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KENAI RIVER SPORTFISHING  
ASSOCIATION

## Kenai River Sportfishing Association

The Kenai River Sportfishing Association (KRSA) is dedicated to ensuring the sustainability of the world's premier sport fishing river. The association's area of responsibility encompasses the Kenai River watershed, greater Cook Inlet basin, and Alaska. Established in 1984 and incorporated in 1992 as a 501(c)(3) nonprofit organization, KRSA accomplishes its mission through four primary program areas: Habitat, Fisheries Management, Research, and Education.

### Mission

#### HABITAT:

KRSA fosters habitat conservation and rehabilitation to maintain and improve the Kenai River watershed for sustainable fisheries;

#### FISHERIES MANAGEMENT:

KRSA advocates for predictable and meaningful sport and personal use fishing opportunity;

#### RESEARCH:

KRSA funds and conducts fishery, economic, and conservation research to advance information for management of sustainable fisheries; and

#### EDUCATION:

KRSA provides public education, scholarships and outreach to promote stewardship of fisheries resources.



## Quick Reference

### PARTICIPATION

- 160,000 anglers—Alaskans and visitors—sport fish for salmon, and 20,000 Alaskans harvest salmon for personal use in Upper Cook Inlet recreational salmon fisheries each year.
- 1,375 to 2,500 individuals are seasonally employed in commercial salmon harvesting and processing or have jobs arising indirectly from the effects of commercial harvest and processing activity in Upper Cook Inlet.
- Sport and personal use salmon fishing in Upper Cook Inlet account for well over one-third (37%) of all recreational fishing in Alaska.
- Upper Cook Inlet accounts for 2% of the total statewide commercial salmon catch.
- Cook Inlet commercial salmon fisheries have substantially lower yields and substantially higher rates of permits not fished than comparable fisheries.

### ECONOMIC SIGNIFICANCE

- Recreational salmon fishing in Upper Cook Inlet generates 3,400 average annual jobs producing \$104 million (2006 dollars) in income.
- Commercial salmon fishing in Upper Cook Inlet generates between 275 and 500 average annual jobs producing between \$10 and \$18 million (2006 dollars) in income.
- The average commercial salmon harvest size in Upper Cook Inlet from 2002 to 2006 is greater than the average harvests over the past ten and past fifty years.
- The current (2000-2006) value of Upper Cook Inlet commercial salmon harvests is 14% of the highest historic value (1986-1992) and 39% of the most recent decade (1991-2000).

### NET ECONOMIC VALUE (NEV)

- The average value over and above expenses that individual Alaskans place on their annual recreational fishing is \$776 (2006 dollars).
- The net economic value of recreational salmon fishing in Upper Cook Inlet to Alaskans and visitors is \$115 million (2006 dollars)—almost half (47%) of the statewide net economic value total—with \$62 million of that total going to Alaskans.
- The net economic value of Upper Cook Inlet commercial salmon fishing to all permit holders—Alaskans and non-residents—is less than \$1 million.

### FUTURE TRENDS

- Demand for recreational fishing opportunities in the Cook Inlet boroughs is expected to continue to grow by 2.3% per year through 2011—a net increase of almost 29,000 anglers over 2002-2006 levels.
- Salmon farming and globalization of seafood markets will continue to exert downward pressure on prices and values in all of Alaska's commercial salmon fisheries.

### ECONOMIC IMPACTS

- Institute of Social and Economic Research (ISER) study models from the mid-1990s suggest that at current commercial prices and values, increasing sockeye salmon allocations for sport fishing in Upper Cook Inlet would generate overall economic gains in the region.

### ALLOCATION

- Commercial fisheries are currently allocated 82% of the Upper Cook Inlet salmon harvest, while sport and personal use fisheries are allocated 18% of the harvest.
- In Alaska 2% of the total salmon harvest is allocated for recreational use. For allocations in Alaska to be comparable with other North American Pacific salmon fisheries, allocation rates for recreational fishing would need to be increased two (200%) to five (500%) times.

# ECONOMIC VALUES OF SPORT, PERSONAL USE, AND COMMERCIAL SALMON FISHING IN UPPER COOK INLET

## EXECUTIVE SUMMARY

Upper Cook Inlet is unique among all of Alaska's maritime regions in its relative proportions of recreational and commercial fishing. Upper Cook Inlet supports Alaska's largest and most economically valuable recreational fisheries. Sport and personal use fishing is heavily concentrated in the region, and the economic values associated with these activities are very substantial. By contrast, commercial fisheries in Upper Cook Inlet yield a small fraction of the state's commercial harvest and the associated economic values are very modest.

Over the past decade the economic values of sport and personal use salmon fisheries in Upper Cook Inlet have greatly surpassed those of the commercial salmon fisheries

by every available measure. State fisheries management systems—designed primarily to accommodate commercial fisheries—continue to grapple with the profound and ongoing changes in both recreational and commercial salmon fisheries in the region.

To more clearly define the economic importance and relative values of salmon fisheries in Upper Cook Inlet, this report reviews published studies and agency data on participation, economic significance, net economic value, and potential economic impacts of management practices in the region's sport, personal use, and commercial salmon fisheries.

## COOK INLET SALMON FISHERIES

Cook Inlet is divided into two fisheries management areas—Upper and Lower Cook Inlet. Anchor Point (near Homer) is the boundary between the two areas. Upper Cook Inlet is divided into two districts—the Central District (from Anchor Point north to Boulder Point) and the Northern District (from Boulder point north). The Central District is the gateway for salmon returning to the Kenai, Matanuska-Susitna, and Anchorage Borough watersheds.

Almost two-thirds (64%) of the total Cook Inlet commercial salmon catch comes from Upper Cook Inlet. An even greater percentage of the total harvest value—about five-sixths (83%)—comes from Upper Cook Inlet. This means that the great bulk of high-value salmon species caught in Cook Inlet are taken in Upper Cook Inlet. Sockeye salmon constitute almost all (93%) of the value of the Upper Cook Inlet commercial salmon harvest with Chinook and coho each constituting 3% and chum 1%, and pink less than a half of a percent.

**Upper Cook Inlet Commercial Salmon Harvest Value by Species**

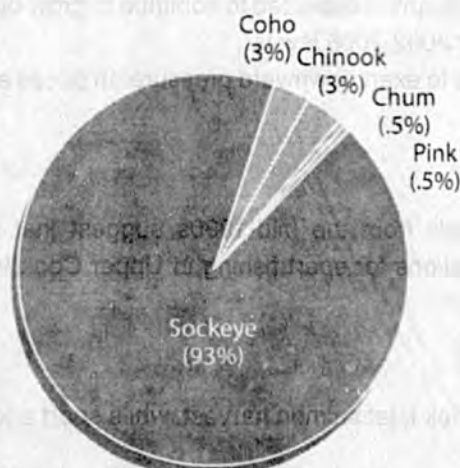


Figure ES 1. From 2002-2006, sockeye salmon averaged 93% of the annual harvest value with Chinook and coho each constituting 3%, chum 1%, and pink less than a half of a percent. Source: ADF&G 2007.

**Upper Cook Inlet Commercial Sockeye Salmon Harvest by Gear Type & Location**

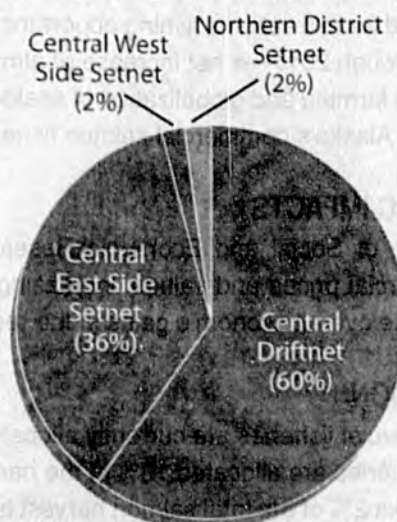


Figure ES 2. Division of Upper Cook Inlet commercial sockeye salmon harvest by gear type and location, 1990-1994. Source: ISER 1996.

While sockeye salmon is by far the most commercially valuable fish species in Cook Inlet, run-timing and migration routes utilized by all salmon species overlap in Upper Cook Inlet to such a degree that the commercial fishery is largely mixed-stock and mixed-species in nature.

Sockeye salmon are one of the most highly valued salmon species and by far the most abundant species in recreational fisheries in Upper Cook Inlet. Chinook salmon is perhaps the most highly valued salmon species in recreational fisheries, but Chinook harvests are by far the smallest of any salmon species in the region. Though less abundant than sockeye, coho salmon are much more abundant than Chinook and are very highly valued in Upper Cook Inlet recreational fisheries.

Essentially all (98-99%) commercially harvested salmon in Upper Cook Inlet are caught in the Central District. Set gillnets take half of the Upper Cook Inlet commercial salmon harvest and more than two-thirds (70%) of these set gillnets are concentrated on the east side of the Central District where the Kenai River watershed is located. Kenai sockeye generally comprise more than half (52%) of the total Upper Cook Inlet commercial salmon harvest.

The Kenai River watershed supports the largest and most intensively used recreational salmon fisheries in the state. Low numbers of salmon passing through the Central District commercial salmon fisheries to the Northern District of Upper Cook Inlet have limited the development of recreational salmon fishing in Matanuska-Susitna Borough watersheds.

