MEMORANDUM

State of Alaska

Department of Fish and Game
Division of Commercial Fisheries

To: Sam Rabung
Statewide PNP Hatchery Coordinator
Commercial Fisheries – HQ, Juneau

Thru: Bill Davidson
Regional Management Coordinator
Commercial Fisheries – Sitka

Robert Chadwick
Regional Management Coordinator
Sport Fisheries – Sitka

From: Gordie Woods
Commercial Fisheries – Yakutat

Brian Marston
Sport Fisheries – Yakutat

Date: October 26, 2012

Telephone: (907) 747-6688- CF
(907) 747-5355- SF

Fax: (907) 747-6693

Subject: Yakutat MFA

Per your request, and as specified by **5 AAC 40.130. Management Feasibility Analysis**, the following is a management feasibility analysis (MFA) for a proposed private nonprofit (PNP) salmon enhancement projects in Yakutat Bay, Alaska. Each of the six points specified in regulation are discussed within this document: 1) potential contributions to common property fisheries, 2) size and location of special harvest area, 3) special management concerns, 4) potential broodstock sources, 5) assessment of production potential for each species, and 6) additional relevant factors considered. Five of the proposed sites (Humpback Creek, Redfield Cove, Broken Oar Cove, Puget Cove, and Monti Bay) are addressed collectively in one section and the sixth site (Eleanor Cove) is addressed separately. This is because the first five sites are located within existing traditional fishing areas (Yakutat Bay and Humpback Creek) and Eleanor Cove is not.

Background Information

The Yakutat Regional Aquaculture Association (YRAA) has proposed six salmon enhancement projects in Yakutat Bay, Alaska (Figure 1). The start-up phase would consist only of remote release sites, and the project would eventually operate one or more production hatcheries at full capacity. The primary species proposed for production at this time are chum and pink salmon. The proposed production plan for the hatchery and remote release sites is as follows:

- The letter of request for an MFA identifies a late summer pink salmon stock. A suitable stock of pink salmon for broodstock would need to be identified and approved by the department. Initially, ten million pink salmon eggs would be collected, incubated, and the resulting fry would be reared in salt water net pens. Assuming 10% mortality from green egg stage, a potential 9 million would be released from the site in early spring. Assuming a marine survival for pink salmon of 2.5%, a return of approximately 225,000 pink salmon could be anticipated. At full production, 200 million pink salmon eggs would be collected at the facility, incubated, and approximately 190 million fed fry would be released with a potential return of 4.75 million adults. Common property harvests could occur in traditional set gillnet fisheries for pink salmon in Yakutat Bay as well as opportunities provided in one or more terminal harvest areas (THA). Additional common property harvests could occur in the troll fishery. Assuming a fecundity of 1,500, the program would require approximately 13,500 adults for broodstock to start, and approximately 270,000 adults for broodstock at full capacity. Some portion of the return would be harvested terminally for cost recovery purposes. The initial request estimates an initial 50% cost recovery and that at full capacity cost recovery could be reduced or eliminated over time.

- The letter of request for an MFA identifies an early summer chum salmon stock. A suitable stock of chum salmon for broodstock would need to be identified and approved by the department. Initially, 10 million chum salmon eggs would be collected, incubated, and the resulting fry would be reared in saltwater net pens to a target weight of 2g. Assuming 10% mortality from green egg stage, a potential 9 million fry would be released from the facility in early spring. Assuming a marine survival of 2.5% for chum salmon, a return of approximately 225,000 chum salmon could be anticipated. At full production, 78 million chum salmon eggs would be collected at the facility, incubated, and approximately 70 million fry would be released, with a potential return of 1.75 million chum salmon. Common property harvests could occur in traditional set gillnet fisheries in Yakutat Bay as well as in opportunities provided in one or more THAs. Additional common property harvests could occur in the troll fishery. Assuming a fecundity of 2,000, the program would require approximately 10,000 adults for broodstock to start, and approximately 78,000 adults for broodstock at full capacity. The initial request estimates an initial 50% cost recovery and that at full capacity cost recovery could be reduced or eliminated over time.

Broken Oar Cove, Redfield Cove, Humpback Creek, Monti Bay, and Puget Cove

1. <u>Potential Contributions To The Common Property Fisheries</u>

<u>Potential Contributions to the Commercial Fisheries</u>

Yakutat Bay (herein referred to as Bay) is open to both set gillnet and troll gear. The Bay opens for set gillnet gear on the second Sunday in June and remains open through the end of the season in early October. Annual salmon harvests in the setnet fishery in the Bay from 1963-2011 are shown in Table 1. From June through early August this fishery targets sockeye salmon. Chinook salmon are also harvested incidentally. Sockeye salmon stocks are primarily of Situk River

origin, although the fishery also targets stocks destined for other river systems southeast of Yakutat Bay, including, but not limited to, the Dangerous and Akwe rivers, the New Italio River, and the Alsek and East Alsek rivers. There are very little data on Chinook salmon stocks that are harvested in the Bay. Beginning in May, 2013, genetic information for Chinook will be collected during an experimental spring troll fishery. It is possible an early summer enhanced chum salmon run could add substantial harvest opportunities in the Bay's set gillnet fishery.

Beginning in early August through the end of the season, the set gillnet fishery targets both coho and pink salmon. The Bay is not a major producer of coho salmon, and effort levels in the fishery decline in the fall. Many creeks in the Bay contribute small numbers of both pink and coho salmon; but only one, Humpback Creek, is a major contributor. The name is axiomatic; Humpback Creek has been a major pink salmon producer in the Bay and sustained a commercial fishery, distinct from the Bay fishery, from Statehood through the mid-1990s in the cove immediately adjacent to the mouth of the creek (Table 2). Habitat degradation of man-made origin has caused a major decline in pink salmon production in Humpback Creek, and that fishery has not been opened since 1996. Because of these productivity changes in Humpback Creek the formal escapement goal was deleted in 2006. It is possible that a fall run of enhanced pink salmon could reinvigorate the pink salmon fishery in Yakutat Bay

The spring troll season in Yakutat Bay will open on May 1, with a closing date to be determined. It will be in the nature of an experimental fishery, open only for one day a week with a cap of 1,000 Chinook salmon. The fishery would close on June 30, or whenever the cap of 1,000 Chinook salmon has been taken, whichever comes first. The general summer troll season is from July 1–September 20. It is difficult to predict the impact on the troll fishery of enhanced pink and chum salmon. The Yakutat troll fleet is quite small, consisting of approximately 25 permits, almost all of which are hand troll permits. This fleet would undoubtedly target both enhanced chum and pink salmon. But what is unknown is how much of an attractant enhanced chum and pink salmon in Yakutat Bay would be to the power troll fleet in SE Alaska. Traditionally, the troll fishery has targeted coho salmon in Yakutat, and troll effort has varied widely over time. When the coho "bite" is on, there can be 100-150 power trollers fishing Yakutat waters. When the "bite" is off, the local hand troll fleet has the waters to themselves.

There are large areas of Yakutat Bay open to commercial set gillnetting, but not fished. The current fishery takes place in the area of known sockeye and Chinook salmon migration patterns. The introduction of enhanced chum and pink salmon at full capacity could greatly expand the area of fishing opportunity in Yakutat Bay and could lead to increased setnet fishing effort in the Bay (with corresponding reductions in effort in other set gillnet fisheries in the area).

Weekly set gillnet fishing periods in the Bay are currently linked to the open periods in the Situk-Ahrnklin Inlet fishery. Those weekly fishing periods are predicated on the weir counts at the Situk River weir which has been operated in the lower river since 1988. The weekly opening length is typically 2.5 days per week with increases, or decreases, in fishing time dependant on observed salmon (primarily sockeye but also Chinook) escapements counted through the weir. The setnet fishery in the Bay would continue to be managed in this way because of the department's mandate to manage for wild stocks. If fishing time were limited to protect wild stocks and there were large numbers of enhanced summer chum salmon, or later in the season

pink salmon, in the area there could be substantial numbers of enhanced salmon that would not be available for harvest within the traditional Yakutat Bay setnet fishery.

