

# STATE OF ALASKA

## DEPARTMENT OF FISH AND GAME

### DIVISION OF COMMERCIAL FISHERIES

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#### MEMORANDUM

TO: Jeff Regnart, Director

THROUGH:

FROM: Eric Volk, Chief Fishery Scientist, Salmon

DATE: March 27, 2014

SUBJECT: Solomon Gulch Hatchery Permit Alteration Request; staff comments

#### ***Summary of Permit Alteration Request***

Valdez Fisheries Development Association (VFDA) is permitted to take up to 230 million green pink salmon eggs at Solomon Gulch Hatchery (SGH) and is requesting a 30.5% increase to 300 million eggs. These increases are proposed in a step-wise fashion over a period of about five years from PAR approval and are predicated on expansion of the existing incubation building, securing additional water supply, and purchase of additional salt water rearing pens. The proposal documents an approximate timeline for physical plant modifications, increased egg takes and smolt releases. The earliest any additional eggs would be taken is 2016. It is estimated that increasing green egg takes by 70 million would require an additional 82,000 fish for brood stock.

#### ***Projected increased pink salmon run to SGH***

Estimated marine survivals of SGH pink salmon since 1995 have averaged 7.1% (range = 0.6% to 11.1%) in odd years and 5.1% (range = 2.5% to 8.1%) in even years. Assuming similar average marine survivals and a 94% green egg to fry survival, this production increase would increase average annual adult runs by ~5.0 million for the odd-years brood line and ~3.5 million for the even-years brood line. VFDA projects this would add \$5 million annually to the value of the Prince William Sound (PWS) purse seine fishery. At highest observed marine survivals (11.1%) and requested capacity (300 million green eggs), the potential exists for returns in excess of 31 million fish to SGH. The 10-year average pink salmon return to SGH for 2004—2013 is 14.3 million fish.

### ***Possible impacts to wild stocks: straying of un-harvested hatchery fish***

Hatchery salmon strays may have both ecological and genetic impacts to wild salmon stocks. Brenner et al. (2012) recently investigated hatchery salmon straying into streams utilized by wild salmon within PWS. This study sampled one stream within the Port of Valdez containing 87–98% hatchery pink salmon in 2009-2010, the vast majority of which (93%) originated from SGH. Within the remainder of the Eastern District, proportions of SGH pink salmon within wild-stock streams ranged from 0–21%, with an average across three sampled years of 1.9-4.7%. Few pink salmon strays from SGH were found outside the Eastern District and these fish appear to have a lower propensity to stray than pink salmon from other PWS hatcheries. Nevertheless, recognizing the long migratory route through Prince William Sound, a 30% increase over present production would increase the risk of straying into natural spawning areas and possible genetic hybridization with wild stock populations throughout Prince William Sound. The ADF&G Genetics policy, section IIA, seeks the “prevention of detrimental effects of gene flow from hatchery fish straying and interbreeding with wild fish.” The department manages for wild salmon escapement goals in PWS based on aerial survey fish indices in streams. Because it is not possible to differentiate between wild and hatchery salmon during aerial surveys, both contribute to the escapement estimate and the presence of hatchery fish in index streams inflates wild stock escapement estimates to some extent. From 1983 to 2013, escapement goals for Eastern District pink salmon have been met in 24 of 31 years. There are currently no salmon index systems within Port Valdez and the streams are no longer assessed.

### ***Possible impacts to wild stocks and other species: Competition for Food***

Recent studies suggest that wild adult and juvenile pink salmon within PWS may compete with hatchery adult and juvenile pink salmon for prey items. Sturdevant et al. (2013) showed that adult pink salmon feeding within PWS have considerable dietary overlap with outmigrating juvenile pink salmon. This study also showed that Pacific herring represented an important dietary component of adult pink salmon in PWS in one study year (2010). Other studies during the last decade provide evidence of resource competition between hatchery and wild pink salmon juveniles within PWS (e.g., Wertheimer et al. 2004 and Cross et al. 2009). The current magnitude of hatchery origin pink salmon releases raises concerns over possible negative impacts of these interactions on wild stocks and additional hatchery production will likely increase competitive interactions with wild salmon and predation on herring in PWS to some degree.