### Upper Cook Inlet Commercial Fisheries Management Districts

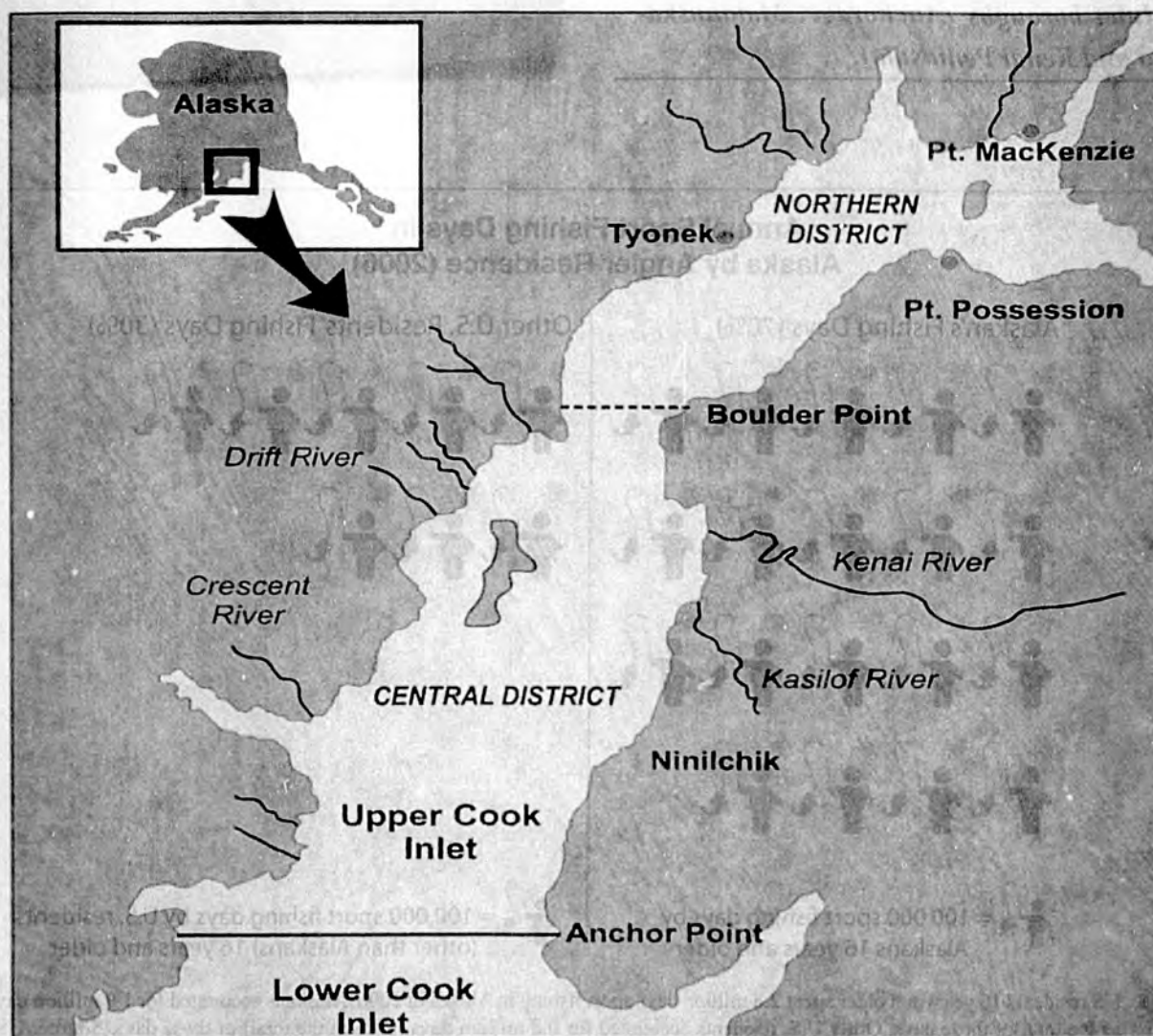


Figure ES 3. Upper Cook Inlet Commercial Management Districts. Source: ADF&G 2004.

## PARTICIPATION

### Sport and Personal Use

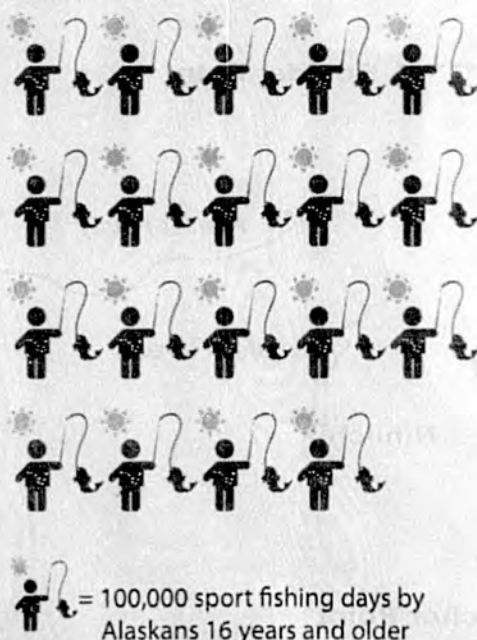
With one out of every three Alaskans active in sport fishing (some 207,000 resident anglers), Alaska has the highest rates of participation in recreational fishing in the nation. The great bulk of sport fishing activity in Alaska is attributable to Alaskans who account for well over two-thirds (70%) of some 2.8 million annual sport fishing days in the state. Moreover, recreational fishing by Alaskans is highly concentrated in the Southcentral region with almost three-quarters (72%) of all established resident anglers living and doing nearly all (95%) of their sport fishing in the region.

*More than a quarter of a million anglers—Alaskans and visitors—fish each year in the Cook Inlet boroughs (Anchorage, Matanuska-Sustina and Kenai Peninsula).*



### Annual Sport Fishing Days in Alaska by Angler Residence (2006)

#### Alaskan's Fishing Days (70%)



#### Other U.S. Residents' Fishing Days (30%)



Figure ES 4. US residents 16 years and older spent 2.8 million days sport fishing in Alaska in 2006. Alaskans accounted for 1.9 million days (70% of the total) of those days. Other U.S. residents accounted for 0.8 million days (30% of the total) of those days. Source: USF&WS 2007.



## Percentages of Alaskans Who Sport Fish by Region of Residence



Figure ES 5. Percentage of all Alaskans who sport fish by region of residence, 2002-2006. (2% of anglers are of unknown residence.) Source: ADF&G 2007.

More than half (51%) of all summer fishing trips in the state—by Alaskans and visitors—are in Upper Cook Inlet. Salmon fishing in Upper Cook Inlet accounts for almost three-quarters (73%) of all fishing trips in the area and well over one-third (37%) of all recreational fishing in the state.

More than a quarter of a million (261,000) anglers—Alaskans and visitors—fish each year in the Cook Inlet boroughs. Of these, some 160,000 anglers fish for salmon in Upper Cook Inlet. In addition, some 20,000 Alaskans

obtain personal use permits to net Upper Cook Inlet salmon to feed their households. Alaskans with personal use permits harvest about the same number of sockeye salmon (~300,000) in Upper Cook Inlet each year for household use as all anglers—Alaskans and visitors—take in the Upper Cook Inlet sport fisheries. Alaskans with personal use permits take about one-third and sport anglers—Alaskans and visitors—take about two-thirds of the total Upper Cook Inlet recreational (non-commercial) salmon harvest of all species.

## Proportion of All Alaska Fishing Trips Occurring in Upper Cook Inlet

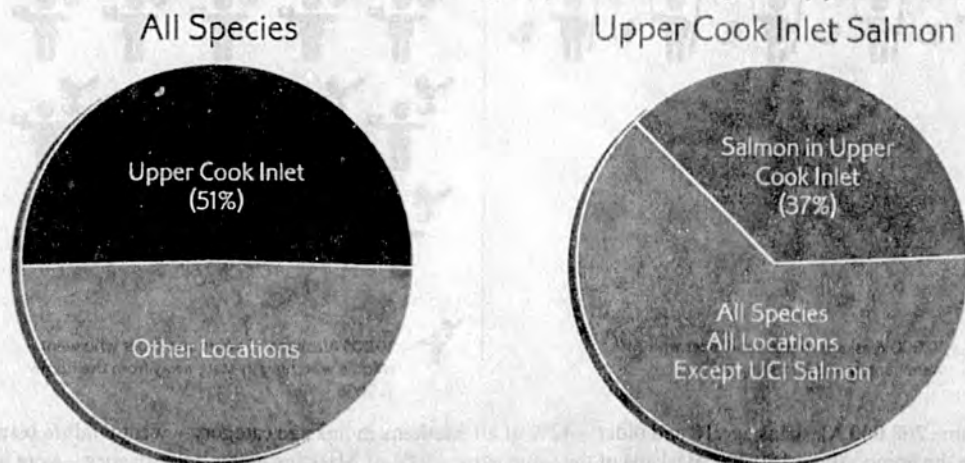


Figure ES 6. Proportion of all Alaska fishing trips (by Alaskans and visitors) occurring in Upper Cook Inlet and proportion of all state fishing trips targeting salmon in Upper Cook Inlet, 1993. Source: Tabulation of site-specific trip data in Haley et al. 1999.

## Wildlife Watching

Salmon runs also play a critical role in wildlife watching in Alaska, an activity with even greater rates of participation than recreational fishing and hunting combined. Salmon runs draw marine mammals—such as orcas, belugas, and Steller sea lions—and terrestrial mammals and birds—such as bears, eagles, and land otters—into concentrations and locations where it is both possible and attractive for Alaskans and visitors to view them. Both private and commercial wildlife watching in Cook Inlet rely on access by small plane, motorized and non-motorized boats, conventional and off-road vehicles, and foot to areas where wildlife is concentrated in sufficient numbers to engage participants. Ultimately the spawn and decomposing bodies of salmon provide the critical nutrients in a terrestrial food web extending from insects and plants to a broad host of birds and animals that support more extended wildlife watching opportunities.

Not quite half of all adult Alaskans (42%) and over half of all U.S. summer visitors (56%) actively engage in wildlife watching—in trips away from the home—for a total of more than a half million participants (514,000) and well over 4.2 million days of activity annually.



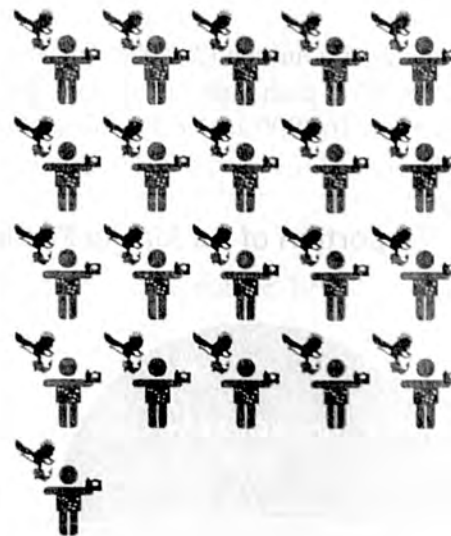
## Alaskans Active in Hunting, Sport Fishing & Wildlife Watching (2006)

### Hunting and/or Fishing



 = 10,000 Alaskans 16 years and older who went hunting and/or fishing in 2006

### Wildlife Watching



 = 10,000 Alaskans 16 years and older who went wildlife watching in-state away from the home in 2006

Figure ES 7. In 2006 some 208,000 Alaskans age 16 and older—42% of all Alaskans in this age category—went wildlife watching in-state away from the home. About 150,000 Alaskans of the same ages—30% of Alaskans in this age category—went hunting and/or fishing in 2006. Source: USF&WS 2007.