Under the scenario described above the department would try and identify areas where there is separation between wild and enhanced salmon. The intent would be to create one or more THAs where increased fishing time could be provided targeting enhanced salmon while greatly limiting impacts on wild stocks. Such areas would need to be large enough to accommodate expected effort levels. After an initial review of the five proposed areas evaluated in this section of the MFA the department feels that opportunities for creating THAs are extremely limited. Redfield Cover, Broken Oar Cove, and Puget Cove are all fairly small in size and none of those locations could accommodate what could be a large number of setnet permits. While larger in size, Monti Bay is known to be a key area in the existing Yakutat Bay setnet fishery and wild salmon stocks are prevalent in the area. It is possible that a THA could be identified in the Humpback Creek area; however the department would probably provide a relatively small area for a THA initially until additional information on wild stock presence could be collected.

Potential Contributions to the Sport Fisheries

Angling effort in the Bay and Ankau Lagoon from 1999 to 2011 has ranged from 4,000 angler days in 2002 to 9,500 in 2006 as estimated by the Alaska Department of Fish and Game Statewide Harvest Survey (Figure 2). Anglers fishing the Bay primarily target Chinook and coho salmon and/or groundfish and halibut with incidental harvests of chum and pink salmon (Tables 3-7). Chum harvest in the entire Yakutat area is almost negligible with an average of less than 100 being harvested from 1999-2011.

Rental boats are provided by lodges for non-guided angling to visiting anglers. Private boats are also used by Yakutat residents. Based on reported effort and harvest from saltwater charter logbooks, in 2009, seven sport fishing businesses operated 10 vessels to conduct 585 guided sport fishing charter trips which represented 2,404 angler days expended in the Yakutat area marine salmon fishery. During these trips, guided anglers harvested 1,146 coho salmon, 388 Chinook salmon, 10 sockeye salmon, 31 pink salmon, and 5 chum salmon.

A chum or pink salmon return in the magnitude described in this MFA would likely result in increases in sport angler use of Monti Bay and Yakutat Bay for targeting those species. Most of these release sites would be accessed by boat based anglers. Shore based anglers accessing publicly owned low tide shore lands from public access sites could legally travel up and down the bay, but currently access sites are limited in the Yakutat area.

The proposed increase of chum and pink salmon would likely result in differing responses by the angling public. The addition of significant chum salmon would likely result in increases in both private and charter sport use of the Yakutat Bay area for trolling, and smaller increases by shore based anglers fishing both at the return site(s), and other access sites along the shoreline. Small boat rental use would likely also increase for the concentrated resource in or near the return sites, as well as in nearby protected bays that may harbor milling hatchery fish. Pink salmon are less

likely to attract anglers who troll, but their presence could attract shoreline angling, especially at road accessible sites near the terminal areas. Rental and private boat based casting anglers may also target release sites, or nearby bays, for pink salmon.

The magnitude of the sport harvest of common property chum salmon is difficult to predict. Streams in Yakutat Bay are generally quite small and not used by anglers upstream of the estuaries, so fresh water chum salmon fisheries in Yakutat Bay would not likely increase. Other areas in SC Alaska and SE Alaska with chum salmon releases have created chum salmon sport fisheries in salt waters (e.g. Whittier, Juneau, and Ketchikan). For chum salmon in Yakutat Bay, a gross estimate of angler take for the initial start up years of the project would be that the current angler use magnitude that is focused on coho in salt waters, could duplicate and focus on chum salmon. This potential effort is likely a near future maximum since most current local lodging infrastructure is filled by the current extent of coho angling. This would add angler use days, potentially different and more anglers, and would also place anglers in the area at slightly different times such as earlier in summer. Angler harvest of chum salmon could be expected to start at the amount typically found for coho salmon in Yakutat Bay, or ~ 6,000 fish, with a range from 4,500 to 8,700 fish (Table 4). The recent gradual increases in angler use of Yakutat Bay, without chum salmon releases, indicate that growth in the industry is possible and occurring already (Figure 3). For the longer term, the current size of the charter and lodge oriented businesses would likely increase to mirror the availability of fish. Future angler use days and harvest would likely increase further to some extent if the projected releases increase as planned.

The magnitude of pink salmon sport harvest as a result of hatchery releases in Yakutat would not likely be as large as chum salmon in either fresh or salt waters. To a lesser degree, pink salmon release sites have also created significant salt water sport fisheries in other areas of the state (e.g. Valdez and Juneau) but these were areas that had only small fisheries for other salmon species and did not have existing abundant pink salmon. Since pink salmon are already abundant in Yakutat Bay, but current sport harvest is small in salt waters (mean = 200 fish; Table 3), sport fishery expansion is less likely for pink salmon in Yakutat Bay. Terminal harvest sites along the road system to some extent would create a fishery that does not currently exist, and this could create an increase in pink salmon harvest. The most commonly fished areas of Yakutat Bay, which are the areas of road access, are Monti Bay, Sawmill Cove, and Ankau Lagoon. Terminal harvest sites near these areas would likely garner the most use. Potential pink salmon harvests for the Yakutat area could increase to a relatively greater extent, in the event of the choice of a terminal release site near any public road accessible areas. Additionally, concurrent release of chum salmon could compound pink salmon harvests as increases in angler days targeting chum salmon outlined above may also lead to increased incidental harvests of pink salmon harvest.

Management of the Sport Fishery

The YRAA MFA identifies two potential timings for return fish; May to July for chum salmon, and July to August for pink salmon. Wild stocks of pink and chum salmon could be affected by targeted use of hatchery stocks. The timing of these returns could also incidentally increase harvest of wild stocks of other species such as Chinook and coho salmon. Current chum and pink angling regulations in both salt and fresh waters limit harvest to 6 per day 12 in possession with no annual limit for each species. Angling limits could be altered by emergency order to increase

harvest during returns in excess of spawning needs or to restrict harvest to protect the sustainability during years of low abundance. Chum salmon are not common in Yakutat Bay. Management of chum salmon in Yakutat Bay is limited due to lack of knowledge of any stocks of wild chum salmon and the very low harvest. Angling pressure could increase to harvest hatchery chum salmon with little effect on wild chum salmon management. However, Yakutat Bay tributaries have not been adequately surveyed to determine the extent of wild chum salmon stocks that may be present let alone stock size if present.

Pink salmon spawning is common in Yakutat Bay streams. Wild pink salmon return to Yakutat Bay in July and August, and spawn mainly from late August through September. Currently, there are no pink salmon escapement goals for any stream in Yakutat Bay, other than Humpy Creek (noted above). Increases in wild pink salmon harvests due to targeting hatchery stocks of pink salmon in Yakutat Bay could require changes in assessment protocols. Survey schedules and escapement goals may need to be developed to ensure adequate pink salmon escapement in the many small streams in Yakutat Bay. Sport fishery management would be relative to the achievement of those goals. Yakutat Bay tributaries have not been adequately surveyed to determine the extent of presence of wild pink salmon stocks or stock size.

Coho salmon spawning is common in Yakutat Bay streams. Current bag/possession limits for coho salmon in salt waters are 6 per day, 12 in possession, while fresh water limits are 2 per day 2 in possession on the east side streams, and 4 per day, 8 in possession on west side streams. Anglers typically encounter coho salmon in late July through September, and coho spawn mainly in September and October. No escapement goals for Yakutat Bay wild coho stocks currently exist. The BOF lowered angling limits for coho salmon in small streams entering Yakutat Bay's east side, from 4 fish per day to 2 fish per day for conservation reasons. Very little angling effort is expended on west side streams. Coho angling regulations may need to be restricted further in east side fresh waters, or restricted in salt waters, if increasing pressure on coho stocks results from increased targeting of later run hatchery chum or pink salmon in August through September. Escapement surveys and goals may also be required for coho stocks in the Bay to ensure escapement in the many small streams in the area. Yakutat Bay tributaries have not been adequately surveyed to determine the extent of presence of wild coho salmon stocks or stock size.

