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Memorandum

TO: Representative Bob Herron
FROM: Susan Haymes, Legislative Analyst
DATE: October 17, 2011
RE: Arctic-Yukon-Kuskokwim (AYK) Stocks of Concern
LRS Report 12.043

You asked about salmon stocks that are currently identified as stocks of concern. Specifically, you asked about Arctic-Yukon-Kuskokwim (AYK) stocks of concern and actions the Alaska Department of Fish and Game (ADF&G) is taking to address those stocks. Additionally, you asked about impacts to an area when a salmon stock is declared a stock of concern.¹

In 2000, the Alaska Department of Fish and Game (ADF&G) adopted Alaska's Sustainable Salmon Fisheries Policy (5 AAC 39.222). The goal of the policy is to "ensure conservation of salmon and salmon's required marine and aquatic habitats, protection of customary and traditional uses and other uses, and the sustained economic health of Alaska's fishing communities." The policy directs ADF&G to evaluate the health of salmon stocks throughout the state and to provide the Alaska Board of Fisheries (ABOF or Board) with reports on the status of salmon stocks and to identify stocks of concern and make recommendations. Stocks of concern are those salmon stocks that have not met escapement goals or yield expectations over a period of four-five years.² Once ADF&G has identified a stock of concern, the ABOF may adopt the recommendation and classify the stock at one of the three following levels:

- **yield concern** is the least severe and results from an inability to maintain expected *harvest* levels over a 4- to 5-year period,
- **management concern** relates to the inability to maintain *escapements* within escapement goal ranges over a 4- to 5-year period despite the use of management measures, and
- **conservation concern** is the most severe and relates to the inability over a 4- to 5-year period to maintain *escapements* above a minimum threshold below which the stock's ability to sustain itself is jeopardized.

If the Board establishes a stock of concern, the ADF&G and the Board are required to develop an action plan to rebuild those stocks through the use of management measures, improved research, and restoring and protecting habitat. The goal of the action plan is to reduce fishing mortality in order to meet spawning escapement goals, to provide for subsistence levels within the amounts necessary for subsistence (ANS) range, and to reestablish the historical range of harvest levels for other users.³

The ADF&G reports to the ABOF on the status of the stock of concern and action plan every three years.⁴ Depending on escapement and harvest levels, the Board may decide to remove the stock of concern classification, change the classification, and/or implement additional management measures. During the fishing season, ADF&G fisheries biologists are responsible for the in-season management of commercial, subsistence and sport fisheries. Area managers use their emergency order authority to make immediate adjustments such as fishery openings and closures and gear changes to allow the harvest of

¹ You also asked about test fisheries in the Lower Yukon and management actions the ADF&G is taking to protect stocks of concern during commercial fishing activities. We referred those questions to the experts at ADF&G. We have not yet received a reply; however, we understand ADF&G is also sending a response directly to you.

² Escapement goals are classified either as "biological escapement goals," which are scientifically-based and represent the escapement estimated to provide the greatest potential for sustained yield, or as "sustainable escapement goals," which represent an escapement level that is known to provide for sustained yield over a five-to ten-year period.

³ Alaska law, AS 16.05.258, and the Alaska Native Interest Lands Conservation Act (ANILCA) require a priority for subsistence over other consumptive uses.

⁴ The board meeting cycle is three years long. The board considers changes to regulations on a region-based schedule every three years.

surplus fish and ensure adequate escapement (AS 16.05.060). Generally, for stocks of concern, AD&G manages more conservatively to ensure escapement goals are achieved and subsistence needs are met.

Currently, 12 salmon stocks are classified as stocks of concern.⁵ Four of the stocks are located in the Arctic-Yukon-Kuskokwim (AYK) area, one in the Bristol Bay area, six in the Cook Inlet area, and one in the Southeast area. The following table shows the location of the stock, the species, the designation, the year the stock was first designated, and the current status.

