | 84% |

¹Terminal and non-terminal.

Chum Salmon: The anticipated 2023 adult run of chum salmon to AFK Hatchery is 190,000, assuming a 1.06% marine survival. All fish will be harvested by the CPF.

Chum Salmon Projected Run Summary

| Total Run | Hatchery Escapement | | | CPF Harvest¹ |
|-------------------|----------------------------|----------------------|--------------|--------------------------------|
| | Broodstock | Cost Recovery | Total | |
| 190,000 | -0- | -0- | -0- | 190,000 |
| % of Total | 0% | 0% | 0% | 100% |

¹Terminal and non-terminal.

Chum Salmon Projected Run, Age Composition Summary

| BY | Fry Released | Anticipated Marine Survival | Anticipated Total BY Return | Return Age | 2023 Projected Run | % of Total |
|-----------|---------------------|------------------------------------|------------------------------------|-------------------|---------------------------|-------------------|
| 2017 | 20,100,000 | 2.69% | 540,432 | Age-6 | 17,000 | 8.4% |
| 2018 | 18,500,000 | 0.62% | 115,587 | Age-5 | 39,000 | 20% |
| 2019 | 18,000,000 | 1.21% | 217,587 | Age-4 | 129,000 | 67.4% |
| 2020 | 18,800,000 | 1.21% | 227,257 | Age-3 | 9,000 | 4.2% |
| | | | | Total | 190,000 | 100% |

Historical average return age composition: 3% age-6, 34% age-5, 59% age-4, and 4% age-3.

3.4 Separation of Hatchery Escapement

The hatchery escapement goal of 1,096,000 pink salmon is the midpoint of the SHA escapement goal range 944,000–1,290,000 to provide for the broodstock and cost recovery requirements based on these variables; sex ratio of fish available for broodstock, fecundity, holding mortality percentage, immature and over-mature spawner percentage, average fish size, and price per pound.

In 2008, PWSAC designated an outer HEEZ within the SHA as an alternative to using a barrier net (Figure 2). The outer HEEZ consists of the waters of the SHA west and south of a line from 60°03.398'N lat., 148°03.326'W long. to 60°03.017'N lat., 148°02.547'W long. The inner HEEZ consists of the waters of the SHA west and south of a line from 60°03.253'N lat., 148°03.576'W long. to 60°02.889'N lat., 148°03.644'W long.

3.5 Special Management Strategies

Pink Salmon: Because there is no way of isolating hatchery fish from wild stocks in the general waters of the Southwestern, Montague, and adjacent districts, these districts can only be opened and closed as the wild stock run strength will allow. When the hatchery run can withstand a higher exploitation rate than the returning wild stocks, hatchery fish that are not intercepted in the mixed stock areas of the general districts continue into Port San Juan Subdistrict and waters of Sawmill Bay. Port San Juan Subdistrict was established to harvest the highest concentration of surplus hatchery fish in a mixed-stock fishery when wild stock interception must be minimized.

The principal tool available to manage the hatchery's return is emergency order manipulations of fishing time in the five designated approach zones to the hatchery: the Point Elrington Subdistrict, the Port San Juan Subdistrict, the THA in outer Sawmill Bay, the SHA in inner Sawmill Bay, and the AFK HEEZ (figures 2–3). The approaches to AFK Hatchery may be conservatively managed to provide for PWSAC's escapement needs. Test fishing and CCPF openings in the general waters of the Southwestern District may occur, as necessary, to assess the timing and magnitude of the late pink salmon return. When necessary to protect wild stocks and/or to decrease interception of hatchery fish to ensure hatchery escapement objectives are met, a closure of the two subdistricts during the regular season may be used. Fishing time will be extended in the Port San Juan Subdistrict when there is surplus hatchery production and wild stocks do not need protection to meet minimum escapement requirements. When it is apparent that a large hatchery surplus exists, every effort will be made to extend fishing time in waters of the Port San Juan Subdistrict in such a manner as to prevent a large buildup of fish from occurring and to allow for timely harvest of the best possible quality fish while protecting wild stock escapements.