## Percentages of Alaskans Who Sport Fish by Region of Residence

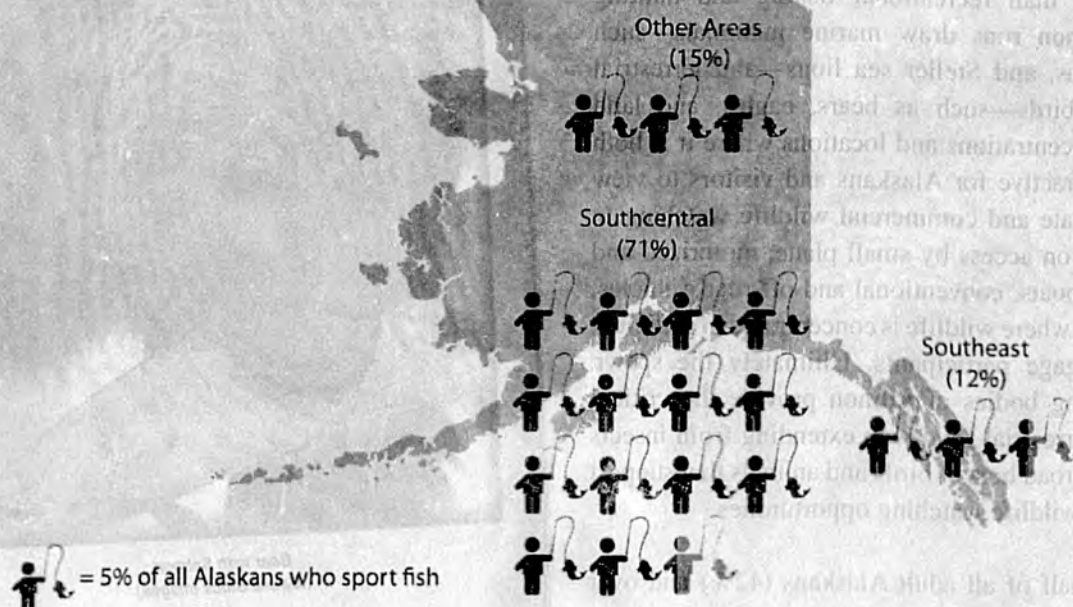


Figure ES 5. Percentage of all Alaskans who sport fish by region of residence, 2002-2006. (2% of anglers are of unknown residence.) Source: ADF&G 2007.

More than half (51%) of all summer fishing trips in the state—by Alaskans and visitors—are in Upper Cook Inlet. Salmon fishing in Upper Cook Inlet accounts for almost three-quarters (73%) of all fishing trips in the area and well over one-third (37%) of all recreational fishing in the state.

More than a quarter of a million (261,000) anglers—Alaskans and visitors—fish each year in the Cook Inlet boroughs. Of these, some 160,000 anglers fish for salmon in Upper Cook Inlet. In addition, some 20,000 Alaskans

obtain personal use permits to net Upper Cook Inlet salmon to feed their households. Alaskans with personal use permits harvest about the same number of sockeye salmon (~300,000) in Upper Cook Inlet each year for household use as all anglers—Alaskans and visitors—take in the Upper Cook Inlet sport fisheries. Alaskans with personal use permits take about one-third and sport anglers—Alaskans and visitors—take about two-thirds of the total Upper Cook Inlet recreational (non-commercial) salmon harvest of all species.

## Proportion of All Alaska Fishing Trips Occurring in Upper Cook Inlet

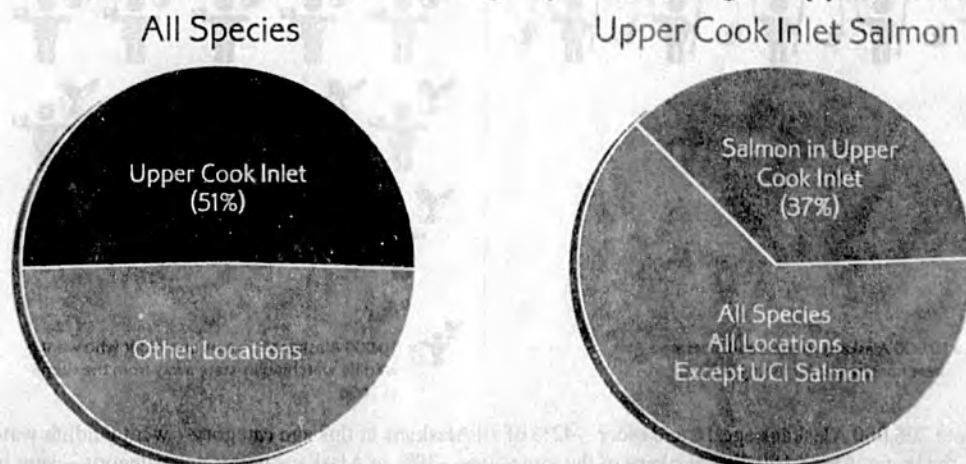


Figure ES 6. Proportion of all Alaska fishing trips (by Alaskans and visitors) occurring in Upper Cook Inlet and proportion of all state fishing trips targeting salmon in Upper Cook Inlet, 1993. Source: Tabulation of site-specific trip data in Haley et al. 1999.

## Commercial

Some 844 commercial permit holders reported a catch in the Upper Cook Inlet management area in 2006. One out of five (22%) commercial permit holders in Cook Inlet are nonresidents. Between 1,375 and 2,500 individuals are estimated to be seasonally employed in commercial harvesting and processing or have jobs arising out of the indirect economic effects of commercial salmon harvests in Upper Cook Inlet.

The Upper Cook Inlet commercial salmon catch accounts for 2.2% of the total statewide commercial salmon harvest.

Comparisons of commercial salmon harvest yields in Cook Inlet with yields in other commercial salmon fisheries in the state indicate that commercial salmon fishing effort is disproportionately concentrated in Cook Inlet. Cook Inlet commercial salmon fisheries have substantially lower yields and substantially higher rates of permits not fished than comparable fisheries. In Cook Inlet there are 25 commercial salmon permits fished for every 100,000 fish harvested, compared to three permits fished for every 100,000 fish harvested in the rest of the state. Comparison of Upper Cook Inlet percentages of commercial salmon caught and permits fished statewide indicate that commercial salmon fishing effort is disproportionately concentrated in Upper Cook Inlet.



Commercial Salmon Set Gillnet

### Upper Cook Inlet Proportion of Statewide Commercial Salmon Harvest

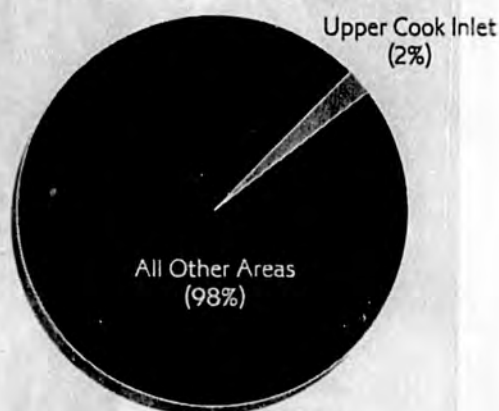


Figure ES 8. Average annual proportions of statewide commercial salmon catch by area 2000-2006. Source: ADF&G 2007.

### Upper Cook Inlet Percentages of Commercial Salmon Caught & Permits Fished Statewide (2006)

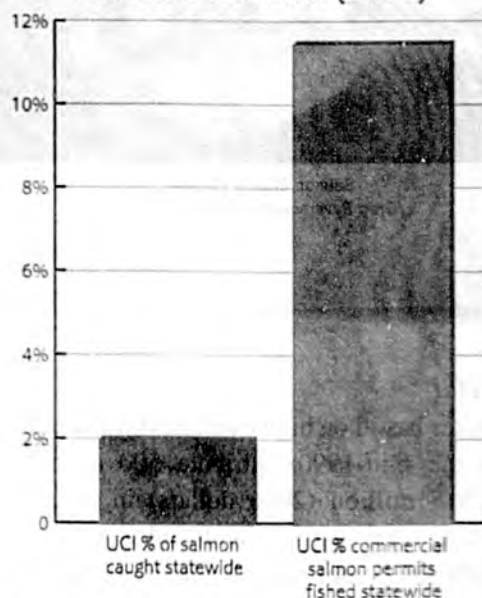


Figure ES 9. In 2006 Upper Cook Inlet accounted for 11.5% of all actively fished commercial salmon permits but only 2.0% of the statewide salmon catch. Source: ADF&G 2007, CFEC 2007. (From 2000-2006 the Upper Cook Inlet commercial salmon catch averaged 2.2% of the statewide harvest total. Source: ADF&G 2007.)

## ECONOMIC SIGNIFICANCE

### *Sport and Personal Use*

Sport and personal use fishing in Southcentral Alaska generate direct annual spending of some \$453 million (2006 dollars) and total sales of \$581 million that support 6,100 "full-time equivalent" or "average annual" jobs that produce \$186 million in income. Sport and personal use salmon fishing in Upper Cook Inlet generates total annual sales of some \$316 million (2006 dollars) that support 3,400 average annual jobs producing \$104 million in income in the region.

*Recreational salmon fishing in Upper Cook Inlet generates 3,400 average annual jobs producing \$104 million (2006 dollars) in income.*



Salmon Charter Fishing  
(Greg Syverson/Accent Alaska.com)

### *Commercial*

Estimates based on high ex-vessel (commercial catch) values of the mid-1990s attribute 500 average annual jobs and \$18 million (2006 dollars) in annual income to harvesting, processing, and indirect and induced employment from commercial salmon harvests in Upper Cook Inlet. At current (2000-2006) average annual commercial harvest values for salmon in Upper Cook Inlet, employment arising from commercial harvesting and processing as well as indirect and induced employment is

estimated to be between 275 and 500 average annual jobs, and average annual income is estimated to be between \$10 and \$18 million (2006 dollars).