Table 1: Stocks of Concern Designations				
Area Stocks	Salmon Species	Original Designation	Year	Current Classification
AYK Area Stocks				
Norton Sound Subdistrict 1 (Nome)	Chum	Management	2000	Yield since 2007
Norton Sound Subdistricts 2 (Golovin) and 3 (Moses Point)	Chum	Yield	2000	Yield
Norton Sound Subdistricts 5 (Shaktolik) and 6 (Unalakleet)	Chinook (King)	Yield	2004	Yield
Yukon River	Chinook (King)	Yield	2000	Yield
Bristol Bay Area Stocks				
Kvichak River	Sockeye	Yield	2001	Yield
Cook Inlet Area Stocks				
Susitna (Yentna) River	Sockeye	Yield	2008	Yield
Chuitna River	Chinook (King)	Management	2011	Management
Theodore River	Chinook (King)	Management	2011	Management
Lewis River	Chinook (King)	Management	2011	Management
Willow and Goose Creeks	Chinook (King)	Yield	2011	Yield
Alexander Creek	Chinook (King)	Management	2011	Management
Southeast Area Stocks				
McDonald Lake	Sockeye	Management	2009	Recommended for declassification in 2011
Sources: Alaska Department of Fish and Game at http://www.adfg.alaska.gov/index.cfm?adfg=specialstatus.akfishstocks ; John Hilsinger and Charlie Swanton, "Memorandum to Board of Fisheries: AYK Stock of Concern Recommendations," September 22, 2009; Alaska Board of Fisheries Findings Regarding Stocks of Concern in the Upper Cook Inlet, March 26, 2011.				

For purposes of this report, we focus on stocks of concern in the AYK region.⁶ We discuss the management measures used and some of the costs to the communities for each of the four stocks of concern below.

⁵ Since 2000, the ABOF has classified a number of stocks as stocks of concern. Some of these stocks are no longer stocks of concern, after meeting escapement and harvest goals. For example, the Yukon summer and fall chum stocks were classified in 2000 as a management concern and yield concern, respectively. Both stocks were delisted in 2007.

⁶ We note that escapement goals and management strategies for salmon stocks in the AYK region have been the subject of considerable controversy.

Salmon in the AYK region have been a critical resource for the people and wildlife for thousands of years. Salmon are not only the foundation of the subsistence diet, but commercial salmon fishing provides an important, and sometimes, the only source of cash income in an area of the state with some of the lowest incomes.⁷ Over the last 15 years, however, dramatic declines in salmon runs across the AYK region have led to restrictions on subsistence fishing and the closure of many commercial fisheries. Harvest restrictions, including those during the 2010 season, have created tremendous hardships for many communities in the region.⁸ While causes of the poor runs are not known with certainty, the regional decline of some stocks indicates that ocean conditions play a critical role. Other possible impacts have also been discussed such as changes in the freshwater environment due to climate change and other factors, and Chinook and chum salmon bycatch in the Bering Sea groundfish trawl fisheries.⁹

Norton Sound Subdistrict 1 (Nome) Chum Salmon

The ABOF classified the Norton Sound Subdistrict 1 chum salmon stock as a stock of *management* concern in September 2000, and adopted an action plan in January 2001.¹⁰ There has not been a commercial chum salmon fishery in the Nome Subdistrict since the 1990s. Sport fishing has also been closed, and until 2006, subsistence salmon management was among the most restrictive in the state. From 1999-2005, the chum salmon subsistence fishery was a Tier II, which restricts subsistence fishing to those households that apply for and receive a subsistence permit. Permits are awarded based on a scoring system that determines a household's historical dependence on chum salmon.

After failing to reach escapement goals in several years, in 2004, the Board maintained the management concern classification. Escapement goals were achieved in 2005 and 2006, and in 2006, Subdistrict 1 reverted back to Tier I subsistence regulations, which allow all Alaska residents to fish during subsistence fishing periods. After the majority of escapement goals were achieved during the 2002-2006 time period, the Board reclassified the chum salmon stock to a yield concern in 2007. Escapement goals were met in 2007 and after, except 2009, when escapement fell short of the lower end of the range. Although, the majority of escapement goals were met, in 2010, the Board retained the yield classification based on low chum salmon harvests from 2005-2009.

In 2010, the Nome Subdistrict escapement of chum salmon was 180 percent above the upper bound of the escapement range setting a new record. As a result, all subsistence catch limits for chum and pink salmon were waived. A record 494 subsistence permits were issued during the 2010 season.¹¹

Table 2 shows the management measures that have been adopted by the ABOF and in-season measures used by ADF&G managers since 2001.

⁷ Subsistence is not only an integral part of the culture and traditions of the people of the AYK region, but also supplements the expensive and limited selection of food in village stores. Subsistence activities have been even more important in recent years, given the high cost of fuel and its impact on the cost of food. We note that subsistence and commercial fisheries are often linked. Subsistence fish may be taken during commercial fishing and the profits from commercial fishing help pay for items (boats, outboard motors, guns snow machines, ATVs) needed to perform subsistence activities.