Performance of the hatchery return is evaluated by comparison of daily harvest rates to a predicted run-entry table (Table 3). In addition, sex ratios in the hatchery harvest predict the midpoint of the return. PWSAC will provide these two types of data from the cost-recovery harvest to ADF&G management staff on a daily basis during the season so the area management biologist can make estimates of the number of salmon left in the run. Once egg-take operations commence at the hatchery, progress towards the hatchery's final goal could determine future SHA openings

dependent upon SHA fish abundance estimates. PWSAC will provide daily estimates of fish abundance inside the barrier net (if applicable), within the HEEZ, and in the SHA outside of the HEEZ, along with egg-take progress updates to ADF&G management staff.

If hatchery escapement problems occur at the hatchery, or western PWS wild stocks are not meeting escapement goals, subdistrict closures may be made based upon the magnitude of the shortfall and the stage of the run. Protection would be provided by commercial and subsistence closures of the Port San Juan and Point Elrington subdistricts. These areas will be reopened as hatchery returns recover and wild stock escapements allow.

The effective management of mixed-stock fisheries is difficult. It is the intent of ADF&G to provide for stated PWSAC hatchery escapement goals by species. Achieving the target revenue goal will depend on the timing and magnitude of the PWSAC pink salmon return, average fish size, and price per pound PWSAC receives. It will also depend upon precise in-season assessments of both wild and hatchery run strength. Depending upon on the precision of in-season run assessments, actual percentages of PWSAC total returns by species that provide hatchery escapement may fall above or below the stated goals. If precise and timely stock identification data are available, ADF&G will use them to manage the fisheries in season for an allocation of PWSAC-produced pink, chum, and sockeye salmon between the CPF and PWSAC. Pink, sockeye, and chum salmon will be managed for PWSAC hatchery escapement by stock.

PWSAC will submit written management recommendations to the department with clear justifications as to how the recommendations support achieving cost-recovery and/or broodstock collection goals. Each recommendation, in the form of a brief email, will include, but not be limited to, current cost-recovery harvest data, HEEZ and outer SHA estimates, actual and anticipated run entry, and actual and anticipated cost-recovery progress. Each recommendation will also include a summary of actual and anticipated hatchery escapement and broodstock collection progress as it relates to the weekly goals established in this AMP. For this reporting, hatchery escapement will be defined as fish in the HEEZ and outer SHA; fish in the raceways or brood holding ponds will be defined as broodstock.

To ensure accurate and clear reporting, the AMP Adult Return Summary table for each hatchery and species will be submitted to the department, in association with written management recommendations.

It will be the responsibility of PWSAC staff, with written consent of the PWSAC Executive Committee, to advise ADF&G of any desired in-season adjustments to preseason hatchery escapement goals and/or significant changes to the preseason management strategy. Recognizing the imprecision of preseason forecasts and in-season assessment of wild stock and hatchery contribution estimates, ADF&G will assess PWSAC's requested changes based upon the best available information. If, based on the assessment of ADF&G, the total hatchery return will be less than or greater than the original PWSAC forecasted return, then ADF&G will adjust openings, as necessary, to best provide for wild stock escapement, hatchery escapement, and CPF harvests. Total hatchery and wild stock returns will be estimated after a thorough postseason analysis of all available data. Postseason estimates may not coincide with ADF&G's or PWSAC's in-season estimates.

3.6 Sport Fish Harvest

Sport fisheries will be managed in accordance with regulations as provided in 5 AAC 47–5 AAC 75. Emergency orders may be issued to liberalize or restrict sport fisheries based on achievement of broodstock goals. No target sport fishery has developed to date nor is anticipated at AFK Hatchery.

3.7 Subsistence Harvest

The AFK Hatchery facility is within the Prince William Sound Southwestern District subsistence area. Alaska residents may harvest fish for subsistence use as described in 5 AAC 01.600–01.648.

3.8 Avoidance of Nontarget Species

Numerical abundance of species other than pink and chum salmon at AFK Hatchery is insignificant and no particular problems have developed in the history of the facility.