*Commercial salmon fishing in Upper Cook Inlet generates between 275 and 500 average annual jobs producing between \$10 and \$18 million (2006 dollars) in income.*

Though the size of wild salmon runs fluctuates from year to year, the recent average annual commercial salmon harvest in Upper Cook Inlet is greater than long-term averages. The average commercial salmon harvest in Upper Cook Inlet over the most recent five-year period (2002-2006) of 4.34 million is greater than the average harvests in the region over the past ten years (1996-2005) of 3.70 million and past fifty years (1966-2005) of 4.27 million. By contrast, the inflation adjusted average annual value (in 2006 dollars) of Upper Cook Inlet commercial salmon harvests from 2000-2006 of \$16 million is one-seventh (14%) of the highest historic average annual value for an equivalent time period (1986-1992) of \$108 million and about one-third (39%) of the average annual value of the most recent decade (1991-2000) of \$40 million.



Salmon Row Processor  
(Terry Chick/Accent Alaska.com)



### Average Annual Jobs and Income Generated by Salmon Fishing in Upper Cook Inlet by Harvest Type

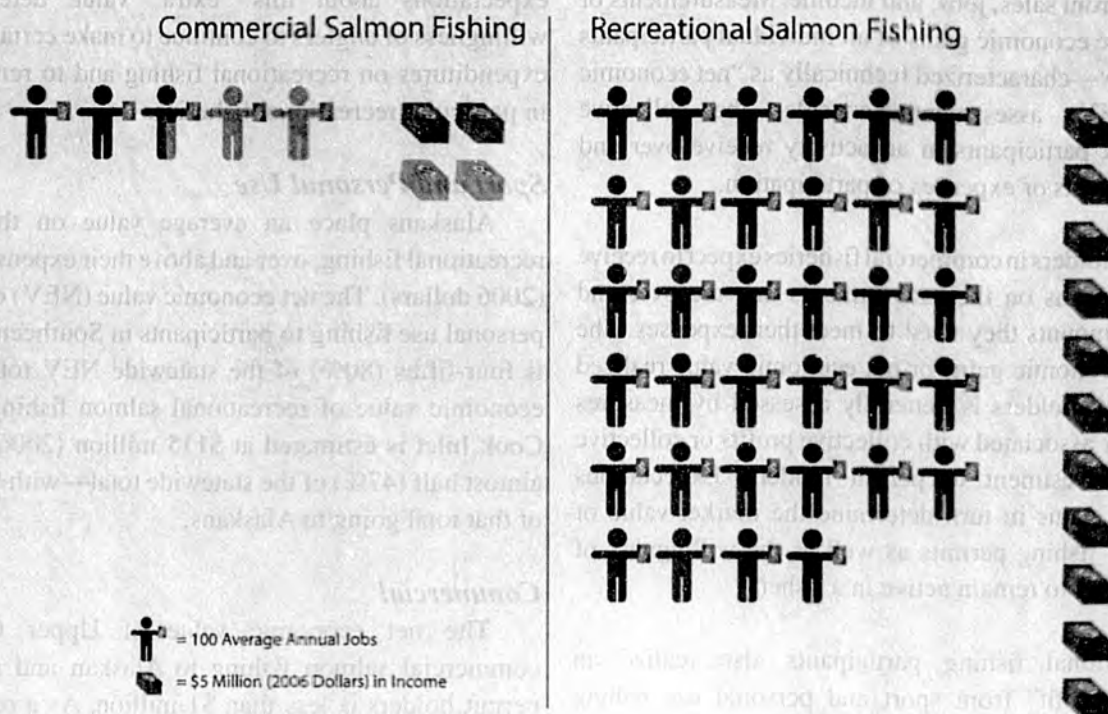


Figure ES 11. Commercial salmon fishing in Upper Cook Inlet generates between 275 and 500 average annual jobs producing between \$10 and \$18 million (2006 dollars) in income. Recreational salmon fishing in Upper Cook Inlet generates 3,400 average annual jobs producing \$104 million (2006 dollars) in income. Source: Calculations based on data reported in ADL&WD 2007, ADF&G 2007, ADF&G 2006, ADF&G 2005(b), Colt 2001, Haley et al. 1999, ISER 1996.

### Upper Cook Inlet Commercial Salmon Ex-Vessel Values by Decade & Most Recent Period (Inflation Adjusted)

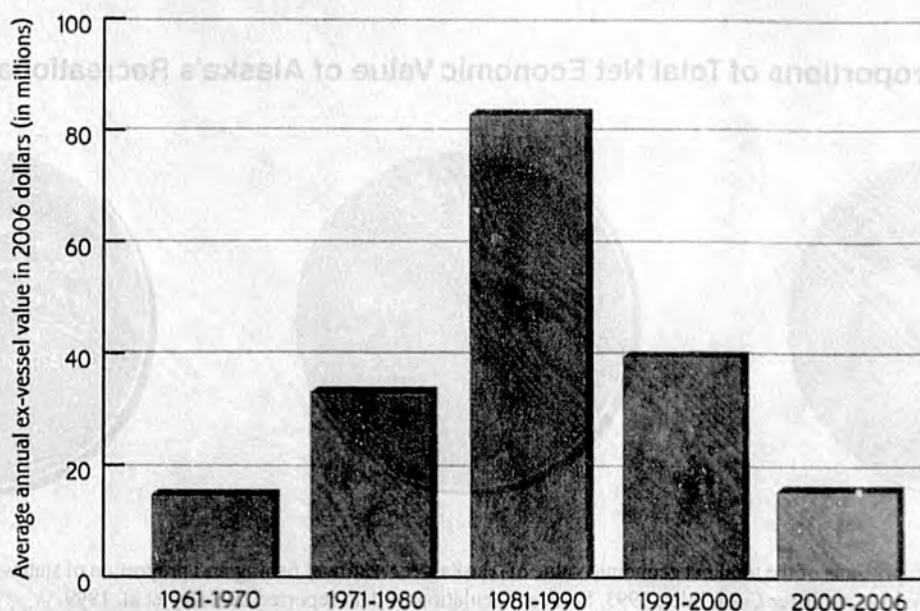


Figure ES 12. Average annual ex-vessel value of commercial salmon harvests in Upper Cook Inlet by decade and most recent period. Source: ADF&G 2007, ADL&WD 2007.

## NET ECONOMIC VALUE (NEV)

Both commercial and recreational fishing have economic worth in addition to the value created in local economies from sales, jobs, and income. Measurements of the collective economic gains of all individual participants in an activity—characterized technically as “net economic value” (NEV) assessments—consider the collective benefits that participants in an activity receive over and above their costs or expenses of participation.

Permit holders in commercial fisheries expect to receive profits or returns on their investments that are over and above the amounts they need to meet their expenses. The collective economic gains or net economic value realized by all permit holders is generally assessed by measures most closely associated with collective profits or collective return on investment to permit holders. Expectations about these gains in turn determine the market value of commercial fishing permits as well as the willingness of permit holders to remain active in a fishery.

Recreational fishing participants also realize an economic “profit” from sport and personal use fishing if they value their experience more than the amount they actually have to pay to go fishing. Economists can measure the amount of this “profit” by determining the extra amount that a recreational fishing participant would be willing to pay in addition to the actual costs of going fishing. The collective total of the “extra” value obtained

by each participant is characterized by economists as the net economic value of recreational fishing. Participants’ expectations about this “extra” value determine the willingness of anglers to continue to make certain levels of expenditures on recreational fishing and to remain active in particular recreational fisheries.

### Sport and Personal Use

Alaskans place an average value on their annual recreational fishing, over and above their expenses, of \$776 (2006 dollars). The net economic value (NEV) of sport and personal use fishing to participants in Southcentral Alaska is four-fifths (80%) of the statewide NEV total. The net economic value of recreational salmon fishing in Upper Cook Inlet is estimated at \$115 million (2006 dollars)—almost half (47%) of the statewide total—with \$62 million of that total going to Alaskans.

### Commercial

The net economic value of Upper Cook Inlet commercial salmon fishing to Alaskan and nonresident permit holders is less than \$1 million. As a result of low ex-vessel prices and correspondingly low net economic value, current values of commercial salmon permits in Cook Inlet are about one-tenth (10%) of the all-time high values in the late 1980s and early 1990s.

## Regional Proportions of Total Net Economic Value of Alaska's Recreational Fishing

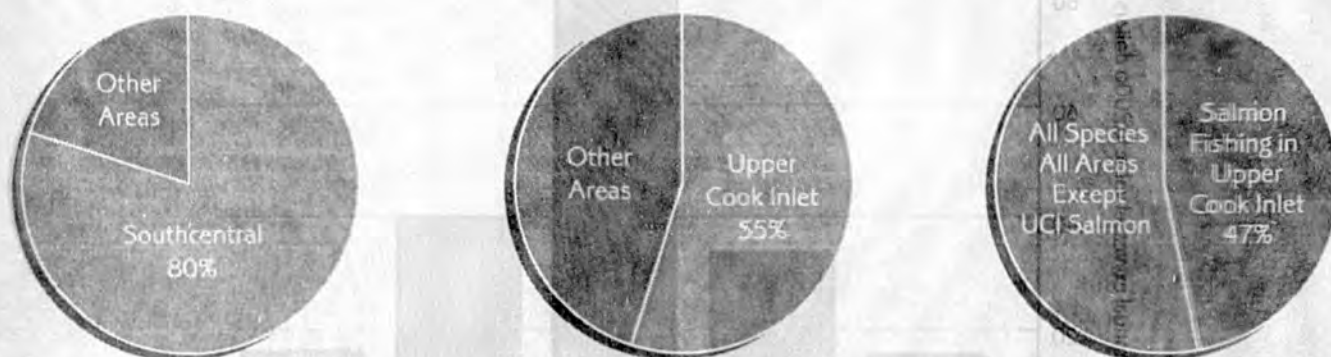


Figure ES 13. Regional proportions of the total net economic value of Alaska's recreational fishing and proportion of statewide net economic value of salmon fishing in Upper Cook Inlet, 1993. Source: Tabulation of data reported in Haley et al. 1999.