⁸ In response to poor salmon runs, regional Native Corporations joined with state agencies, including ADF&G, and federal agencies to form the Arctic-Yukon-Kuskokwim Sustainable Salmon Initiative (AYK SSI) in 2002. The AYK SSI is described as a proactive science-based program working cooperatively to identify and address the critical salmon research needs facing this region. The program has funded numerous research studies on such issues as genetic health and structure of salmon, alternative methods for setting escapement goals, and the role of the marine environment. Arctic-Yukon-Kuskokwim Sustainable Salmon Initiative, "Protecting the Future of Salmon, Research and Discovery Report, 2002-2010," http://www.aykssi.org/wp-content/uploads/WEB-AYKbsfa-0210_REPORT_cmprssd.pdf.

⁹ Kyle Hopkins, "Feds OK Plan to Cap King Salmon Bycatch," *Anchorage Daily News*, May 20, 2010, <http://www.adn.com/2010/05/19/1286149/feds-ok-plan-to-cap-king-salmon.html>; "Yukon Fisheries News," Spring 2011, Yukon River Drainage Fisheries Association, <http://www.yukonsalmon.com/newsletters/spring11.pdf>; and the AYK Sustainable Initiative, <http://www.aykssi.org/ayk-plan>.

¹⁰ The management stock of concern classification was adopted as a result of persistent low chum salmon runs since the 1980s.

¹¹ ADF&G News Release, 2010 Norton Sound Salmon Season Summary, December 16, 2010.

Table 2: Norton Sound Subdistrict 1 (Nome) Chum Salmon Management

Year	Management Measures
2000	The Board classifies the chum salmon stock as a management concern. Subsistence chum fishery is managed as a Tier II fishery.
2001	The Board adopts an action plan that 1) closes commercial fishing until certain conditions are met; 2) subsistence fishing will be opened and closed by emergency order on a stream-by-stream basis; 3) a subsistence permit is required and will identify the body of water and annual limit of fish; 4) pink salmon may be taken only with gillnets that have 4.5 inch or less mesh; and 5) allows subsistence hook and line attached to a rod or pole as a lawful gear. Subsistence chum fishery is managed as a Tier II fishery.
2002	Subsistence chum fishery is managed as a Tier II fishery.
2003	Subsistence chum fishery is managed as a Tier II fishery. Subsistence fishery suspended when escapement goal not reached in mid-July.
2004	The Board makes the following changes: requires that subsistence salmon fishermen using hook and line obtain subsistence permits, and repeals pink salmon mesh size restriction. Subsistence chum fishery managed as a Tier II fishery.
2005	Tier II subsistence fishing until mid-July when restrictions waived. In late July Tier I restrictions are waived.
2006	ADF&G suspends Tier II restrictions. For the first time since 1990, the subdistrict is on a regular subsistence schedule.
2007	ADF&G suspends Tier II restrictions. A strong chum run allows ADF&G to waive subsistence limits. The Board makes the following changes: expands subsistence fishing with hook and line to all areas where sport fishing is allowed; eliminates subsistence permit catch limits in regulation and allows ADF&G to set catch limits based on expected returns; and reduces areas where nets can be used.
2008	No Tier II restrictions, regular subsistence schedule is in effect.
2009	The ADF&G projects a chum surplus; however, subsistence closes in mid-July when escapement falls short.
2010	Escapement of chum salmon was 180 percent above the upper bound of the escapement range. As a result, all subsistence catch limits for chum and pink salmon were waived.

Sources: Jim Menard and Daniel J. Bergstrom, *Norton Sound Subdistrict 1 (Nome) Chum Salmon Stock Status and Action Plan, 2010: A Report to the Alaska Board of Fisheries*, Special Publication No. 09-20, ADF&G, December 2009; John Hilsinger and Charlie Swanton, Memorandum to Board of Fisheries: AYK Stock of Concern Recommendations, September 22, 2009.

Norton Sound Subdistricts 2 (Golovin) and 3 (Moses Point) Chum Salmon

The Board classified Norton Sound Golovin and Moses Point chum salmon stock as a yield concern in 2000, and adopted an action plan in January 2001 (5 AAC 04.390). As required, the Board reviewed the status of the stock in 2004, 2007 and 2010, and retained the yield concern each time due to low harvest levels.