IV. EVALUATION STUDIES

4.1 Otolith Marking

During the fall incubation period (October–December 2023), 100% of the pink and chum salmon production will be marked at the eyed-egg stage. The table below summarizes the 2023 thermal otolith mark assignments by the ADF&G Mark, Tag, and Age Lab (MTAL). Voucher samples are collected and submitted along with data as 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 Eyed Eggs | Thermal Otolith Mark | Intended Release Location |
|----------------|----------------------------|-----------------------------|----------------------------------|
| Pink Salmon | 89,800,000 | 4H | AFK, Sawmill Bay |
| Pink Salmon | 89,800,000 | 4H3 | AKF, Sawmill Bay |
| Chum Salmon | 20,000,000 | 1,2,1H | AFK, Sawmill Bay |

4.2 Otolith Recovery in Returning Adults and Data Reporting

Returning adult pink and chum salmon will be sampled for otolith mark recoveries. Recovery efforts will be directed at the commercial CPF and cost recovery fisheries and will be performed by field personnel at processing locations.

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 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 with independently-collected otolith mark-recovery data by April 1 each year. These data are to be the individual specimen otolith mark results.

V. ATTACHMENTS

FIGURE 1. AFK Adult Pink Salmon Probable Migration Route

FIGURE 2. AFK Hatchery Fishery Management Areas

FIGURE 3. AFK Hatchery Escapement Exclusion Zone

TABLE 1. 2023 PWSAC Hatchery Return Forecast Summary

TABLE 2. 2023 PWSAC Planned Egg Takes

TABLE 3. 2023AFK Pink Adult Return Summary

TABLE 4. 2023 PWSAC Hatchery Egg-Take Schedules

TABLE 5. 2023 PWSAC Estimated Salmon Releases

TABLE 6. 2024 PWSAC Estimated Salmon Releases

TABLE 7. Egg-take Data Template for Each Species at Each Hatchery

VI. APPROVAL

Recommendation for Approval: Armin F. Koernig Hatchery Annual Management Plan, 2023

Geoff Clark, PWSAC, General Manager 4/26/2023

Brittany Blain-Roth, Area Management Biologist, Division of Sport Fish 4/27/2023

Heather Scannell, Area Management Biologist, Division of Commercial Fisheries 4/27/2023

Jason Dye, Regional Supervisor, Division of Sport Fish 4/27/2023

Bert Lewis, Regional Supervisor, Division of Commercial Fisheries 4/27/2023

Ethan Ford, Regional Resource Development Biologist, Div. of Commercial Fisheries 4/27/2023

Lorraine Vercessi, PNP Hatchery Program Coordinator, Div. of Commercial Fisheries 5/15/2023

The 2023 Armin F. Koernig Hatchery Annual Management Plan is hereby approved:

Tom Taube, Deputy Director, Division of Sport Fish 5/17/2023

Forrest Bowers, Operations Manager, Division of Commercial Fisheries 5/17/2023

[illegible]

Figure 2. AFK Hatchery Fishery Management Areas

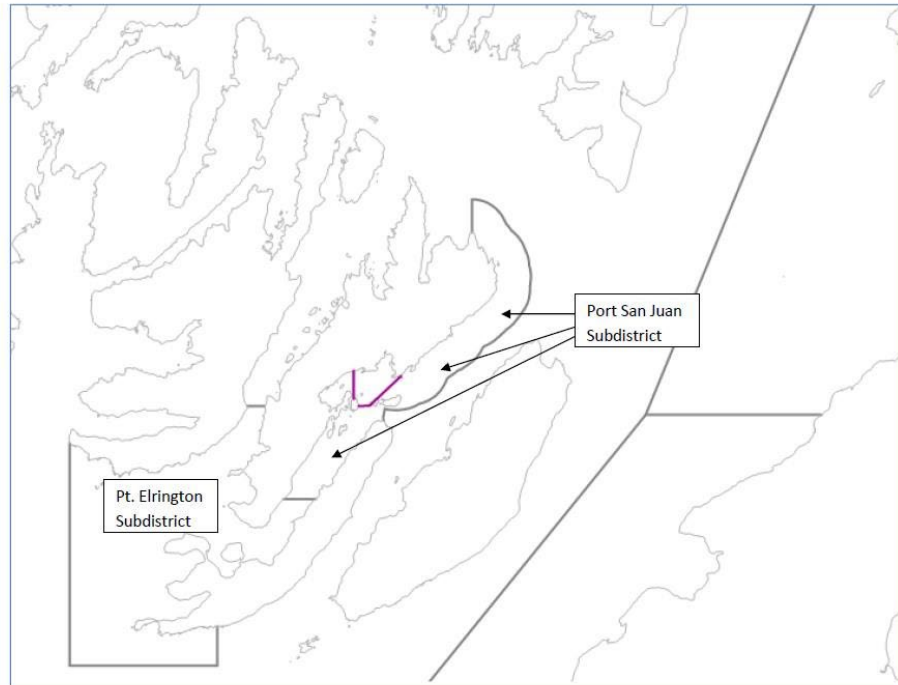


Figure 3. AFK Hatchery Escapement Exclusion Zone (HEEZ), Special Harvest Area, Terminal Harvest Area