## THEME FUTURE TRENDS

### *Sport and Personal Use*

Demand for recreational fishing opportunities in the Cook Inlet boroughs is expected to grow by 2.3% per year through 2011—a net increase of almost 29,000 anglers over 2002-2006 levels. From 2002 to 2006, ADF&G issued an average 20,000 permits for Upper Cook Inlet personal use fishing. A record 21,910 personal use permits were issued in Upper Cook Inlet in 2004. Increases in sport and personal use harvests in Upper Cook Inlet will be determined by administrative allocation rather than underlying demand for fishing opportunities.

### *Commercial*

Comparisons of historical harvest data show that the size of the current commercial salmon catch in Upper Cook Inlet cannot be used as the explanation for current low commercial salmon harvest values. The size of the average annual commercial salmon harvest in Upper Cook Inlet in recent years is greater than the average harvest sizes in the region over the past ten and past fifty years, yet the current average market value of the harvest is lower than any decade since the 1960s.

This fundamental change in price regimes for Alaska salmon has resulted from dramatic increases in production of farmed salmon and globalization of world seafood markets. Salmon farming and globalization of seafood markets will continue to exert downward pressure on prices and values in Alaska's commercial salmon fisheries and act as a driving force for changes in salmon fisheries management.

In this new economic environment, the exceptional values of commercial salmon harvests in Upper Cook Inlet from the late 1980s to the early 1990s can no longer realistically be used to set benchmarks for fisheries management goals and objectives. To match the historic financial yields of Upper Cook Inlet commercial salmon permit holders under current market conditions, the average annual commercial salmon harvest in Upper Cook Inlet would have to be increased by two (200%) to five (500%) times and exceed the highest average annual harvest of any decade on record.

## ECONOMIC IMPACTS

In 1996, the Institute of Social and Economic Research (ISER) published a study assessing the potential economic impacts of increasing management targets for late-run Kenai sockeye by 200,000 fish thus making more fish available in-river for sport and personal use fishing on the Kenai River while potentially reducing commercial harvests and profits. The study modeled scenarios projecting ranges of sockeye run sizes and salmon prices—reflective of values in the early 1990s—ranging from a low of \$1.00 per pound to a high of \$1.75 per pound.

The study found that during high runs there would be no economic impacts, at medium runs and low prices sport gains would exceed commercial losses, and at low runs commercial losses would probably exceed sport gains. The study's authors noted that "given the range of uncertainty in our estimates, we can't definitely conclude that actual commercial losses would be larger than sport gains." The study noted but failed to assess the gains that would accrue to Northern District (Matanuska-Susitna and Anchorage boroughs) recreational fisheries from the increased number of sockeye salmon that would escape through the Central District under the higher management target.

The real (inflation adjusted) price per pound values of commercially caught sockeye salmon modeled in the ISER study are much higher than the nominal (non-

inflation adjusted) values stated in the study. Characterized in constant value 2006 dollars, ISER effectively modeled commercially harvested sockeye salmon at a high value of \$2.37 per pound, a low value of \$1.35 per pound, and a median value of \$1.94 per pound. The nominal values paid for commercially harvested sockeye salmon in Upper Cook Inlet from 2000-2006 were between \$1.10 and \$0.60 per pound. The average annual price per pound from 2000-2006—calculated in constant 2006 dollars—was \$0.83 per pound. This means that the ISER study used price assumptions almost one and two-thirds times (163%) greater at the low end and almost three times (286%) greater at the high end than the current average annual price per pound. Moreover, commercial permit values, harvesting and processing jobs and income, and commercial fisheries net economic values are now fractions of the values used in the ISER study.

This suggests that under current commercial salmon fishery price regimes and values the ISER study model would show economic gains in sport fisheries in Upper Cook Inlet that would exceed regional losses in the commercial fisheries in essentially all of the critical harvest level study scenarios. This would indicate that increasing salmon allocations for recreational fishing in Upper Cook Inlet would generate overall economic gains in the region.

## ALLOCATION AND MANAGEMENT

Commercial fisheries are allocated about five-sixths (82%) of the Upper Cook Inlet salmon harvest, while sport, personal use, and subsistence fisheries are allocated about one-sixth (18%) of the catch. The percentage of the total salmon harvest that is allocated for recreational use in British Columbia is 11%, in the Pacific Northwest it is 4%, and in Alaska it is 2%. For Alaska to be comparable with proportionate distributions in other North American Pacific salmon fisheries, allocations for recreational salmon fishing in the state would need to be increased by two (200%) to five and a half (550%) times. Since Alaska's recreational salmon fishing is so heavily concentrated in Cook Inlet, this would mean that allocations in the region would need to be substantially increased.

The success of recreational fisheries relies not only on receiving an appropriate share of the salmon harvest but also on receiving those fish in a way that is meaningful to recreational users. Recreational fisheries management is based on providing anglers predictable opportunities to harvest a meaningful number of fish incrementally over the entire course of the fishing season. Management practices that optimize commercial fisheries harvests in Upper Cook Inlet often negate management practices that sustain recreational fisheries.

### Percentage of Pacific Salmon Harvest Allocated for Recreational Fishing by Region

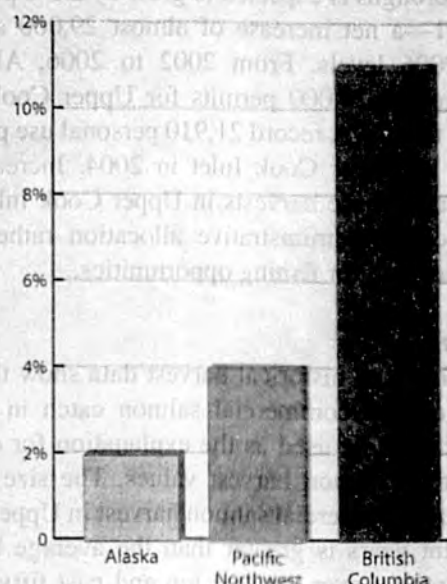


Figure ES 14. Upper Cook Inlet annual average harvest share by species for commercial and recreational (sport and personal use) fishing from 2002-2006. Source: Knapp et al, 2007.

### Upper Cook Inlet Salmon Harvest Allocation by User Group & Species, 2002-2006

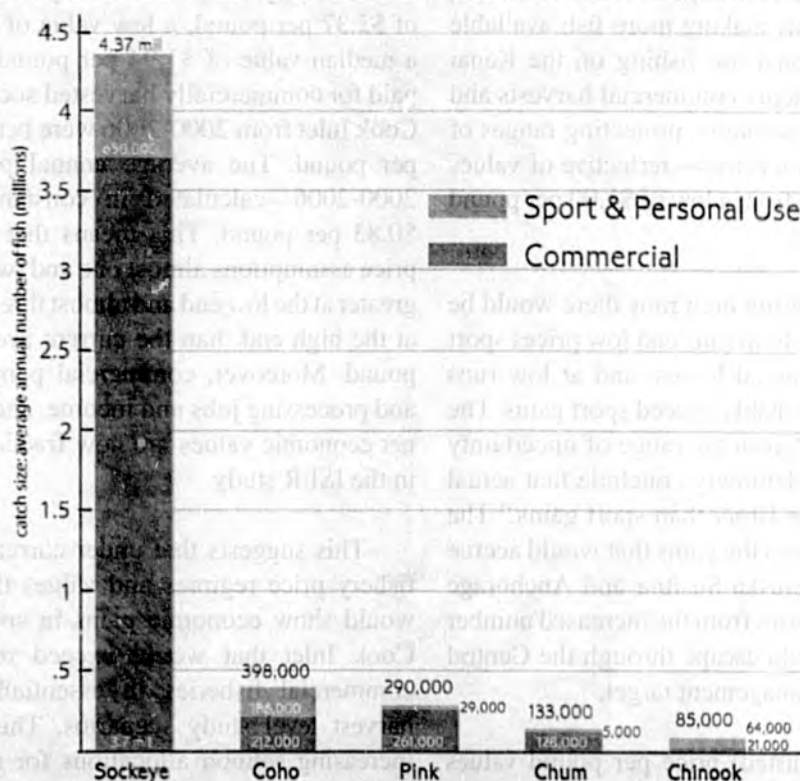


Figure ES 15. Upper Cook Inlet annual average harvest share by species for commercial and recreational (sport and personal use) fishing from 2002-2006. Source: ADF&G 2007.



## CONCLUSION

The significant economic differences between commercial and recreational salmon fishing in Upper Cook Inlet are not generally understood or widely recognized. Because participation levels in recreational salmon fishing in Upper Cook Inlet are so much greater than those in commercial salmon fishing, recreational fishing produces much greater activity in local economies than does a comparable commercial harvest.

There are about eight to 15 times (800-1,454%) as many Alaskans who obtain personal use permits to harvest salmon in Upper Cook Inlet as there are individuals—Alaskans and nonresidents—who are employed in or have jobs arising out of commercial salmon harvests in Upper Cook Inlet. There are about 32 to 59 times (3,240-5,890%) as many Alaskans who sport fish for salmon in Upper Cook Inlet as there are individuals—Alaskans and nonresidents—who are employed in commercial salmon harvesting and processing or have jobs arising indirectly out of commercial salmon harvests in Upper Cook Inlet.

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*Recreational salmon fishing in Upper Cook Inlet generates about 7 to 12 times (680-1,236%) as many average annual jobs and 6 to 10 times (577-1,040%) as much average annual income in the region as commercial salmon fishing.*

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Recreational fishing also attracts visitors from outside of Alaska who bring wealth into the state in the form of new dollars spent in local economies. There are about 31 to 57 times (3,120-5,670%) as many visitors to Alaska who sport fish for salmon in Upper Cook Inlet as there are individuals—Alaskans and nonresidents—who are employed in commercial salmon harvesting and processing or have jobs arising indirectly out of commercial salmon harvests in Upper Cook Inlet.

In all, there are about 63 to 115 times (6,300-11,560%) as many anglers—Alaskans and visitors—who sport fish for salmon in Upper Cook Inlet as there are individuals—Alaskans and nonresidents—who are employed in commercial salmon harvesting and processing or have jobs arising indirectly out of commercial salmon harvests in Upper Cook Inlet.

Due, in part, to the impact of these vastly greater rates of participation, recreational salmon fishing in

Upper Cook Inlet generates about seven to 12 times (680-1,236%) as many average annual jobs and six to ten times (577-1,040%) as much average annual income in the region as commercial salmon fishing.