The proposed hatchery releases of chum and/or pink salmon in Yakutat Bay are not anticipated to change the regulations in regards to the salt water Chinook salmon sport fishery unless significant changes in Chinook harvest occur incidentally. Current regulatory limits for sport Chinook salmon angling are set regionally by emergency order each year in accordance with the Southeast Alaska Chinook Salmon Management Plan (5 AAC 47.055). The regulations are based on the preseason abundance index for coastwide stocks of Chinook salmon generated by the Pacific Salmon Commission which then establishes the regional all-gear quota. In Yakutat Bay, anglers typically encounter Chinook salmon from April through June, as well as during brief sporadic times in other winter months. Depending on annual abundance indices, anglers are typically allowed 1-3 fish (> 28 inches) per day. Additionally, non residents typically have an annual limit of approximately four Chinook salmon which too varies depending on the preseason index. Harvests of Chinook salmon in Yakutat Bay averages approximately 550 fish per year

(Table 5), which contributes relatively little to the overall Southeast Alaska Chinook salmon harvest.

2. Special Harvest Area

One or more special harvest areas (SHA) would need to be established for cost-recovery and broodstock purposes. The department typically recommends that SHAs be smaller than THAs to limit impacts to wild stocks in common property fisheries.

One or more THAs would have to be established to harvest hatchery salmon that would be surplus to cost recovery and broodstock needs. Any THAs would need to be large enough to provide for orderly harvest of hatchery fish while minimizing harvest impacts to wild stocks. The five sites under consideration, Humpback Creek, Redfield Cove, Broken Oar Cove, Puget Cove, and Monti Bay, have in common the fact that an SHA for each of them would be in the area of the now existing common property fishery in the Bay. A THA for Humpback Creek could conceivably be located at least partially outside the existing common property fishery area, but the migration route for returning enhanced chum salmon would be through the common property area. THAs for the other four sites would, of necessity, also be located within the common property area. Humpback Creek, as mentioned, supports a run of wild pink salmon. Onklat Creek, at the head of Redfield Cove, supports wild pink salmon stocks, and a survey of that stream in 1989 revealed 10,000 pink salmon in it. Two creeks in Hatchet Pass (locally called Canoe Pass), immediately adjacent to Broken Oar Cove, support small runs of coho salmon. A creek in Puget Cove has a small run of coho salmon and a larger run of pink salmon. Ankau Creek, located in Monti Bay, supports both coho and sockeye salmon, and both runs in Ankau Creek are in the thousands of fish. All of these systems contribute small amounts of fish to those harvested in the common property area. Sockeye salmon stocks returning to the Situk River and other systems outside the Bay make up the largest component of the harvest.

Any THA/SHA for late summer pink salmon, for any one of the five sites, would not have as great an impact on the common property fishery due to run timing. Most sockeye salmon stocks destined for systems outside of Yakutat Bay will have, for the most part, cleared the area of the common property fishery. The smaller streams and creeks in Yakutat Bay that support pink and coho salmon stocks may well be affected by the positioning of any THA/SHA.

3. Additional Management Considerations And Need For Studies

One of the most important tools for managing this project would be an evaluation plan to assess impact and measure success as outlined in the *Comprehensive Salmon Enhancement Plan for Yakutat*. The current plan is almost 30 years old and does not recognize the necessity for enhanced salmon stocks in Yakutat. That plan is currently in the process of being updated.

Marking of salmon

It will be necessary to require 100% otolith marking of hatchery pink and chum salmon released in the Yakutat area. This is consistent with marking requirements for these species elsewhere in the State, particularly in Southeast Alaska, and facilitates adequate evaluation of hatchery production. Such evaluation could include but would not be limited to monitoring stray rates of hatchery fish into local streams and estimating harvest of hatchery fish in common property and cost recovery fisheries.

Wild Salmon Stocks

Protection of wild stocks is the primary consideration in assessing any new proposed salmon enhancement projects. Yakutat Bay has several systems that support wild stocks of sockeye, pink, and coho salmon. Four systems located along the western shore of Yakutat Bay, Manby Stream, Spoon River, Sudden Stream, and Esker Creek, support runs of all three species. Collectively known as the Manby Shore inside waters, all four are open to commercial set gillnetting as terminal areas, and all four have harvest records. These fisheries tend to be small and sporadic; in some years one or two of the systems may receive some effort, while in other years no effort is recorded in these fisheries.

There are several streams and creeks along the eastern shore of the bay that support wild salmon stocks. Ankau Creek is located on the southern shore of Monti Bay. Ankau Creek has the characteristics of a salt chuck, and is intertidal for most of its length. It supports both sockeye and coho salmon stocks, but Chinook salmon, Dolly Varden char, and various marine species are known to mill in and out of the creek, feeding on the tides. Surveys have revealed escapements of as many as 7,000 sockeye salmon and 13,000 coho salmon. Historically, the headwaters of Ankau Creek connected across the drainage into the Lost River system via Summit Lake and Ophir Creek. With the building of the Ophir Creek Road, the ability of stocks to make the passage from one system to the other has been limited, but it is possible that some Ankau Creek sockeye and coho salmon stocks can still find a way through into the Lost River drainage.

Other wild stock systems within Yakutat Bay tend to be considerably smaller than Humpback Creek and Ankau Creek and they produce relatively fewer numbers of fish. Onklat Creek is located at the head of Redfield Cove and supports a run of pink salmon. A survey one year revealed 10,000 pink salmon, but most years no more than 1,000 to 1,500 are seen. Two unnamed creeks located in the vicinity of Canoe Pass, adjacent to Puget Cove, each support small numbers of coho salmon, and usually fewer than 500 fish are seen. Another small creek located in Puget Cove can produce as many as 3,000 pink salmon, along with very small numbers of coho salmon. A third small creek on the southern shore of Puget Cove has historically supported a very small return of sockeye salmon, and it is unknown if sockeye salmon still enter that creek. Two creeks are located on Knight Island. The larger of the two is a small pink salmon system that produces up to 1,000 fish. The smaller creek supports a very small run of coho salmon.

Straying

The release of hatchery stock chum and or pink salmon into the waters of Yakutat Bay would inevitably lead to hatchery origin fish straying into nearby streams. Initiating a program of

stream surveys would be required to better understand background levels for wild salmon escapements and to monitor anadromous streams for the straying of hatchery-produced salmon. Surveying efforts would include otolith sampling to identify thermally marked hatchery salmon originating from the proposed releases. Initiating such a program would require an increase in funds expended by the department.

Recognizing the potential of detrimental effects of gene flow from hatchery fish straying and interbreeding with wild fish, the department genetic policy states:

> "The magnitude of straying relative to the size of the run is the most important criterion, as massive spawning by hatchery strays may jeopardize a wild population by displacement on spawning habitat and superimposition of redds, as well as, genetic influx. A conservative management approach dictates avoiding release sites where large numbers of hatchery strays can be expected to interact with significant or unique wild stocks. This approach can be achieved by spatial or temporal isolation of the hatchery and wild stock."

The definition of "salmon stock" is clearly defined in regulation: 5 AAC 39.22 (f) (34) "salmon stock" means a locally interbreeding group of salmon that is distinguished by a distinct combination of genetic, phenotypic, life history, and habitat characteristics or an aggregation of two or more interbreeding groups which occur within the same geographic area and is managed as a unit. The criteria to define "significant or unique wild stocks" are a regional responsibility that may be addressed in the regional comprehensive salmon plan. The *Comprehensive Salmon Enhancement Plan for Southeast Alaska: Phase III* has a six point stock appraisal tool to be used by the regional planning teams and department biologists when evaluating the significance of a wild stock that may potentially interact with a hatchery release. The Yakutat plan is currently being updated.

Recent research in Southeast Alaska and Prince William Sound indicates significant staying has occurred within 50 km from release sites. The furthest northeast proposed site in Yakutat Bay (Eleanor Cove) would place the release site within 50 km of all Yakutat Bay steams and the Situk River on the outer coast eastward. The furthest west site (Monti Bay) would also be within 50 km of all Yakutat Bay streams, all streams eastward on the outer coast to the Dangerous River, and all streams to the Sikagi Bluffs to the westward.