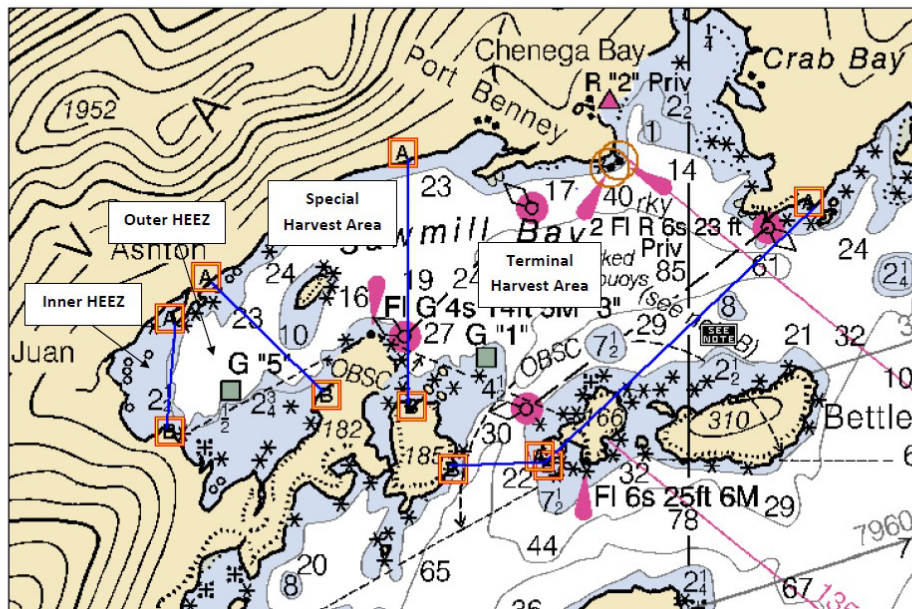


TABLE 1. 2023 PWSAC Hatchery Return Forecast Summary

**PRINCE WILLIAM SOUND AQUACULTURE CORPORATION
2023 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 | 4,100,000 | 6,800,000 | 9,500,000 | 3.97% |
| | | | | | | |
| | CHUM | JUN 1 - JUL 27 | 150,000 | 190,000 | 240,000 | 1.06% |
| | | | | | | |

| | | | | | | |
|-----|------|--------------------|-----------|------------|------------|-------|
| CCH | PINK | JUL 23 - SEP 07 | 8,100,000 | 11,300,000 | 14,500,000 | 7.01% |
| | | | | | | |

| | | | | | | |
|-----|------|--------------------|-----------|-----------|------------|-------|
| WNH | PINK | JUL 19 - SEP 05 | 1,900,000 | 6,100,000 | 10,200,000 | 4.60% |
| | | | | | | |
| | CHUM | JUN 1 - JUL 27 | 1,950,000 | 2,210,000 | 2,460,000 | 3.01% |
| | | | | | | |
| | COHO | AUG 01 - SEP 20 | 75,000 | 122,000 | 170,000 | 4.54% |
| | | | | | | |

| | | | | | | |
|-----|---------|----------|---------|---------|-----------|-------|
| MBH | COGHILL | JUN 15 - | 826,000 | 934,000 | 1,043,000 | 9.09% |
| | SOCKEYE | AUG 01 | | | | |

| | | | | | | |
|----|------------------------------|--|--------|--------|--------|-------|
| GH | GH - Fry to Adult Survival | | | | | |
| | CROSSWIND LAKE SOCKEYE | | 22,000 | 27,000 | 32,000 | 0.31% |
| | | | | | | |
| | PAXSON LAKE - GI SOCKEYE | | 22,300 | 26,100 | 30,100 | 0.45% |
| | | | | | | |
| | PAXSON LAKE - GII SOCKEYE | | 1,900 | 2,200 | 2,400 | 0.80% |
| | | | | | | |
| | SUMMIT LAKE SOCKEYE | | | | | |
| | | | | | | |