### ***Fishery Management***

Run timing of enhanced pink salmon returning to SGH is early and there is minimal overlap with PWS wild stocks outside of Port Valdez. While this fishery largely avoids migration corridors, wild pink and chum salmon stocks in Valdez Arm are incidentally harvested. Harvest of wild stocks returning to Galena, Jack, and Sawmill bays can be controlled through time and area restrictions. Additionally, commercial common property harvests are limited at the beginning and end of the SGH enhanced pink salmon fishery to ensure hatchery cost recovery and broodstock goals are met, which allows early run wild stocks to escape into their natal streams. SGH pink salmon will likely exhibit a similar run timing distribution to many unmonitored stocks in Port Valdez, and some un-monitored stocks will likely be incidentally harvested along with the targeted hatchery fish.

### ***Possible Impacts to Sport Fishery***

The Port of Valdez and Valdez Arm support the largest component of the sport fishery in PWS. The area’s pink salmon sport fishery is the largest in the state. Peak angler and commercial fishing activity typically coincides with the peak of the pink salmon run during the first week of July. Potential for conflict between the two user groups exists at this time, especially at Allison Point near SGH. There is also overlap in run timing between enhanced pink and coho salmon returning to SGH. The coho salmon sport fishery of the Valdez area (Arm and Port) begins in late July and continues through Labor Day weekend. The 2001–2010 sport harvest of coho salmon in that area averaged 48,700 fish. ADF&G manages the Port of Valdez to reduce conflicts between the commercial and sport

user groups by excluding commercial fishing within the Port of Valdez and the Valdez Narrows from August 15 through Labor Day. However, the department may designate open areas for commercial harvest within Port Valdez if a buildup of surplus salmon occurs during the August 15 to Labor Day closure. Any increase in pink salmon production at SGH could increase the likelihood of commercial fisheries targeting surplus pink salmon within Port Valdez during the August 15 to Labor Day closure, and therefore increase the likelihood of conflict between user groups.

### ***Alaska Hatchery Research Program***

There is some concern about impacts of a large production increase on The Alaska Hatchery Research Program objectives. This collaborative research effort, with ADF&G, Alaska hatchery operators, and fish processors, is a multi-generational study of effects of straying and hatchery-wild hybridization on fitness of salmon. A key question in this study is the extent and variability of pink salmon straying in PWS. While the degree to which any production increase might impact this investigation is debatable, a large increase in hatchery production could increase stray numbers to some monitored streams in this project, as well as influence fitness effects through juvenile interactions. Significantly greater hatchery release numbers introduces a new variable part way through the study and effectively changes background conditions against which fitness is measured. Recognizing the potential importance of this project to evaluation of future hatchery production increases, we should not dramatically change conditions under which fitness is being evaluated during the study.

### ***Recommendation***

Recognizing the need for further infrastructure and water supply development before any additional production can be accommodated, permitting of any increased egg takes should be delayed until the additional hatchery capacity is realized. Delay of this permit is also warranted because large increases in PWS pink production may adversely affect study design for the Alaska Hatchery Research Program, which is specifically designed to provide information to guide future decisions on salmon hatchery production in PWS and Southeast Alaska. As new facilities increase capacity at SGH, future PARs should consider an incremental approach to increased capacity so that effects on straying proportions in Eastern District streams and on fishery management can be evaluated prior to consideration of additional increases.

### ***References***

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- Cross, A.D., D.A. Beauchamp, J.H. Moss and K.W. Myers. 2009. Interannual Variability in Early Marine Growth, Size-Selective Mortality, and Marine Survival for Prince William Sound Pink Salmon. *Marine and Coastal Fisheries: Dynamics, Management, and Ecosystem Science*. 1:57-70.
- Sturdevant M.V., R. Brenner, E.A. Fergusson, J.A. Orsi, and W.R. Heard. 2013. Does predation by returning adult pink salmon regulate pink salmon or herring abundance? *North Pacific Anadromous Fish Commission Technical Report No. 9*: 153–164.
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