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*Fisheries management in Upper Cook Inlet faces the ongoing challenge of adhering to policies and practices that recognize the central economic importance of sport and personal use fisheries in the region.*

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The additional worth of commercial and recreational fishing to participants—that is, the value over and above the costs and expenses of participation—is not accounted for by measures of economic activity such as sales, jobs, and income. This additional worth is measured by net economic value (NEV) assessments. The net economic value (NEV) to Alaskans of recreational salmon fishing in Upper Cook Inlet is 62 (6,200%) times greater than the NEV of commercial salmon fishing to permit holders—Alaskans and non-residents—in the region.

Markets for Alaska salmon continue to be impacted by mounting pressures from the globalization of seafood markets and an explosion in aquaculture production. There is no projected abatement of these trends, and they will continue to act as a driving force for changes in salmon fisheries management. Unprecedented commercial fishery values in the late 1980s and early 1990s are no longer realistic benchmarks for fisheries management goals and objectives. It is crucial that the inevitable restructuring of salmon fisheries management in Upper Cook Inlet necessitated by global market forces be fully informed by an awareness of the very significant economic values—both to local economies and to individual participants—of sport and personal use fisheries.

The state agencies that oversee and regulate fisheries were originally designed to address the needs and interests of commercial fisheries. Substantive consideration of the needs of sport and personal use fisheries and informal representation of recreational fishing interests on the Board of Fisheries are relatively recent developments. Fisheries management in Upper Cook Inlet faces the ongoing challenge of adhering to policies and practices that recognize the central economic importance of sport and personal use fisheries in the region.

## CONCLUSION

The relationship between commercial and recreational salmon fishing in Upper Cook Inlet is not generally understood or widely recognized. Because participation levels in recreational salmon fishing in Upper Cook Inlet are so much greater than those in commercial salmon fishing, recreational fishing is much greater activity in local economy and comparable commercial fishing.

There are about eight to 12 times as many Alaskans who obtain their recreational salmon in Upper Cook Inlet as there are commercial fishermen. The recreational fishery is much larger than the commercial fishery. The recreational fishery is much larger than the commercial fishery. The recreational fishery is much larger than the commercial fishery.



KENAI RIVER SPORTFISHING  
ASSOCIATION

KENAI RIVER SPORTFISHING ASSOCIATION • P.O. BOX 1228 • SOLDOTNA, ALASKA 99669

Salmon to participants is the value over and above the cost and expense of participation is not included in the measure of economic activity with a value added. This additional value is measured by the



# Economic Values of Sport, Personal Use, and Commercial Salmon Fishing in Upper Cook Inlet

## (Quick Reference)



### PARTICIPATION

- 160,000 anglers—Alaskans and visitors—sport fish for salmon, and 20,000 Alaskans harvest salmon for personal use in Upper Cook Inlet recreational salmon fisheries each year.
- 1,375 to 2,500 individuals are seasonally employed in commercial salmon harvesting and processing or have jobs arising indirectly from the effects of commercial harvest and processing activity in Upper Cook Inlet.
- Sport and personal use salmon fishing in Upper Cook Inlet account for well over one-third (37%) of all recreational fishing in Alaska.
- Upper Cook Inlet accounts for 2% of the total statewide commercial salmon catch.
- Cook Inlet commercial salmon fisheries have substantially lower yields and substantially higher rates of permits not fished than comparable fisheries.

### ECONOMIC SIGNIFICANCE

- Recreational salmon fishing in Upper Cook Inlet generates 3,400 average annual jobs producing \$104 million (2006 dollars) in income.
- Commercial salmon fishing in Upper Cook Inlet generates between 275 and 500 average annual jobs producing between \$10 and \$18 million (2006 dollars) in income.
- The average commercial salmon harvest size in Upper Cook Inlet from 2002 to 2006 is greater than the average harvests over the past ten and past fifty years.
- The current (2000-2006) value of Upper Cook Inlet commercial salmon harvests is 14% of the highest historic value (1986-1992) and 39% of the most recent decade (1991-2000).

### NET ECONOMIC VALUE (NEV)

- The average value over and above expenses that individual Alaskans place on their annual recreational fishing is \$776 (2006 dollars).
- The net economic value of recreational salmon fishing in Upper Cook Inlet to Alaskans and visitors is \$115 million (2006 dollars)—almost half (47%) of the statewide net economic value total—with \$62 million of that total going to Alaskans.
- The net economic value of Upper Cook Inlet commercial salmon fishing to all permit holders—Alaskans and non-residents—is less than \$1 million.

### FUTURE TRENDS

- Demand for recreational fishing opportunities in the Cook Inlet boroughs is expected to continue to grow by 2.3% per year through 2011—a net increase of almost 29,000 anglers over 2002-2006 levels.
- Salmon farming and globalization of seafood markets will continue to exert downward pressure on prices and values in all of Alaska's commercial salmon fisheries.

### ECONOMIC IMPACTS

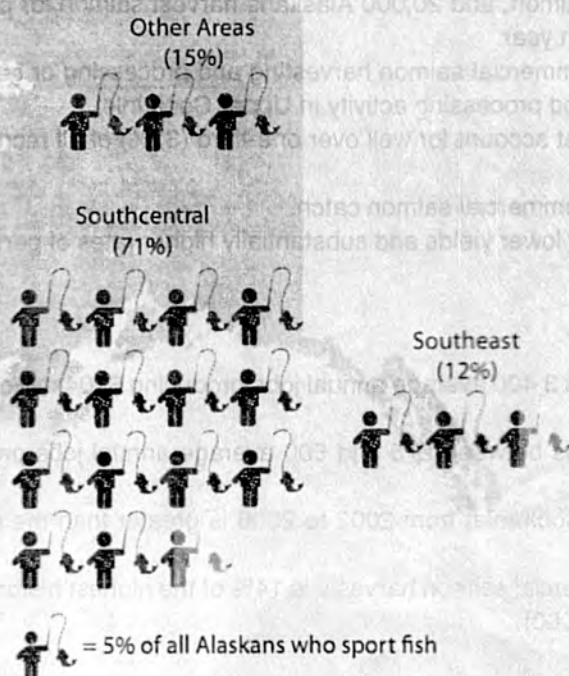
- Institute of Social and Economic Research (ISER) study models from the mid-1990s suggest that at current commercial prices and values, increasing sockeye salmon allocations for sport fishing in Upper Cook Inlet would generate overall economic gains in the region.

### ALLOCATION

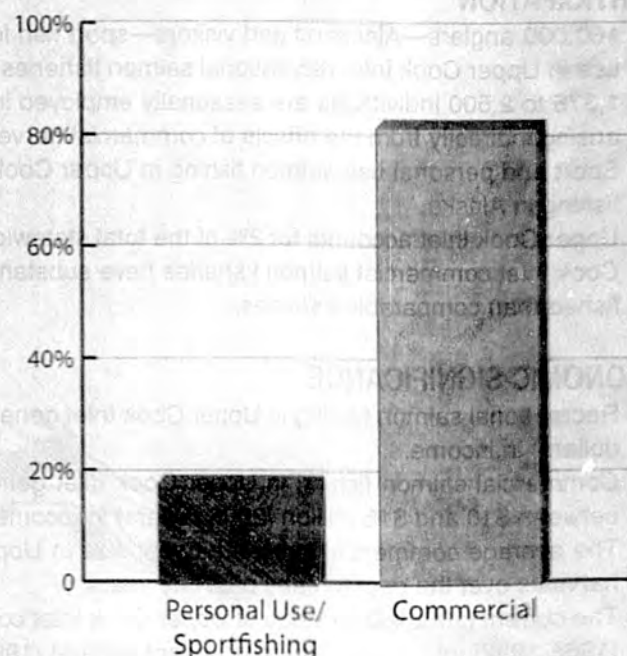
- Commercial fisheries are currently allocated 82% of the Upper Cook Inlet salmon harvest, while sport and personal use fisheries are allocated 18% of the harvest.
- In Alaska 2% of the total salmon harvest is allocated for recreational use. For allocations in Alaska to be comparable with other North American Pacific salmon fisheries, allocation rates for recreational fishing would need to be increased two (200%) to five (500%) times.

# Economic Values of Sport, Personal Use, and Commercial Salmon Fishing in Upper Cook Inlet

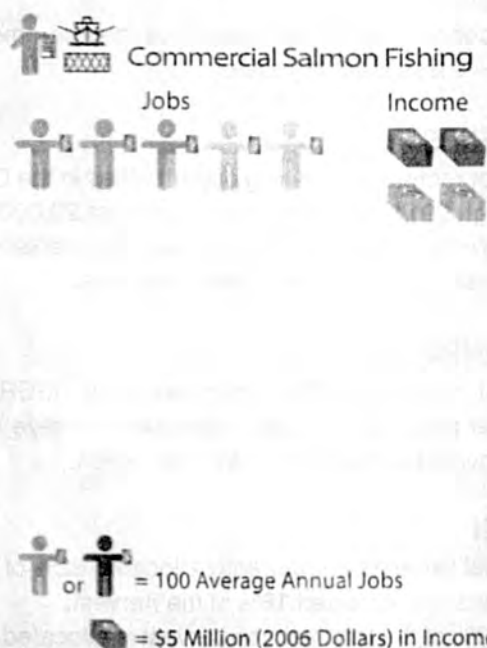
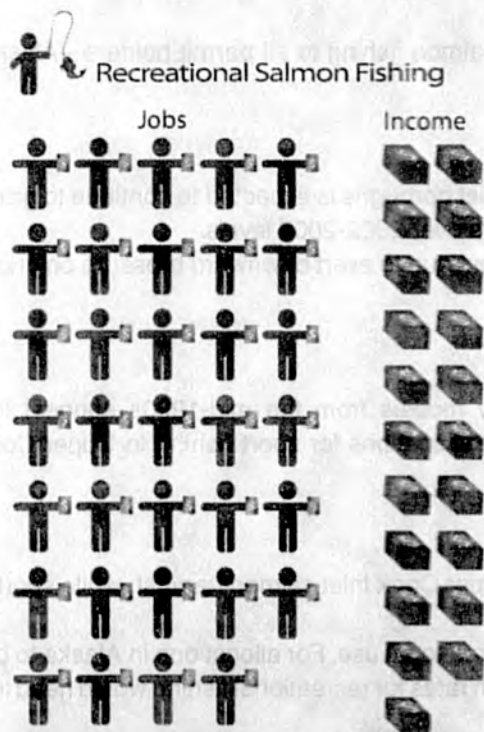
**Percentages of Alaskans Who Sport Fish  
by Region of Residence**