RETURNS TO REMOTE RELEASE LOCATIONS

| | | | | | | |
|---------------|---------|---------------------|---------|---------|---------|-------|
| PORT CHALMERS | CHUM | JUN 1 - JUL 27 | 560,000 | 650,000 | 740,000 | 2.50% |
| | | | | | | |
| CORDOVA | COHO | AUG 01 - SEP 20 | 3,100 | 5,900 | 8,700 | 5.90% |
| | | | | | | |
| WHITTIER | COHO | AUG 01 - SEP 20 | 2,800 | 4,600 | 6,300 | 4.60% |
| | | | | | | |
| CHENEGA | COHO | AUG 01 - SEP 20 | 1,500 | 2,900 | 4,300 | 5.80% |
| | | | | | | |
| CHENEGA | CHINOOK | MAY 25 - JULY 10 | 120 | 230 | 330 | 0.48% |
| | | | | | | |

TOTAL PWSAC RETURNS

| | | | | | |
|--|---------------------------|------------|------------|------------|-------|
| | PINK | 14,100,000 | 24,200,000 | 34,200,000 | 5.19% |
| | | | | | |
| | CHUM | 2,660,000 | 3,050,000 | 3,440,000 | 2.19% |
| | | | | | |
| | COHO | 82,400 | 135,400 | 189,300 | 4.54% |
| | | | | | |
| | CHINOOK | 120 | 230 | 330 | 0.48% |
| | | | | | |
| | SOCKEYE -SOUND, MBH | 826,000 | 934,000 | 1,043,000 | 9.09% |
| | | | | | |
| | SOCKEYE - GH,COPPER RIVER | 46,200 | 55,300 | 64,500 | 0.52% |
| | | | | | |

TABLE 2. 2023 Planned Egg-Takes

PRINCE WILLIAM SOUND AQUACULTURE CORPORATION

2023 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 | 3,685,000 |
| | | POWER CREEK/FLEMING SPIT | CDV | 135,000 |
| | | | TOTAL | 4,000,000 |
| CHINOOK | WALLY NOERENBERG | WJHSFH | WNH | 50,000 |
| | | | TOTAL PWSAC | 731,200,000 |

TABLE 3. 2023 AFK Pink Adult Return Summary.

| PROJECTED | | | | | ACTUAL | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
|-----------|--|--|--|--|--------|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|
|-----------|--|--|--|--|--------|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|

TABLE 3. 2023 AFK Pink Adult Return Summary. Page 2 of 2.

TABLE 4. 2023 PWSAC Hatchery Egg-Take Schedules

PRINCE WILLIAM SOUND AQUACULTURE CORPORATION

2023 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 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 | 72,800,000 |
| | | | 2022 | PORT CHALMERS | 40,700,000 |
| | | | 2022 | AFK | 19,500,000 |
| | | | TOTAL | | 133,000,000 |
| SOCKEYE | MAIN BAY | COGHILL LAKE | 2021 | MBH | 9,650,000 |
| | | GULKANA I | 2022 | PAXSON LAKE | 4,100,000 |
| | GULKANA I | GULKANA RIVER | 2022 | SUMMIT LAKE | 0 |
| | | GULKANA RIVER | 2022 | CROSSWIND LAKE | 0 |
| | | GULKANA RIVER | 2022 | | |
| | GULKANA II | GULKANA RIVER | 2022 | PAXSON LAKE | 1,300,000 |
| TOTAL | | | | | 15,050,000 |
| PINK | ARMIN F. KOERNIG | LARSEN, EWAN, GALENA | 2022 | AFK | 174,900,000 |
| | CANNERY CREEK | CANNERY CREEK | 2022 | CCH | 171,300,000 |
| | WALLY NOERENBERG | LARSEN, EWAN, GALENA | 2022 | WNH | 134,800,000 |
| | TOTAL | | | | 481,000,000 |
| COHO | WALLY NOERENBERG | CORBIN CREEK | 2021 | WNH | 2,800,000 |
| | | MILE 18 | 2021 | CORDOVA | 100,000 |
| | | CORBIN CREEK | 2021 | WHITTIER | 100,000 |
| | | MILE 18 | 2021 | CHENEGA | 50,000 |
| | | TOTAL | | | 3,050,000 |
| CHINOOK | WALLY NOERENBERG | SHIP CREEK | 2021 | CHENEGA | 44,000 |
| GRAND TOTAL | | | | | 632,144,000 |