The results of a recent study conducted by the department (*Hatchery Chum Straying in Southeast Alaska, 2011)* found hatchery chum salmon strays in sampled streams throughout the Northern Southeast Inside area. The proportion of hatchery strays encountered in sampled streams decreased with increasing distance from the respective release site. Hatchery strays were found in streams greater than 100 km from the release sites. High stray rates, 78%, 47%, and 66% for the years 2009-2011, were observed in Sawmill Creek, which is 14 kilometers from the nearest Juneau release site. Based on the results of this study, the department made the following recommendations:

> "Incremental increases in permitted capacity, maximization of current permitted capacity, and the development of new release sites may result in additional hatchery strays and changes to the distribution of hatchery strays in the region. Studies are also needed to

clarify the genetic stock structure of chum salmon in Southeast Alaska, determine if hatchery strays effectively spawn with wild fish, and, if so, the consequences of that interaction on the genetic structure and productivity of wild stocks."

Straying of enhanced salmon into the Situk River may directly or indirectly impact the genetics of local fish in the river. Chum salmon are generally not found in the Situk River system, although a small number of chum salmon are counted yearly at the Situk River weir, so any potential intra-species effects of straying hatchery chum salmon are limited. However, pink salmon straying into the Situk system is a larger concern due to the pink salmon stock in that river, as well as the sport and commercial fisheries that exist there for that species. Straying potential is minimized the farther the release is from a wild stock source. Choosing the farthest location possible away from the Situk River would minimize risk of straying into the Situk system and minimize potential for genetic impacts to the pink salmon population of that system. The use of local fish to establish broodstocks would also lessen potential effects of cultured fish on wild populations. However, if broodstock are segregated from wild populations, genetics divergence from local stocks would increase, so that straying would continue to present a genetic risk to natural populations.

Straying hatchery chum or pink salmon into the Situk River is a potential concern that could also impact wild Chinook, coho, and sockeye salmon spawning, as well as steelhead stocks by physically impeding wild fish spawning behaviors, or superimposition of wild fish redds. This concern is also applicable to many small streams in Yakutat Bay that contain wild, pink, coho and steelhead stocks. The relatively small size of known wild stocks in the Situk River, and in the entirety of the Yakutat Bay area, relative to the proposed maximum return sizes of hatchery fish could further exacerbate potential for physical imposition of wild spawning fish. At proposed full capacity return levels, a relatively small straying rate of the proposed 4.75 million adult pink salmon return, could result in a stray fish population larger than all known stocks of all salmonids in the Yakutat Bay area individually, or combined. Situk River stocks of all salmonids except pink salmon would also be very small relative to potential stray fish numbers.

The Situk River weir is normally erected and operational in the lower river beginning early May through mid August with a staff of two to assess steelhead, Chinook and sockeye salmon returns. Counting and sampling of a small number of chum salmon prior to August at this weir may be possible to help determine the extent of chum straying, but typically the wild pink salmon run is not complete by mid August when the weir is pulled due to high seasonal water flows. Current Situk River weir operations would probably need to be changed, weir structures would need to be augmented, and staff size increased to adequately monitor straying pink salmon later in the August\September higher water seasons. Additionally, boat counts on the Situk River have counted in excess of 750,000 pink salmon in some years, which would require an extensive staff to adequately assess, if weather logistics could be surmounted.

Interactions with Other Species

Introducing a large magnitude of hatchery-produced salmon may cause negative consequences associated with competition with local salmon stocks, as well as other marine species during the early marine phase of salmon production and growth. The early marine phase interactions

between hatchery-produced salmon with local salmon stocks and other marine species are largely unknown. Initial growth and forage studies with specific emphasis on predation of herring larvae were required of the Medvejie and Sheldon Jackson hatcheries when increasing production by 10 million chum salmon. Initial results did not indicate a shortage of prey items or specific predation on herring larvae in the areas studied. It would be desirable to better understand the foraging behavior of hatchery-produced salmon at proposed production levels and their impact(s) upon natural systems within Yakutat Bay. This would serve to identify to what extent, if any, negative consequences exist and be better able to develop strategies to avoid negative consequences.

Adult hatchery fish that have strayed into nearby streams during wild fish spawning events, could also potentially impede the spawning of wild fish of other species through redd superimposition or aggression in spawning areas. These possible inter-specific effects could be less adverse if hatchery releases were more comparable to, or smaller in proportion to wild stock abundance, and release sites farther from the Situk River could lessen the potential for inter specific effects to wild fish in that particular stream. Return timing choice could also lessen potential for inter species interaction if wild fish spawning and hatchery returns could be separated in time. Additionally, a thorough survey of salmonid streams in Yakutat area would be desirable so that specific wild salmon stock information, such as spawn timing, could be used for potential hatchery release planning to limit the potential for inter specific effects.

Disease Screening

Depending on the watershed, the department would likely need samples for establishing disease histories for the native stocks that might be affected by the release of Southeast Alaska hatchery chum salmon to a new site. Both DIPAC (Macaulay) and NSRAA (Hidden Falls, HF) have histories of Bacterial Kidney Disease (Rs, BKD) in their fish stocks except the Hidden Falls chum stock has been negative by a method known as ELISA. Therefore, from the pathology perspective the HF chum stock would be preferable to DIPAC as the donor enhancement stock.

4. Potential Broodstock Sources

The MFA request submitted to the department does not identify specific pink and chum salmon stocks desired for the program. It is recognized that indigenous stocks are best for hatchery broodstock development. There are several options for indigenous stocks of pink salmon in the Yakutat area. Humpback Creek would probably be capable of providing incubation and rearing levels desired during the first reproductive cycle for a remote release site. The Situk River would be another possible source of broodstock for pink salmon. It has the largest return of pink salmon in the Yakutat area and would be capable of providing incubation and rearing levels for a remote release site during the first reproductive cycle. A pink salmon return to a hatchery building will be required to reach full capacity of 200 million eggs. At full capacity the proposed Yakutat program would be the second largest pink salmon hatchery in the state, after Solomon Gulch Hatchery which has a permitted capacity of 230 million pink salmon eggs.

Historically, the only relatively significant wild chum salmon stream in the Yakutat area has been the East Alsek River (locally called the East River). The East River is located approximately 65 miles southeast of Yakutat. The entire river is within the boundary of Glacier Bay National Preserve that is administered by the National Parks Service (NPS). The East Alsek River has experienced habitat degradation due to natural geophysical changes in the landform. Chum salmon spawn primarily in Dog Salmon Creek, a small tributary of the East Alsek River. Dog Salmon Creek today is approximately one-half the size it was 50 years ago. There are still chum salmon in the East Alsek River, with reduced levels from historical figures. Harvest numbers are not an indicator of run strength, as they are caught incidentally to coho salmon. Very little effort has been directed on fall run fish in the East Alsek in recent years, and an average of about 300 chum salmon has been the norm for the past four or five years. In 2012, 1,200 chum salmon were harvested. Given the chum salmon population in the East River has declined and is assumed to be at relatively low abundance it is not likely to be a suitable source of broodstock. The department also defers to the NPS on any permitting that may be required should the YRAA choose that stock as a potential broodstock source.

Given that there are very limited wild chum salmon stocks in the Yakutat area, a non-indigenous stock would probably be required to start the program. A chum salmon return to a hatchery building will be required to reach full capacity of 78 million eggs. At full capacity the Yakutat program would be the fifth largest chum salmon hatchery in the state. Neets Bay, Hidden Falls, Macaulay, and Wally Noerenberg Hatcheries all operate at levels over 100 million chum salmon eggs.