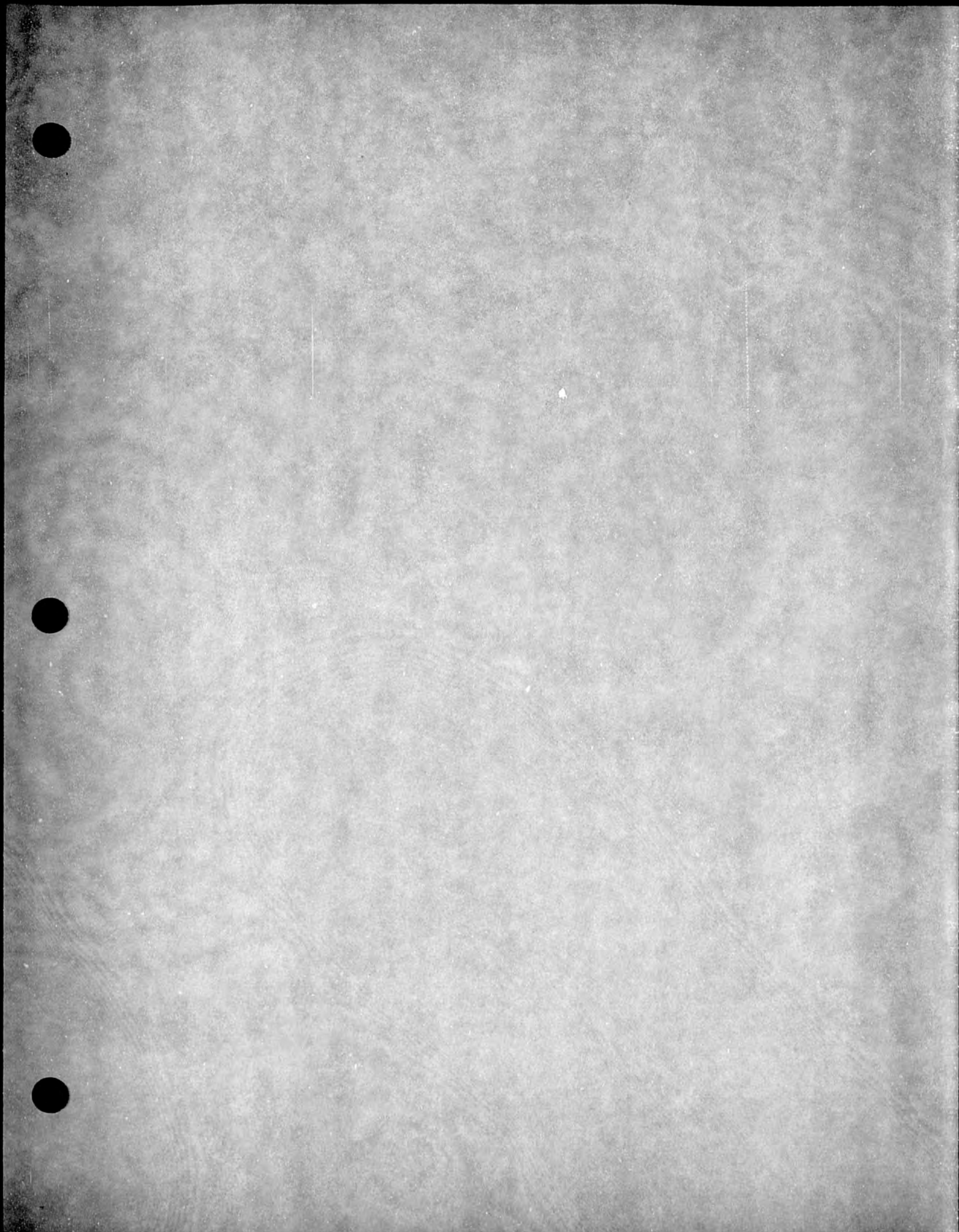


**Allocation of Upper Cook Inlet Salmon  
Harvest by User Group, 2002-2006**



**Average Annual Jobs and Income Generated by Salmon Fishing in  
Upper Cook Inlet by Harvest Type**





ALASKA DEPARTMENT OF FISH AND GAME  
DIVISION OF COMMERCIAL FISHERIES

From: Bruce Knowles [mailto:bigfish@mtaonline.net]

Sent: Friday, May 16, 2008 6:11 PM

To: Rep. Craig Johnson; Rep. Bill Stoltze; Rep. Mark Neuman; Rep. Wes Keller; Sen. Charlie Huggins; Sen. Lyda Green

Subject: Mat-Su Borough Blue Ribbon Committee Comments

Rep. Johnson following our phone conversation this afternoon I am sending you the Cook Inlet Preseason Salmon Forecast from the ADFG commercial fishing web site. The Dept is forecasting a total return of 5.6 million sockeye with a harvest total harvest by all user groups of 3.9 million which equates to a 70% harvest rate.

The department has forecasted 453,000 sockeye for the Susitna River Drainage, when you subtracted 70% from the 453,000 that leaves 136,000 sockeyes to return to the Susitna River drainage that needs a minimum of a 180,000 to met both the Yetna River SEG. The harvest would have to be reduced to less than 50% to met the escapement goal.

I am also attaching a copy of the letter that has been sent to the Matanuska-Susitna Borough Mayor, from the Mat-Su Borough Blue Ribbon Sportsmen's Committee. Express our concerns about the actions of the Board of Fisheries and the Department of Fish and Game.

I serve as the chairman of the Susitna River Advisory Committee, co chair of the Mat-Su Borough Blue Ribbon Sportsmen's Committee and several committees and groups. I am available to provide information concerning the Northern District Stocks and the mismanagement that has taken place and is still currently taking place. I have some very sound and logical management action that could be taken to move all stocks into the Northern District and in two life cycles approximately 10 years would increase the runs and the harvest of commercial fishermen. When first over escapement occur on the Kenai River sockeye salmon return was going to die and each year after, dire results were forecasted. The only thing that has happen commercial fishermen have had some of their largest harvest on record year after. While the Northern District stocks decline.

Bruce Knowles

907-495-4965

232-5873

# ALASKA DEPARTMENT OF FISH AND GAME

## DIVISION OF COMMERCIAL FISHERIES

### NEWS RELEASE



*Denby S. Lloyd, Commissioner*  
*John Hilsinger, Director*



Contact:  
Mark Willette, Research Project Leader  
Jeff Fox & Pat Shields, Area Management Biologists  
Phone: (907) 262-9368  
Fax: (907) 262-4709

Soldotna ADF&G  
43961 Kalifornsky Beach Rd.  
Suite B  
Soldotna, AK 99669  
Date Issued: 12/17/2007

#### 2008 UPPER COOK INLET SOCKEYE SALMON FORECAST

A run of 5.6 million sockeye salmon is forecasted to return to UCI in 2008 with a harvest by all user groups of 3.9 million sockeye salmon. The forecasted harvest in 2008 is about 200,000 fish below the 20-year average harvest by all user groups. The sockeye salmon run forecast for the Kenai River of 3.1 million is 16% less than the 20-year average run of 3.7 million. Age-1.3 sockeye salmon typically comprise about 65% of the run to the Kenai River. A sibling model based upon the return of age-1.2 sockeye salmon in 2007 was used to predict a return of 2.6 million age-1.3 sockeye salmon to the Kenai River in 2008, while the fry model predicted a return of 2.5 million age-1.3 sockeye salmon. Age-2.3 sockeye salmon typically comprise about 20% of the run to the Kenai River. A sibling model based upon the return of age-2.2 sockeye salmon in 2007 was used to forecast the return (286,000) of age-2.3 sockeye salmon to the Kenai River in 2008. The return of age-2.2 sockeye salmon in 2007 was 58% less than the 20-year average return for this age class. The predominant age classes in the 2008 run should be age 1.3 (85%) and age 2.3 (9%).

The sockeye salmon run forecast for the Kasilof River of 1.3 million is 33% greater than the 20-year average run of 968,000 fish. Age-1.3 sockeye salmon typically comprise about 35% of the run to the Kasilof River. A sibling model based upon the return of age-1.2 sockeye salmon in 2007 was used to forecast the return (376,000) of age-1.3 sockeye salmon in 2008. The return of age-1.2 sockeye salmon last year was 57% greater than the 20-year average return for this age class. Age-1.2 sockeye salmon typically comprise about 30% of the run to the Kasilof River. A sibling model based upon an above average return of age-1.1 sockeye salmon in 2007 was used to forecast the return of age-1.2 sockeye salmon to Kasilof River. The sibling model predicted a return of 484,000 age-1.2 sockeye salmon. However, we are less confident in this forecast, because a smolt model predicted a return of only 252,000 age-1.2 sockeye salmon. Age-1.2 sockeye salmon migrated as smolts from the Kasilof River in 2006, when their estimated abundance was only 2.6 million, about one-half of the 20-year average. The predominant age classes in the 2008 run should be age 1.2 (38%) and age 1.3 (29%).

The sockeye salmon run forecast for the Susitna River of 344,000 is 24% less than the 20-year average run of 453,000. Age-1.2 and -1.3 sockeye salmon typically comprise 72% of the run to the Susitna River. A spawner-recruit model was used to forecast the return (80,000) of age-1.2 sockeye salmon to the Susitna River. The spawner abundance for this age class was about 37% less than the 20-year average spawner abundance. A sibling model based upon the return of age-1.2 sockeye salmon in 2007 was used to forecast the return (170,000) of age-1.3 sockeye salmon to the Susitna River in 2008. The return of age-1.2 sockeye salmon in 2007 was 44% less than the 20-year average. The predominant age classes in the 2008 run should be age 1.3 (49%) and age 1.2 (23%).

The sockeye salmon run forecast for Fish Creek of 53,000 is 67% less than the 20-year average run of 159,000. Age-1.2 and -1.3 sockeye salmon typically comprise 79% of the run to Fish Creek. Sibling models based upon the abundances of age-1.1 and -1.2 sockeye salmon in 2007 were used to forecast the returns of age-1.2 (36,000) and -1.3 (10,000) sockeye salmon in 2008. The abundances of age-1.1 and -1.2 sockeye salmon returning to Fish Creek in 2007 were 74% less than the 20-year average. The predominant age classes in the 2008 run should be age 1.2 (67%) and age 1.3 (19%).