The poor chum salmon runs in Golovin and Moses Point have mainly impacted the commercial fishery. In 2001, area biologists determined earlier in the season that the chum salmon escapement goal would be reached, and as a result allowed a modest commercial chum harvest. From 2002-2006, however, there was no commercial fishing in either subdistrict due to a lack of market interest and in several years poor chum salmon runs. In 2002, Golovin experienced a poor run, but Moses Point had its third best chum return since the 1980s. Unfortunately, the sole buyer in the area had technical difficulties with a tender and could not buy any fish. For the next three years, poor chum runs prevented a commercial fishery. In 2006, chum salmon rebounded in Moses Point to historic levels, but the run continued to be poor in Golovin. In 2007, both subdistricts experienced a large surplus of chum salmon, but the buyer was only able to purchase fish in Moses Point. In 2008, after one commercial chum opening, the fishery closed because in-season projections showed the escapement goal would not be reached.¹² Both subdistricts remained closed in 2009 to a commercial chum fishery because of a poor run. In 2010 and 2011, however, above average chum salmon runs allowed commercial fishing in both Golovin and Moses Point. The strong runs

¹² In the same year, for the first time in eight years, a buyer returns to Subdistrict 2 and ADF&G allows a commercial coho season. Pink and coho commercial periods occur in Subdistrict 3. Likewise, in 2009, strong coho runs allow commercial fishing in both Subdistricts.

coupled with increased buyer interest in all salmon species have resulted in increased opportunities for commercial salmon fishermen in Golovin and Moses Point.¹³

Since 2000, ADF&G restricted chum salmon subsistence fishing in only one year. Typically, subsistence salmon harvests increase in even-numbered years because of the greater abundance of pink salmon in those years. From 2005 through 2009, subsistence chum salmon harvests averaged 1,767 and 1,216 fish in Golovin and Moses Point, respectively. According to ADF&G's 2010 report to the Board, fisheries managers do not anticipate future restrictions in the chum subsistence fishery because the low exploitation rate of subsistence users has only a minor effect on escapement.

Table 3 shows the management measures that have been adopted by the ABOF and in-season measures used by ADF&G managers since 2001.

Table 3: Norton Sound Subdistricts 2 (Golovin) and 3 (Moses Point) Chum Salmon Management Measures

Year	Management Measures
2001	For the commercial chum salmon fishery, the Board establishes (1) new escapement goals for the Kwiniuk (11,500-23,000) and Tubutulik Rivers (9,200-18,400); (2) the harvest may not exceed 15,000 fish before the mid-July run assessment in subdistrict 2; and (3) the fishery may only occur if the escapement goals will be achieved and subsistence needs are met. Commercial pink fishery can occur only if subsistence needs met and chum salmon escapement is achieved. Commercial coho fishery may occur only when chum salmon escapement goals in certain rivers are achieved. The ADF&G may not restrict subsistence fishing for chum salmon unless the commercial chum salmon season is closed and sport fishing is restricted. The ADF&G provides the authority to establish a subsistence gillnet mesh size restriction of 4.5 inch or less by emergency order when necessary to conserve chum salmon.
2003	The ADF&G implements some restrictions on chum salmon subsistence fishing opportunities.
2004	New chum salmon escapement goal for Niukluk River Tower. Board requires subsistence salmon permits, but does not establish any harvest limits.
2007	Board eliminates the commercial fishing period schedule in Subdistricts 2 and 3 allows ADF&G to set periods by emergency order. For the first time in six years, a buyer returns to Moses Point and commercial chum salmon and coho salmon fishing periods occur.
2008	After one commercial chum salmon period, the Moses Point subdistrict is closed when in-season projections indicate the chum salmon escapement goal will not be met.
2009	Both subdistricts close to commercial chum salmon fishing because projections show escapement goals will not be met. Kwiniuk River counting tower records one of the worst chum salmon escapements on record.
2010	Board makes changes to allow a directed pink salmon fishery after July 6 in Subdistrict 3 and after July 14 in Subdistrict 2, if ADF&G determines a pink salmon fishery will not have a significant impact on escapement or subsistence use of chum salmon. Strong chum run allows commercial fishing.

Source: Jim Menard and Daniel J. Bergstrom, *Norton Sound Subdistrict 2 (Golovin) and Subdistrict 3 (Moses Point) Chum Salmon Stock Status and Action Plan, 2010; a Report to the Alaska Board of Fisheries*, Alaska Department of Fish and Game, December 2009; ADF&G News Release, 2010 Norton Sound Salmon Season Summary, December 16, 2010.