The closest hatchery in Southeast Alaska with a large enough return of summer run chum salmon to provide 10 million chum salmon eggs would be Macaulay Hatchery which is approximately 200 miles away. Transporting eyed eggs would be the best approach for a transport of this distance, but eyed eggs will require three to five months of incubation after they arrive in Yakutat. Transporting fry from this distance is possible, but will be logistically very challenging. Currently, the longest chum salmon fry transport routinely made in Southeast is Neets Bay Hatchery to Nakat Inlet which takes about twelve hours. Two different boats have been used for this transport. One boat has a 52 cubic meter hold, and the other has 80 cubic meter hold. Both are equipped with oxygen supply, re-circulating pumps, and a CO_2 stripper. Both boats are loaded at a density of 40 kg/ cubic meter, which equates to four to six million fry per trip.

5. Production Potential

The hatchery production levels proposed by YRAA appear to make good use of the hatchery sites potential for salmon production. However, it has often been the department's practice during the development of hatchery programs in Southeast Alaska, and other areas, to gradually step up production over time. Such practices allow the hatchery operator to develop expertise in fish cultural practices, build a track record of successes, and to more wisely expend capital resources. Phasing also allows the department to evaluate potential resource problems during developmental stages, and to take on evaluation studies consistent with staffing levels and budget allocations.

6. Additional Factors Considered

Water Rights

A water right is required before a hatchery permit will be issued. A desired hatchery water source has not been identified by the applicant. Broodstock will need to return to a hatchery building in order to reach maximum production goals. Commercial fisheries in the area of the hatchery building may be managed for broodstock concerns, even if a remote release site is used for the majority of production. A working example of this is Medvejie Hatchery near Sitka. A small release is made from Medvejie Hatchery to provide returns for broodstock. Commercial fisheries in Silver Bay SHA are managed separately from returns to Deep Inlet THA where the primary Medvejie Hatchery releases are made. A suitable water source needs to be identified before the department can provide feedback on a hatchery building location.

Gear

The only net gear allowed in the Yakutat area is set gillnet. Part of the problem with set gillnets would be net avoidance on the part of the fish. In the marine waters of Yakutat Bay itself, set gillnets have proven to be very inefficient at harvesting pink salmon. In 2011 there were more pink salmon in Yakutat Bay than had ever been seen before. The department estimated a pink salmon biomass in the Bay of over 3 million fish. Only ten or twelve permits targeted those fish, and they set an all time harvest record for the Bay of 62,000 pink salmon. Effort was located in Humpback Cove, Redfish Cove, and Puget Cove. Complaints from the permits participating in this fishery were universal. The gear was simply too inefficient as pink salmon went around and beneath the gear. Drift gillnets in SE Alaska can and do harvest chum salmon, including enhanced fish, and there is no reason to suppose that set gillnets could not do the same. But set gillnet in marine waters is still liable to net avoidance, and is not as efficient as a net harvesting in the confined waters of terminal areas. Any change of allowable gear must be proposed to, and approved by, the Alaska Board of Fish.

Situk River Weir

The department has operated a salmon weir on the Situk River for almost 40 years. The proposed site of Eleanor Cove is approximately 48 kilometers from the Situk River, and the other five proposed sites get progressively closer, with Monti Bay being approximately 25 kilometers from the Situk River. Enhanced chum and pink salmon straying into the Situk River would have to be addressed. The Situk River weir would be the only preventative measure available to keep enhanced fish out of the upper river. Under a start up scenario, numbers of straying salmon may be minimal, and it is possible they could be killed and removed below the weir with little effort, but some way to differentiate wild and hatchery fish would need to be developed. The full capacity scenario would offer a quantum leap in difficulty if large numbers of enhanced chum salmon show up at the weir. It is difficult to imagine just how the killing and removal of those fish could be accomplished without disrupting the migration patterns of returning wild stocks of Chinook, sockeye, and pink salmon. The killing and removal of those fish would not be within the parameters of the ADF&G weir crew's duties, and responsibility for killing and removal would fall to YRAA. The Situk River does have a very small fall return of wild chum salmon and substantial return of wild pink salmon. The other river systems feeding into the Situk-

Ahrnklin Inlet, primarily the Ahrnklin and Lost rivers, do not have weirs on them, and so are not afforded such a similar opportunity to mitigate impacts.

Impact on Traditional Set Gillnet Fisheries

Yakutat Bay, including the common property fishing area, is a major corridor for wild salmon stocks, including sockeye and Chinook salmon. Locating any remote release sites within this corridor may have impacts well outside the immediate vicinities of the release locations.

The average (1980-2011) weekly harvest timing for Yakutat Bay Chinook, sockeye, and coho salmon and Amalga Harbor Special Harvest Area chum salmon (the DIPAC hatchery stock proposed as a brood source) are shown in Figure 3. It is clear that there is substantial overlap in the return timing of local wild stocks and the DIPAC summer chum salmon stock. As fisheries develop that target hatchery-produced chum and pink salmon, the department may increasingly need to take management actions restricting set gillnet fisheries to ensure wild sockeye, Chinook, and other salmon stocks meet escapement goals.

Of special concern is the set gillnet fishery in the Situk-Ahrnklin Inlet. This fishery has been conservatively managed in accordance with the Situk and Lost River Chinook Salmon Management Plan due to low Chinook salmon abundance in recent years (2008–2012). The management plan has several in-season trigger points for both restrictions and liberalizations to sport angling that are based on Chinook salmon abundance in the Situk River. Escapement objectives have not been met in four of the last five years. If the low return trend continues, the department will need to further restrict fisheries that catch Situk Chinook salmon, and also will need to notify the Board of Fisheries that Situk Chinook are considered a stock of conservation concern.

In May and early June, a subsistence fishery takes place within the common property area in Yakutat Bay. It primarily targets Chinook salmon while incidentally taking small numbers of sockeye salmon. The ten-year average subsistence take is 406 Chinook and 280 sockeye salmon. The reported dates of harvest on returned permits indicate the majority of the subsistence harvest occurs within the same time period as the anticipated return of the enhanced chum salmon stock.

Impact on Sport Fisheries

With large releases of chum or pink salmon and establishment of a THA, the intensive commercial fishing effort will increase the possibility of negative interactions between commercial and sport user groups in Yakutat Bay. Current negative interactions in Yakutat Bay are very rare between commercial set gillnet/trolling and sport user groups, but method and or intensity changes to the commercial fishery may alter this dynamic. Sport use of salmonids in the Bay is concentrated during April to July and from mid August through September. Sport trolling activities are focused in Monti Bay, and to a lesser extent in coves south and west of Humpy Creek to Yakutat. Trolling with sport gear for Chinook salmon also occurs out to Knight Island but to a smaller extent. Sport fishing for ground fish species occurs throughout the spring and summer months, mainly at the Yakutat Bay moraine at the bay mouth, to a lesser extent in the middle of the Bay, or in coves near the Yakutat Islands between Redfield Cove and Yakutat. The

potential for negative interactions between sport and commercial activities could be lessened if THA and increased commercial fishery activities were located north and east of Redfield Cove and after July 1, but prior to mid August.

The nearby Situk River has had recent year (2008–2012) low counts of Chinook salmon that have restricted Chinook fisheries in that river in accordance with the Situk and Lost River Chinook Salmon Management Plan. This plan has several in-season trigger points for both restrictions and liberalizations to sport angling that are based on Chinook salmon abundance in the Situk River. The Yakutat Bay harvest of Chinook salmon in the sport fishery currently appears to have little impact on the Situk River as depicted with ADF&G genetics samples. However, increases in sport trolling for other species, such as a May-June hatchery stock of chum salmon described above, could increase incidental take of the Situk stock of wild Chinook salmon, and could cause further restrictions to the Situk River sport fisheries in low abundance years. Additionally, in higher abundance years, changes may occur in the frequency that sport fishing method liberalizations are used on the Situk River, as outlined in the Situk and Lost River Chinook Salmon Management Plan, if significant harvest of Situk Chinook salmon occurs outside the river. The potential for impacts to the Situk River Chinook salmon fishery would be lessened if adult returns of hatchery fish to Yakutat Bay were in summer after July 1.

Eleanor Cove

1. Potential Contributions in Common Property Fisheries

Potential contributions from Eleanor Cove would be the same as from the other five sites.