TABLE 6. 2024 PWSAC Estimated Salmon Releases

PRINCE WILLIAM SOUND AQUACULTURE CORPORATION

2024 ANTICIPATED SALMON RELEASES

| SPECIES | HATCHERY | ORIGINAL DONOR STOCK | BROOD YEAR | RELEASE LOCATION | ESTIMATED FRY/ SMOLT RELEASE |
|---------|------------------|----------------------|------------|------------------|------------------------------|
| CHUM | WALLY NOERENBERG | WELLS RIVER | 2023 | WNH | 73,200,000 |
| | | | 2023 | PORT CHALMERS | 40,800,000 |
| | | | 2023 | AFK | 19,400,000 |
| | | | TOTAL | | 133,400,000 |
| SOCKEYE | MAIN BAY | COGHILL LAKE | 2022 | MBH | 11,080,000 |
| | | | | | |
| | GULKANA I | GULKANA RIVER | 2023 | PAXSON LAKE | 6,000,000 |
| | | GULKANA RIVER | 2023 | SUMMIT LAKE | 4,700,000 |
| | | GULKANA RIVER | 2023 | CROSSWIND LAKE | 10,000,000 |
| | GULKANA II | GULKANA RIVER | 2023 | PAXSON LAKE | 1,300,000 |
| | | | | TOTAL | 33,090,000 |
| PINK | ARMIN F. KOERNIG | LARSEN, EWAN, GALENA | 2023 | AFK | 171,600,000 |
| | CANNERY CREEK | CANNERY CREEK | 2023 | CCH | 168,800,000 |
| | WALLY NOERENBERG | LARSEN, EWAN, GALENA | 2023 | WNH | 133,600,000 |
| | | | | TOTAL | 474,000,000 |
| COHO | WALLY NOERENBERG | CORBIN CREEK | 2022 | WNH | 1,000,000 |
| | | POWER CREEK | 2022 | CORDOVA | 100,000 |
| | | CORBIN CREEK | 2022 | WHITTIER | 100,000 |
| | | CORBIN CREEK | 2022 | CHENEGA | 50,000 |
| | | | | TOTAL | 1,250,000 |
| CHINOOK | WALLY NOERENBERG | SHIP CREEK | 2022 | CHENEGA | 45,900 |
| | | | | GRAND TOTAL | 641,485,900 |