Norton Sound Shaktoolik (Subdistrict 5) and Unalakleet (Subdistrict 6) Chinook Salmon

In January 2004, the ABOF classified the Norton Sound Subdistricts 5 (Shaktoolik) and 6 (Unalakleet) Chinook salmon stock as a yield concern and adopted an action plan. In 2007, after three consecutive years of failing to meet escapement goals despite reductions in harvests, the ABOF continued the yield concern classification and adopted additional measures in an effort to meet escapement goals (5 AAC 04.395). Specifically, the Board established a more restrictive subsistence schedule and a 50 percent reduction in the daily and annual sport fish bag limits. The intent was to enhance Chinook salmon escapements by providing escapement windows between subsistence fishing periods and by reducing sport fish harvests.

¹³ Jim Menard, "2011 Norton Sound Salmon Fisheries Management Plan," Regional Information Report No. 3A11-03, May 2011. The report can be accessed at <http://www.adfg.alaska.gov/FedAidPDFs/RIR.3A.2011.03.pdf>. "Norton Sound Salmon Prices Up 20-25 Percent," *Bristol Bay Times*, June 20, 2011, http://www.thebristolbaytimes.com/article/1125norton_sound_salmon_prices_up_20-25_percent.

Escapement goals were met in 2007 and 2009. Area managers note that escapement goals may not have been achieved, had it not been for inriver set gillnet mesh size restrictions (six inches or less) and early closures imposed on subsistence and sport fisheries. The mesh size restrictions were intended to allow larger and more fecund females to reach spawning areas. In addition, managers report that restricting commercial mesh size was effective in allowing commercial fishermen to target other salmon while keeping incidental harvests of Chinook salmon low. In 2009, the ADF&G recommended and the ABOF agreed to continue the designation of yield concern, due to low harvests during the most recent 5-year period (2005-2009).

Commercial and subsistence fishermen have both been affected by the poor Chinook salmon runs.¹⁴ As subsistence is the mandated priority use, commercial harvests have taken the brunt of the decrease in available Chinook salmon. Average subsistence harvest rates declined by 47 percent from 1989-1998 to the 2005-2009 time period, while average commercial harvest rates declined by 99 percent during the same time periods. The ADF&G has not allowed any commercial fishing periods targeting Chinook salmon since 2001, except for two periods in 2005, which yielded small harvests. Subsistence and sport fishing closures were implemented in 2003, 2004, and from 2006-2011 to meet escapement needs.

Like the Golovin and Moses Point subdistricts, the Unalakleet and Shaktoolik subdistricts experienced a strong chum run in 2010 and 2011. As a result of renewed market interest in Norton Sound chum and pink salmon, there has been interest in starting commercial fisheries earlier for these species in order to target the peak migration to increase harvests. Fishery managers and subsistence users, however, are concerned about potential impacts to the Chinook stocks, as fishing on chum and pink stocks earlier overlaps with the migration of Chinook salmon. Thus, ADF&G managers continue to cautiously manage the directed chum fishery to minimize the incidental catch of Chinook salmon to protect the Chinook escapement and subsistence fishery.¹⁵ This may result in fewer opportunities for commercial fishermen to harvest at the peak of the other salmon runs.

Table 4 shows the management measures that have been adopted by the ABOF and in-season measures used by ADF&G managers since 2004.

¹⁴ We note that a sport fishery, while small, has been active on the Unalakleet River since the 1960s.

¹⁵ News Release, "2010 Norton Sound Salmon Season Summary," ADF&G, December 16, 2010, and Jim Menard, "2011 Norton Sound Salmon Fisheries Management Plan," Regional Information Report No. 3A11-03, May 2011.

Table 4: Norton Sound SubDistricts 5 (Shaktoolik) and 6 (Unalakleet) Chinook Salmon Management