2. Special Harvest Area

Eleanor Cove differs from the other five sites in that both an SHA and THA could be located outside of the boundaries of the existing Yakutat Bay common property fishery area. Interception of wild sockeye and Chinook salmon stocks destined for systems outside of Yakutat Bay could potentially be minimized. An SHA could be established close in to Eleanor Cove and a larger THA, perhaps from Goon Point to the northern tip of Krutoi Island to a point on the mainland near Logan Beach, could be established. There are a few small streams along the mainland shore north of Knight Island that would need to be assessed for wild stocks. But the marine waters south of Knight Island are open to set gillnetting when Yakutat Bay is open, but those waters have seldom, if ever, been commercially fished. Were there wild stocks in sufficient numbers, the area would have had recorded effort in the past. Harvests in the SHA and THA would be sampled for wild stocks. Assuming minimal numbers of wild stocks caught in the fishery, fishing time could be maximized to clean up enhanced fish returning to the area.

3. Additional Management Considerations and Need for Studies

Management considerations and needs for studies for Eleanor Cove would essentially be the same as for the other five sites. Eleanor Cove is the furthest distance from the Situk River and other systems outside Yakutat Bay supporting wild stocks, and straying concerns, while not being eliminated, may be lessened for those systems. Straying of enhanced fish to wild stock

systems within Yakutat Bay itself would remain as for the other five sites. Knight Island Creek has wild pink and coho salmon stocks, and it would be within the THA for Eleanor Cove.

4. Potential Broodstock Sources

Potential broodstock sources for Eleanor Cove remain the same as for the other five sites.

5. Production Potential

Production potential for Eleanor Cove remains the same as for the other five sites.

6. Additional Factors Considered

Additional factors considered for Eleanor Cove would remain the same as for the other five sites.

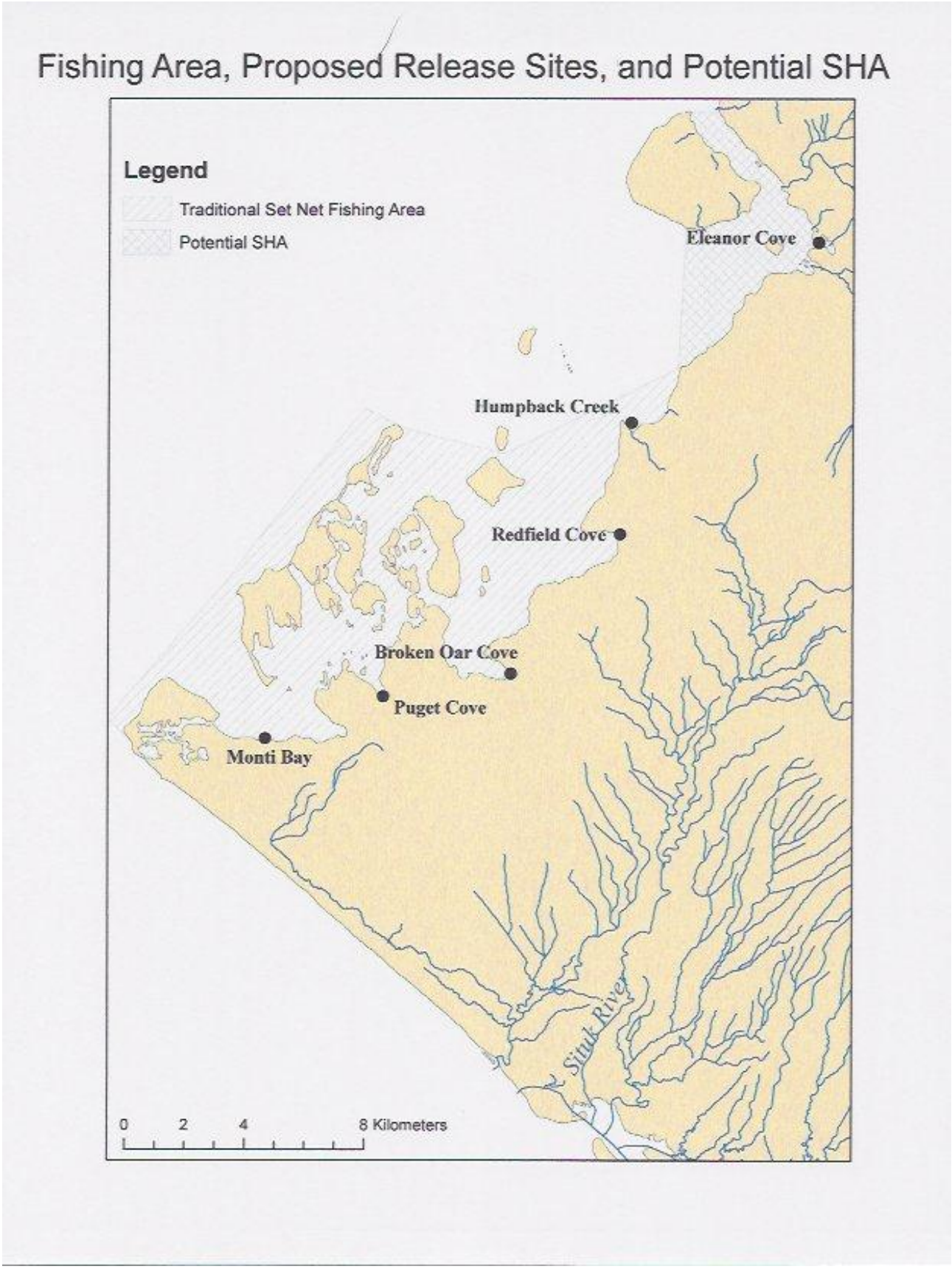

Figure 1.–Proposed release sites and potential THA/SHA boundaries within Yakutat Bay.

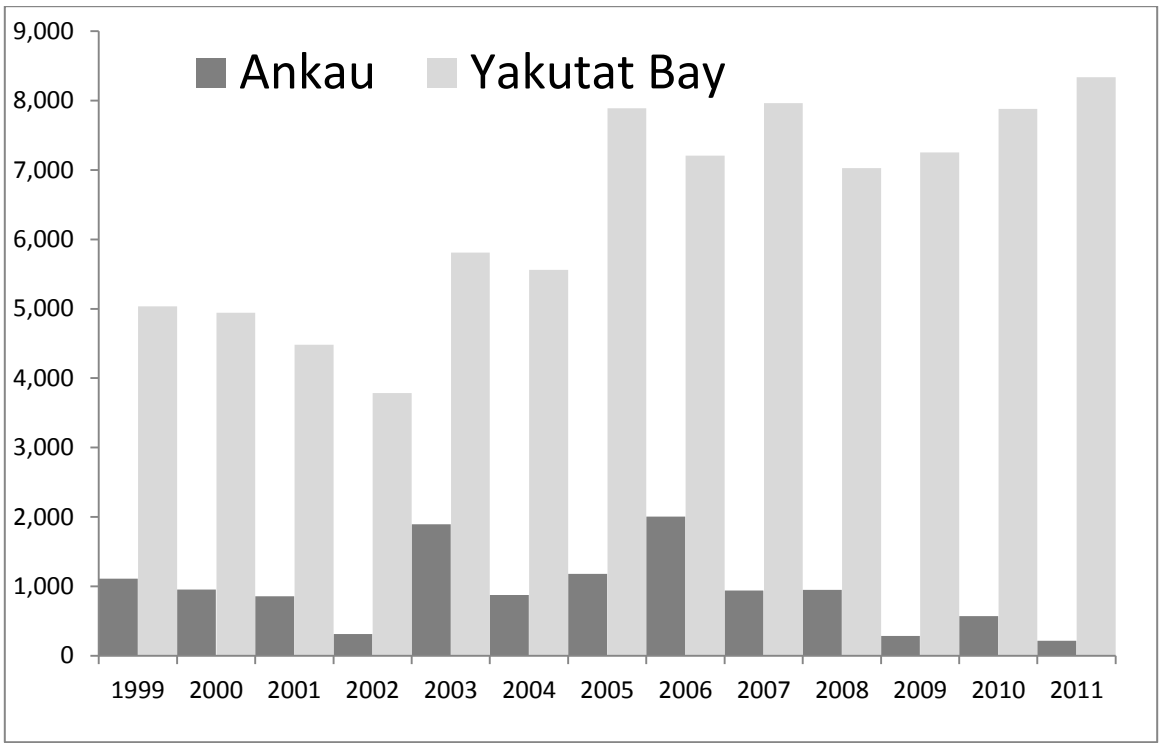

Figure 2. Angler days of effort expended in the Yakutat area fishing the salt waters in Yakutat Bay and Ankau Lagoon during 1999-2011.