TABLE 7. 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 | Gm 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 |
| | | | | | | | | | | 0 | #DIV/0! | | | | | | | | | | | #DIV/0! | #DIV/0! | 0 | 0 |
| | | | | | | | | | | 0 | #DIV/0! | | | | | | | | | | | #DIV/0! | #DIV/0! | 0 | 0 |
| | | | | | | | | | | 0 | #DIV/0! | | | | | | | | | | | #DIV/0! | #DIV/0! | 0 | 0 |
| | | | | | | | | | | 0 | #DIV/0! | | | | | | | | | | | #DIV/0! | #DIV/0! | 0 | 0 |
| | | | | | | | | | | 0 | #DIV/0! | | | | | | | | | | | #DIV/0! | #DIV/0! | 0 | 0 |
| | | | | | | | | | | 0 | #DIV/0! | | | | | | | | | | | #DIV/0! | #DIV/0! | 0 | 0 |
| | | | | | | | | | | 0 | #DIV/0! | | | | | | | | | | | #DIV/0! | #DIV/0! | 0 | 0 |
| | | | | | | | | | | 0 | #DIV/0! | | | | | | | | | | | #DIV/0! | #DIV/0! | 0 | 0 |
| | | | | | | | | | | 0 | #DIV/0! | | | | | | | | | | | #DIV/0! | #DIV/0! | 0 | 0 |
| | | | | | | | | | | 0 | #DIV/0! | | | | | | | | | | | #DIV/0! | #DIV/0! | 0 | 0 |
| | | | | | | | | | | 0 | #DIV/0! | | | | | | | | | | | #DIV/0! | #DIV/0! | 0 | 0 |
| | | | | | | | | | | 0 | #DIV/0! | | | | | | | | | | | #DIV/0! | #DIV/0! | 0 | 0 |
| | | | | | | | | | | 0 | #DIV/0! | | | | | | | | | | | #DIV/0! | #DIV/0! | 0 | 0 |
| | | | | | | | | | | 0 | #DIV/0! | | | | | | | | | | | #DIV/0! | #DIV/0! | 0 | 0 |
| | | | | | | | | | | 0 | #DIV/0! | | | | | | | | | | | #DIV/0! | #DIV/0! | 0 | 0 |
| | | | | | | | | | | 0 | #DIV/0! | | | | | | | | | | | #DIV/0! | #DIV/0! | 0 | 0 |
| | | | | | | | | | | 0 | #DIV/0! | | | | | | | | | | | #DIV/0! | #DIV/0! | 0 | 0 |
| | | | | | | | | | | 0 | #DIV/0! | | | | | | | | | | | #DIV/0! | #DIV/0! | 0 | 0 |
| | | | | | | | | | | 0 | #DIV/0! | | | | | | | | | | | #DIV/0! | #DIV/0! | 0 | 0 |
| | | | | | | | | | | 0 | #DIV/0! | | | | | | | | | | | #DIV/0! | #DIV/0! | 0 | 0 |
| | | | | | | | | | | 0 | #DIV/0! | | | | | | | | | | | #DIV/0! | #DIV/0! | 0 | 0 |
| | | | | | | | | | | 0 | #DIV/0! | | | | | | | | | | | #DIV/0! | #DIV/0! | 0 | 0 |
| | | | | | | | | | | 0 | #DIV/0! | | | | | | | | | | | #DIV/0! | #DIV/0! | 0 | 0 |
| | | | | | | | | | | 0 | #DIV/0! | | | | | | | | | | | #DIV/0! | #DIV/0! | 0 | 0 |
| | | | | | | | | | | 0 | #DIV/0! | | | | | | | | | | | #DIV/0! | #DIV/0! | 0 | 0 |
| | | | | | | | | | | 0 | #DIV/0! | | | | | | | | | | | #DIV/0! | #DIV/0! | 0 | 0 |
| | | | | | | | | | | 0 | #DIV/0! | | | | | | | | | | | #DIV/0! | #DIV/0! | 0 | 0 |
| | | | | | | | | | | 0 | #DIV/0! | | | | | | | | | | | #DIV/0! | #DIV/0! | 0 | 0 |
| | | | | | | | | | | 0 | #DIV/0! | | | | | | | | | | | #DIV/0! | #DIV/0! | 0 | 0 |
| | | | | | | | | | | 0 | #DIV/0! | | | | | | | | | | | #DIV/0! | #DIV/0! | 0 | 0 |
| | | | | | | | | | | 0 | #DIV/0! | | | | | | | | | | | #DIV/0! | #DIV/0! | 0 | 0 |
| | | | | | | | | | | 0 | #DIV/0! | | | | | | | | | | | #DIV/0! | #DIV/0! | 0 | 0 |
| | | | | | | | | | | 0 | #DIV/0! | | | | | | | | | | | #DIV/0! | #DIV/0! | 0 | 0 |
| | | | | | | | | | | 0 | #DIV/0! | | | | | | | | | | | #DIV/0! | #DIV/0! | 0 | 0 |
| | | | | | | | | | | 0 | #DIV/0! | | | | | | | | | | | #DIV/0! | #DIV/0! | 0 | 0 |
| | | | | | | | | | | 0 | #DIV/0! | | | | | | | | | | | #DIV/0! | #DIV/0! | 0 | 0 |
| | | | | | | | | | | 0 | #DIV/0! | | | | | | | | | | | #DIV/0! | #DIV/0! | 0 | 0 |
| | | | | | | | | | | 0 | #DIV/0! | | | | | | | | | | | #DIV/0! | #DIV/0! | 0 | 0 |
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