Year	Management Measures
2004	Board adopts the following measures: (1) if determined necessary for conservation of Chinook salmon, ADF&G may close subsistence fishing and immediately reopen during which time gillnets must have a mesh size not exceeding 6 inches; (2) reduces sport fish daily bag limit for Chinook salmon from 10 to 1 fish; and (3) places an annual sport limit of 4 Chinook salmon 20 inches or greater in the Unalakleet River drainage. Both subdistricts close to commercial Chinook salmon fishing.
2005	ADF&G allows two 24-hour Chinook commercial salmon fishing periods from June 27-30. Catches poor and test fishery and tower counts down, so commercial fishery is closed. Commercial fishing reopened during coho season on July 24.
2006	No commercial Chinook salmon periods. Unalakleet River closes to salmon gillnetting on July 10. Sport fishing is allowed on Unalakleet River, but all Chinook salmon has to be immediately released from July 1-August 3 and the use of bait is prohibited.
2007	Board restricts the subsistence fishing schedule from June 15 to July 15 in Subdistrict 6 to two 48-hour periods per week in the marine water, and two 36-hour periods per week in Unalakleet River. In addition, the Board reduces the sport fish bag limit in the Unalakleet River to one fish per day and an annual harvest limit of two fish. No commercial Chinook fishing is allowed due to weak runs. Because of below average Chinook escapement levels and weak subsistence catch rates in early July, subsistence fishing is closed to set gillnets on July 4 and sport fishing is closed on July 5.
2008	No commercial Chinook salmon fishing is allowed because of poor runs. Subsistence fishing and sport fishing are closed on July 4, due to below average Chinook escapement levels and a sharp decline in subsistence catch rates in late June. ADF&G imposes mesh size restrictions (6 inches or less) on subsistence fishing in Unalakleet River on June 30 to protect Chinook salmon during peak migration period. Subsistence fishing reopens with mesh size restrictions on July 7 and 16.
2009	No commercial Chinook salmon fishing is allowed because of poor runs. Due to below average Chinook escapement levels and a sharp decline in subsistence catch rates in late June, subsistence fishing and sport fishing are closed on July 5. ADF&G imposes mesh size restrictions (6 inches or less) on subsistence fishing in Unalakleet River on June 29 to protect Chinook salmon during peak migration period. Subsistence fishing reopens with mesh size restrictions on July 10.
2010	Board adopts measures directing ADF&G to not allow commercial fishing for pink and chum salmon until July 1, if subsistence fisheries are being restricted in order to reach Chinook salmon escapement goals. Further, the commercial pink or chum fisheries may only occur if ADF&G determines (1) a harvestable surplus of chum or pink salmon exists, and (2) a directed chum or pink fishery will not have a significant impact on escapement goals or subsistence uses of Chinook salmon. Due to poor Chinook run, ADF&G closes Chinook salmon subsistence and sport fishing early.

Source: Scott M. Kent and Daniel J. Bergstrom, *Norton Sound Subdistrict 5 (Shaktoolik) and Subdistrict 6 (Unalakleet) Chinook Salmon Stock Status and Action Plan, 2010: a Report to the Alaska Board of Fisheries*, Alaska Department of Fish and Game, December 2009; ADF&G News Release, 2010 Norton Sound Salmon Season Summary, December 16, 2010.

Yukon River Chinook Salmon

The Yukon River salmon fishery is extremely complex. The river spans approximately 2,000 miles through Canada and Alaska, and along with its tributaries, is the fourth largest drainage basin in North America. Subsistence, commercial and sport fisheries occur throughout the basin and many people depend on the salmon for food, income, and family traditions and cultures. The Yukon River's Chinook salmon is the largest subsistence fishery in the state. The stocks must also be managed for escapement under the Yukon River Salmon Agreement. Salmon that originate in the Canadian portion of the Yukon River drainage are a shared resource between the Yukon Territory (Canada) and Alaska. The Yukon River Panel annually sets escapement targets for Canadian-origin stocks and the number of additional fish that must be provided for Canada's harvest share.¹⁶ Adding to the complexity for managers, are the overlapping multi-species salmon runs, the increasing efficiency of

¹⁶ The Yukon River salmon fisheries are under the international jurisdiction of the Pacific Salmon Treaty. The Yukon River Salmon Agreement was negotiated in 2001. The Yukon River Panel and the Yukon River Drainage Fisheries Association, *Yukon River Salmon Agreement Handbook*, June 2005. The Handbook can be accessed at <http://www.yukonsalmon.org/whatwedo/handbook.pdf>. More information on the Yukon River Panel can be accessed at <http://yukonriverpanel.com/salmon/>.

the salmon fleet, the inability to determine stock specific abundance and run timing, the gauntlet nature of the fisheries, allocation issues between lower river and upper river users, allocation and conservation issues between Alaska and Canada, and the immense size of the drainage.¹⁷ Yukon salmon fisheries managers have three goals: meet established escapement goals in Alaska and Canada; provide for Alaska subsistence users and Canada harvest shares; and when possible provide for commercial, sport and personal use fisheries. Thus, ADF&G managers are in the difficult position of having to meet conservation goals, *and* attend to the hugely important subsistence and commercial fisheries each year.

The ABOF classified the Yukon River Chinook salmon stock as a yield concern at its September 2000 work session. The determination was based on low harvest levels for the previous three-year period (1998-2000) and an anticipated low harvest for 2001. An action plan was adopted by the ABOF in January 2001 (5 AAC 05.360). The Board continued the yield classification in 2004, 2007 and most recently in 2010, due to continued low yields of Chinook salmon.