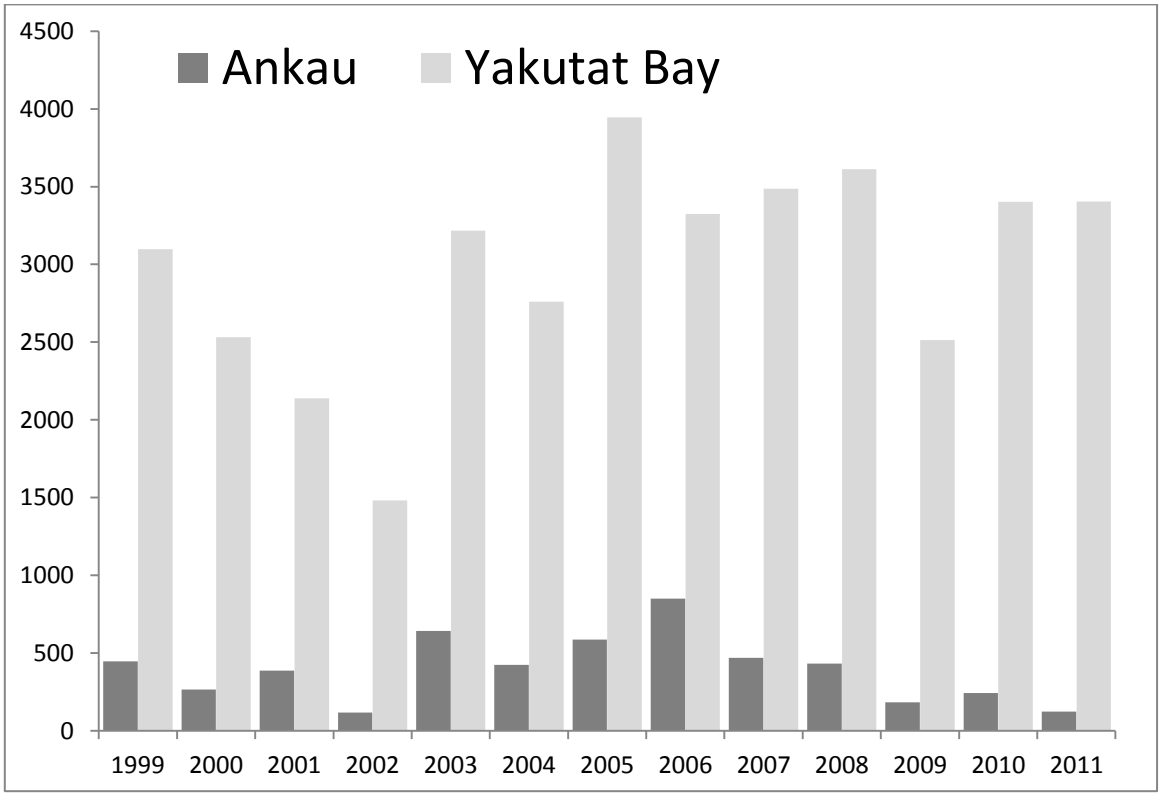

Figure 3. Number of anglers using The Yakutat Area salt waters of Yakutat Bay and Ankau Lagoon during 1999-2011.

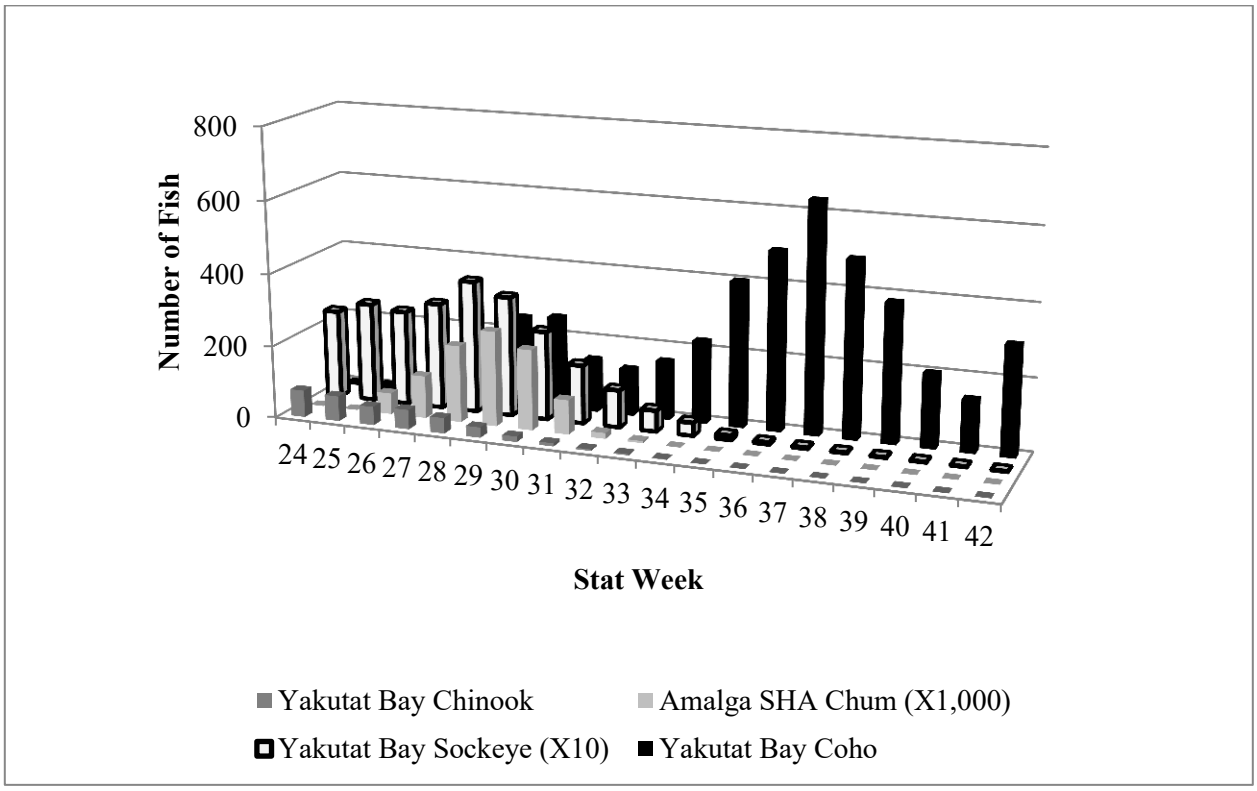

Figure 3. Average (1980-2011) harvest timing of Yakutat Bay commercial setnet Chinook, sockeye, and coho salmon and Amalga Harbor Special Harvest Area chum salmon.

Table 1. Salmon harvests in the Yakutat Bay (183-10) commercial set gillnet fishery, 1963-2011.