Chinook salmon escapement goals were generally met throughout the Alaska portion of the Yukon River Drainage the past five years (2005-2009). According to ADF&G, in-season management actions contributed to achieving escapement goals. Nevertheless, escapement goals established by the Yukon River Panel were not met in 2007 or 2008.¹⁸ The Chinook salmon run in 2008 was particularly poor, so no directed commercial fishery occurred.

In 2009, ADF&G initially allowed a subsistence fishery for much of the lower Yukon districts, based on fish counts that appeared strong. After the run did not materialize as thought, ADF&G chose not to open a commercial fishery and significantly restricted the up-river subsistence fisheries. In interviews with Yukon fishermen after the 2009 season, people in upper Yukon communities described being especially hard-hit by the 2009 Chinook closures.¹⁹ Upper Yukon communities, which rely more heavily on salmon for subsistence purposes than do communities elsewhere on the river, have been the most vulnerable during difficult years. After visiting Fort Yukon and Chalkyitsk during and after the 2009 season, University of Alaska Fairbanks professors, Philip Loring and Craig Gerlach, noted,

[W]e counted empty smokehouses and freezers in numbers not before encountered in our collective 25 years of experience in the region. Some also noted that it would be “harder to find good food in the store now.” The local consensus was that 2009, in terms of food security, was the “worst year in recent times,” and that many people would go hungry this winter.²⁰

As a result of two years of poor runs and a poor run predicted for the 2010 season, Governor Parnell requested a fishing disaster declaration. In January 2010, U.S. Commerce Secretary Gary Locke declared a commercial fishing disaster for the Yukon River Chinook salmon fishery.²¹

Ultimately, the escapement goal was attained in 2009 with about a 12,000 fish surplus. Under the terms of the Pacific Salmon Treaty and the Yukon Agreement, the season was considered a success. Given the severe restrictions on subsistence

¹⁷ Due to the size of the river and dispersed fishing activity, the Yukon salmon fishery is considered a gauntlet fishery. That is the fish must avoid a gauntlet of fishing nets, fishwheels, and other activities to reach spawning grounds.

¹⁸ The outlook for 2007 suggested a run that would provide surplus for commercial fishing so about 33,000 Chinook salmon were harvested in Alaska. The run did not materialize however as projected, and the Canadian border escapement goal was not met. In 2008, the ADF&G began relying on a sonar-based program in Eagle, Alaska, to count Canadian-origin fish. According to ADG&G, the Eagle sonar project dramatically improved accuracy of Chinook salmon passages into Canada. Apportionment of harvest to stock of origin indicates that the Canadian component comprises about 50 percent of the Alaska harvest, and probably the run. Because of the gauntlet nature of the fishery and longer migration distance, ADG&G believes the exploitation exerted on Canadian-origin fish is most likely the highest of any Yukon River Chinook salmon stock.

¹⁹ Philip A. Loring and Craig Gerlach, “Food Security and Conservation of Yukon River Salmon: Are We Asking Too Much of the Yukon River?” *Sustainability*, September 2010, 2, 2965-2987. The article can be accessed at <http://www.mdpi.com/2071-1050/2/9/2965/pdf>.

²⁰ Philip A. Loring and Craig Gerlach, “Food Security and Conservation of Yukon River Salmon: Are We Asking Too Much of the Yukon River?” *Sustainability*, September 2010, p. 2974. The authors also discuss the impact of fishery closures on what appears to be a recovering moose population in the Yukon Flats area, noting that less fish could lead to increased hunting of moose to supplement the food supply.

²¹ Kyle Hopkins, “Lack of Yukon King Salmon Declared Disaster,” *Anchorage Daily News*, January 16, 2010. The article can be accessed at <http://www.adn.com/2010/01/15/1095790/lack-of-yukon-king-salmon-declared.html>. Since 1997, the dramatic declines of AYK salmon runs have prompted at least 16 disaster declarations by the state of Alaska and federal agencies.

fishermen, however, some argued that ADF&G's management actions were too conservative and came at the expense of subsistence food, pointing out that 12,000 fish would have fed many families. Managers responded that there is too much uncertainty in the Yukon system to manage the stock with more precision. In other words, it is better to manage the stock conservatively than to once again fall short of conservation goals and treaty obligations.

The following year (2010) Chinook salmon run was much weaker than the preseason projection and early inseason assessments indicated. As a result, the Chinook salmon commercial fishery was closed and the run fell short of the U.S./Canada Treaty obligation. Subsistence fishermen in the upper communities were asked to consider conservation measures such as voluntary harvest reductions, shifting harvest to other species, and spreading harvest over the duration of the run.²²

As previously noted, the Board met to consider a Yukon River Chinook salmon action plan in January 2010. In order to allow larger fish to get up the river, the Board adopted a 7.5 mesh size for commercial and subsistence fishermen.²³ The new mesh size would be in effect for the 2011 season, which meant fishermen had to obtain new nets. The Pacific State Marine Fisheries Commission, the entity in charge of dispersing disaster assistance, used disaster funds to conduct a net replacement program. Under the program, all documented commercial and subsistence fishermen were provided new 7.5 inch webbing after surrendering their old webbing which was no longer legal.

Table 5 shows the management measures that have been adopted by the ABOF and in-season measures used by ADF&G managers since 2000.

²² "Yukon River Salmon 2010 Season Summary and 2011 Season Outlook," prepared by the United States and Canada Yukon River Joint Technical Committee, March 2011. The report can be accessed at <http://yukonriverpanel.com/salmon/wp-content/uploads/2009/03/jtc-report-final-2010.pdf>.

²³ "Fisheries Board Limits Yukon Salmon Gillnet Mesh," *Juneau Empire*, February 2, 2010. From 2007-2009 the ADG&G and Yukon Delta Fisheries Development Association (YDFDA) initiated a mesh size study to investigate the performance of gillnets with smaller mesh than 8.5 inch mesh currently used in the unrestricted mesh size fishery. According to ADF&G, overall pattern indicates that larger mesh size catch a greater proportion of older fish, more Chinook salmon relative to chum, a greater proportion of females, and more larger fish. Upper Yukon advisory committees submitted proposals for a 6-inch mesh, to allow more of the larger fish to reach the border. Katherine G. Howard and Danielle F. Evenson, *Yukon River Chinook Salmon Comparative Mesh Size Study*, December 2010, Fishery Data Series No. 10-92, ADF&G. The report can be accessed at <http://www.sf.adfg.state.ak.us/FedAidpdfs/FDS10-92.pdf>.

Table 5: Yukon River Chinook Salmon Management Measures

Year	Management Measures
2000	The ABOF classifies the Chinook salmon stock as a yield concern.
2001	The ABOB modifies the Yukon River Management Plan by adopting a subsistence fishing schedule that allows for a chronological progression upriver as the run advances upstream. The schedule is meant to reduce harvest early when there is a higher level of uncertainty and spread the harvest throughout the run to reduce harvest impacts in one area, and provide fishing subsistence opportunities for all users during years of low salmon runs. The ABOF also provides ADF&G with emergency order authority to restrict subsistence gillnets to no greater than 6 inches mesh size for conservation of Chinook salmon. Sport fishing bag limit is reduced to one Chinook or one chum salmon.
2002	From 2002-2005 commercial fishing is shifted to the midpoint of the Chinook salmon run and later, which allows for passage of an early portion of the Chinook salmon run.
2003	The ABOF amends the subsistence fishing schedule to revert to the pre-2001 regulations, which allows, when sufficient abundance exists for a commercial fishery, for a subsistence fishery to occur at the same time, after a 24-hour period.
2004	The ABOF increases the permit harvest areas and fishing schedule for subsistence fishing in certain subdistricts; requires gillnets greater than 4-inch mesh size to be removed from the water and fish wheels to stop rotating during subsistence closures. The ADF&G begins using genetic stock identification techniques to identify region of origin.
2007	The ABOF allows catch and release of Chinook salmon in Goodpaster River under certain conditions.
2008	No directed Chinook salmon commercial fishing. Sport fishing bag limit is reduced to one fish in-season.
2009	No directed Chinook salmon commercial fishing. Subsistence fishing is reduced by one-half along the mainstem fishing districts 1-5. No fishing on the first pulse to conserve Canada-bound Chinook, and some subsistence openings are closed. In-season genetic stock identification of Chinook salmon is used. Sport fishing bag limit is reduced to one fish in-season in tributaries. Retention of Chinook salmon is prohibited in mainstem Yukon River to protect Canadian stocks.
2010	The Board prohibits subsistence and commercial fishermen from using gillnets with a mesh larger than 7.5 inches.
Sources: Katherine G. Howard, Steve J. Hayes and Danielle F. Evenson, <i>Yukon River Chinook Salmon Stock Status and Action Plan 2010; a Report to the Alaska Board of Fisheries</i> , December 2009, Special Publication No. 09-26, ADF&G.	

We hope this is helpful. If you have questions or need additional information, please let us know.