Year	Chinook	Sockeye	Coho	Pink	Chum
1963	141	3,541	3,198	5,457	8
1964	115	7,716	6,796	22,160	62
1965	86	10,177	2,490	525	8
1966	43	9,903	1,861	202	25
1967	241	4,848	1,332	9,605	6
1968	31	10,526	1,281	169	14
1969	29	10,410	1,133	1,504	13
1970	119	11,596	99	660	15
1971	127	13,723	50	623	3
1972	115	15,501	258	497	15
1973	79	9,962	377	2,886	23
1974	64	5,187	1,326	455	12
1975	41	5,144	447	3,094	5
1976	69	10,021	1,179	1,639	55
1977	53	14,201	91	8,178	81
1978	108	5,399	635	6,618	9
1979	49	3,508	549	3,280	5
1980	164	9,454	2,063	16,228	79
1981	151	14,400	1,806	12,024	68
1982	419	24,790	4,046	3,688	269
1983	371	17,893	3,739	6,793	428
1984	145	9,213	3,381	2,139	1,010
1985	240	11,665	3,414	5,515	685
1986	212	21,956	3,070	5,240	688
1987	329	25,240	2,417	1,750	197
1987	0	47	0	0	1
1988	196	14,210	3,086	7,792	627
1989	297	24,524	4,712	8,503	307
1990	304	41,854	5,473	4,969	359
1991	391	28,581	5,299	507	400
1992	147	31,706	6,567	4,892	236
1993	148	19,138	4,398	1,054	72
1993	0	38	0	0	0
1994	211	14,524	6,728	1,741	179
1995	266	17,312	7,865	8,978	270
1996	184	17,039	4,256	529	189
1997	236	17,574	3,563	17,735	112
1998	107	6,782	973	7,992	110
1999	618	41,739	6,768	2,510	411
2000	285	24,757	3,946	12,963	628
2001	703	34,044	4,738	3,585	200
2002	548	17,899	1,201	1,552	165
2003	238	14,358	578	4,834	63
2004	690	22,920	3,721	3,339	130
2005	271	17,844	4,846	11,920	190
2006	317	35,893	3,254	16,681	725
2007	818	59,602	6,384	25,808	1,100
2008	524	14,976	2,072	21,869	362
2009	394	15,423	3,308	9,263	353
2010	92	15,092	1,052	17,200	377
2011	257	27,612	6,646	62,774	215

Table 2. Salmon harvests in the Humpback Creek (183-40) commercial set gillnet fishery, 1963-1996.

Year	Chinook	Sockeye	Coho	Pink	Chum
1963	0	29	327	47,324	11
1967	0	0	1	821	0
1968	0	0	0	445	0
1969	1	153	913	58,351	4
1970	0	44	0	1,235	0
1971	1	58	148	76,680	299
1972	0	0	700	1,322	0
1973	0	36	8	1,738	6
1975	0	167	296	69,097	12
1976	1	39	383	18,486	0
1977	0	240	59	36,965	11
1978	0	1	27	14,997	1
1979	210	6,723	599	109,412	17
1980	0	10	333	91,243	6
1981	0	134	373	88,389	28
1983	0	5	130	9,047	3
1984	0	19	138	18	43
1988	0	29	78	92,173	24
1989	0	4	0	3,653	0
1990	0	4	0	1,209	0
1991	0	0	0	0	0
1993	0	0	0	0	0
1995	0	177	4	3,263	3
1996	1	0	0	70	0

Table 3. Harvest of pink salmon by sport anglers in Yakutat area; 1999-2010 and the most recent data from 2011 for comparison.

	Selected Rivers						All	All	All
Year	**Situk**	**Tsiu**	**Lost**	**Italio**	**Akwe**	**Ahrnklin**	**Saltwater**	**Freshwater**	**All Waters**
1999	746	0	13	0	0	0	40	786	826
2000	773	0	41	62	0	0	51	876	927
2001	394	0	0	86	0	0	548	595	1,143
2002	247	0	0	0	0	0	0	247	247
2003	1,857	10	19	39	0	0	227	2,022	2,249
2004	749	0	0	16	0	0	81	797	878
2005	3,367	0	77	61	0	0	460	3,520	3,980
2006	1,446	0	0	0	0	0	54	1,446	1,500
2007	3,160	30	15	0	0	0	419	3,160	3,579
2008	541	36	0	0	0	0	117	667	784
2009	1106	32	0	105	0	0	69	1266	1,335
2010	1544	49	49	0	0	0	161	1741	1902
Mean	1,328	8	17	26	0	0	200	1,412	1,611
se	356.68	4.37	7.92	10.42	0.00	0.00	63.91	357.61	398.46
2011	1656	0	0	22	0	0	490	1819	2,309

Table 4. Harvest of coho salmon by sport anglers in Yakutat area; 1999-2010 and the most recent data from 2011 for comparison.

	Selected Rivers						All	All	All
Year	**Situk**	**Tsiu**	**Lost**	**Italio**	**Akwe**	**Ahrnklin**	**Saltwater**	**Freshwater**	**All Waters**
1999	8,594	1,728	2,934	1,285	0	0	10,164	18,481	28,645
2000	4,923	2,057	742	653	0	0	3,377	9,151	12,528
2001	4,428	1,783	1,164	835	0	0	6,584	8,864	15,448
2002	1,674	2,713	851	0	0	0	3,803	7,081	10,884
2003	7,265	4,286	1,892	1,027	0	0	8,494	15,755	24,249
2004	11,665	2,372	2,781	1,018	0	0	8,718	21,732	30,450
2005	5,756	2,325	2,104	1,943	0	0	8,641	13,509	22,150
2006	4,478	2,158	2,359	1,295	0	0	3,333	12,181	15,514
2007	3,371	2,752	1,609	2,915	474	149	5,576	13,356	18,932
2008	4,518	3,316	1,529	1,008	674	230	4,603	13,068	17,671
2009	3974	3399	959	1896	304	198	5508	12367	17875
2010	4588	3861	1115	1857	55	119	6258	14171	20429
Mean	5,172	2,897	1,636	1,379	151	70	6,152	13,208	19,360
se	853.75	252.34	202.74	253.19	77.98	29.82	624.26	1239.97	1709.44
2011	8400	2092	1402	2055	1108	285	8701	18823	27524

Table 5. Harvest of Chinook salmon by sport anglers in Yakutat area; 1999-2010 and the most recent data from 2011 for comparison.

	Selected Rivers						All	All	All
Year	**Situk**	**Tsiu**	**Lost**	**Italio**	**Akwe**	**East**	**Saltwater**	**Freshwater**	**All Waters**
1999	1,160	50	0	0	0	50	649	1,369	2,018
2000	1,143	0	22	0	33	0	706	1,220	1,926
2001	245	0	0	86	45	49	548	329	877
2002	72	0	0	0	120	0	192	678	870
2003	826	0	0	192	0	31	355	857	1,212
2004	467	0	0	0	13	0	579	480	1,059
2005	270	0	0	0	145	26	545	441	986
2006	64	0	0	0	102	47	531	213	744
2007	0	0	0	0	86	0	611	120	731
2008	0	0	26	0	52	0	611	78	689
2009	0	0	0	0	21	0	880	34	914
2010	0	0	0	0	13	0	592	13	605
Mean	194	0	3	28	60	15	544	324	869
se	85.94	0.00	2.60	20.15	16.02	6.59	56.29	90.84	58.34
2011	0	0	0	0	186	61	374	277	651

Table 6. Halibut sport harvest in Yakutat Bay; 1999-2010 and the most recent data from 2011 for comparison.

Year	Yakutat Bay	Other Waters	Total
1999	3,240	405	3,645
2000	4,424	303	4,727
2001	3,696	42	3,738
2002	2,231	141	2,372
2003	4,821	555	5,376
2004	4,229	368	4,597
2005	4,970	266	5,236
2006	4,064	163	4,227
2007	5,236	34	5,270
2008	4,915	47	4,962
2009	4904	171	5075
2010	6,382	98	6,480
Mean	4,545	189	4,733
se	346.11	52.63	349.84
2011	4570	16	4586

Table 7. Lingcod sport harvest in Yakutat Bay; 1999-2010 and the most recent data from 2011 for comparison.

Year	Yakutat Bay	Other Waters	Total
1999	1,052	111	1,163
2000	1,053	191	1,725
2001	748	39	787
2002	653	30	683
2003	1,433	88	1,521
2004	1,089	85	1,174
2005	1,585	0	1,585
2006	1,544	29	1,573
2007	1,707	30	1,737
2008	1,792	13	1,805
2009	763	37	800
2010	1,394	36	1,430
Mean	1,271	39	1,310
se	134.27	8.81	132.34
2011	955	0	955