The sockeye salmon run forecast for Crescent River of 100,000 is 7% less than the 20-year average run of 108,000. Sibling models based upon returns of age-1.2 and -2.2 sockeye salmon in 2007 were used to forecast returns of age-1.3 (48,000) and -2.3 (28,000) sockeye salmon to the Crescent River in 2008. The predominant age classes in the 2008 run should be age 1.3 (48%) and age 2.3 (28%).

Forecast runs to individual freshwater systems are as follows:

| System         | Run       | Goal Range                  |
|----------------|-----------|-----------------------------|
| Crescent River | 100,000   | 30,000–70,000               |
| Fish Creek     | 53,000    | 20,000–70,000               |
| Kasilof River  | 1,286,000 | 150,000–250,000             |
| Kenai River    | 3,064,000 | 750,000–950,000             |
| Susitna River  | 344,000   | 90,000–160,000 <sup>a</sup> |
| Minor Systems  | 727,000   | N/A                         |

<sup>a</sup> The inriver goal listed for Susitna River sockeye salmon is the escapement goal range for Yentna River sockeye salmon. The sonar estimate of sockeye salmon escapement into the Yentna River is typically multiplied by 1.95 to expand the estimate to the entire Susitna River watershed.

For more information contact Mark Willette, Jeff Fox, or Pat Shields at the Soldotna ADF&G office at (907) 262-9368.

Honorable Curt Menard  
Mayor, Matanuska-Susitna Borough  
350 E. Dahlia  
Palmer, AK 99645

May 16, 2008

Dear Mayor Menard,

The Mat-Su Borough Blue Ribbon Sportsmen's Committee finds ourselves greatly disturbed with the manner in which the Board of Fisheries (BOF) and the Department of Fish and Game (ADF&G) is addressing the Stock of Concern status of Susitna Sockeye Salmon. The Committee met following the February Board of Fisheries meeting on Upper Cook Inlet Fin Fish and discovered this sentiment unanimous among our membership. We are writing in hopes of escalating this concern to build support for bringing the Susitna Sockeye Action Plan better into compliance with the Sustainable Salmon Fisheries Policy.

During the course of the BOF meeting, the Board declared Susitna Sockeye a Stock of Concern under the Sustainable Salmon Fisheries Policy (5 AAC 39.222). Pursuant to that designation, the ADF&G proposed what they considered an "Action Plan" to the BOF for consideration. The BOF accepted that document without modification. It is our position that this document fails to meet the criteria set forth in the Sustainable Salmon Fisheries Policy (SSFP) for an Action Plan by a wide margin.

We would like to see the ADF&G and the BOF withdraw this document and generate an SSFP-compliant Action Plan for these stocks and we ask your assistance in advancing our position to the state.

The SSFP is very clear about what to do in the case where the sustainability of a salmon stock is uncertain. The ADF&G has repeatedly documented their "uncertainty" regarding Susitna/Yentna salmon. Quoting from their "Action Plan", "Although sockeye salmon escapements are estimated via a Bendix sonar system, there is *great uncertainty* surrounding their accuracy and precision. . . "the department has *low confidence* in the accuracy of our estimate of the Susitna sockeye salmon harvest".

This uncertainty has been consistent for many years and only this season has the BOF succumbed to pressure and taken steps to address the situation. On its face, this is good news, however the action part of this "Action Plan" is lacking.

The SSFP states clearly, "in the face of uncertainty, salmon stocks, fisheries, artificial propagation, and essential habitats shall be managed conservatively as follows." Excerpting from the SSFP it reads:

(4) in association with the appropriate management plan, the department and the board will, as appropriate, collaborate in the development and periodic review of an action plan for any new or expanding salmon fisheries, or stocks of concern; action plans should contain goals, measurable and implementable objectives and provisions including

- (A) measures required to restore and protect salmon habitat including necessary coordination with other agencies and organizations;
- (B) identification of salmon stock or population rebuilding goals and objectives;
- (C) fishery management actions needed to achieve rebuilding goals and objectives in proportion to each fishery's use of, and hazards posed to, a salmon stock;
- (D) descriptions of new or expanding salmon fisheries, management concern, yield concern, or conservation concern; and;
- (E) performance measures appropriate for monitoring and gauging the effectiveness of the action plan that are derived from the principles and criteria contained in this policy;

It is the position of the Mat-Su Mayor's Blue Ribbon Sportsmen's Committee that the abbreviated 6-page "Action Plan" prepared by the ADF&G and the BOF fails to comply with any of the requirements listed above.

By comparison, the 24-page 2006 Kvichak River Sockeye Salmon Stock Status and Action Plan, as well as, the 21-page Norton Sound Shaktoolik and Unalakleet Subdistrict Chinook Salmon Stock Status and Action Plan contain extensive discussion of goals and objectives along with performance measures that enable the BOF to know whether the concerns regarding these stocks are improving.

To further the insult of what many consider an "Inaction Plan" the BOF under the encouragement of the ADF&G violated the most basic principle of the SSFP by not only failing to proceed cautiously, but by further liberalizing the commercial harvest of Upper Cook Inlet sockeyes.

During the BOF meeting, the ADF&G released statistics collected in the past couple years showing that on certain days the Central District commercial fishery caught as many as 100,000 Northern District-bound sockeyes. The implication of this information is that had the fishery been closed for as little as a few days, the escapement of sockeyes to the Northern District could have been doubled.

Making matters worse, we have received word that ADG&G held closed-door meetings with Cook Inlet Aquaculture regarding the nature of research the department plans to contract for as a result of this alleged Action Plan and rumor is that they plan to discontinue the salt water research that provides this kind of information.

Again, the SSFP calls for public input and we feel the appearance of evasive behavior that denies the public any input in this highly sensitive subject will be detrimental to the ADF&G. The department has not even enlisted input from their regional Advisory Committees on this matter.

It is saddening to report that after attempting to participate in the Board of Fisheries process in good faith the perspective of our committee is that the integrity of both the ADF&G and the BOF appears questionable.

Any recommendations on how to elevate these concerns is greatly appreciated.

Sincerely,

Tom Kluberton, Chairman

Cc: John Duffy, MSB Manager

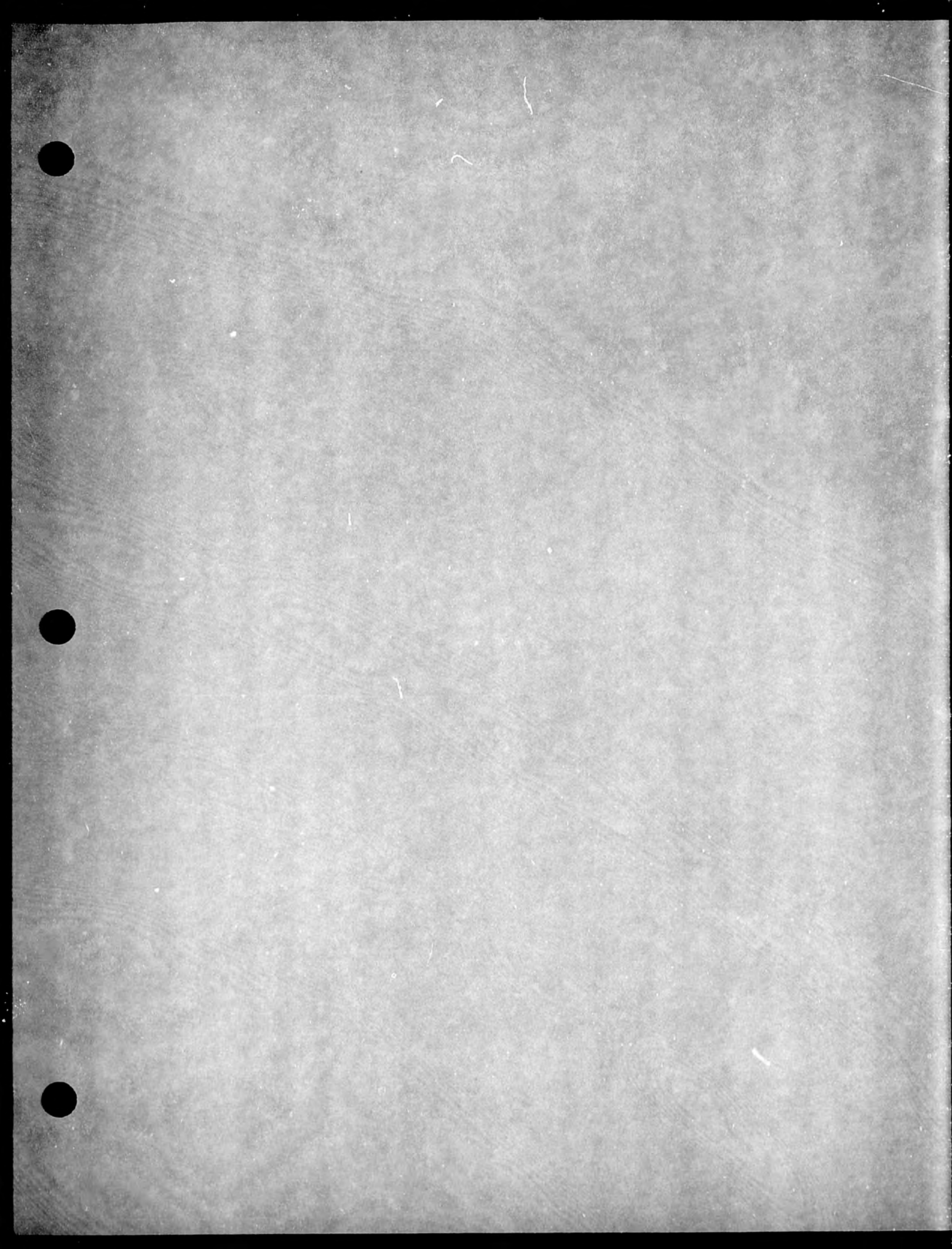
Attachments: SSFP

2008 Susitna Sockeye Action Plan

2007 Kvichak River Sockeye Salmon Stock Status and Action Plan

2003 Norton Sound Shaktoolik and Unalakleet Subdistrict Chinook

Salmon Stock Status and Action Plan

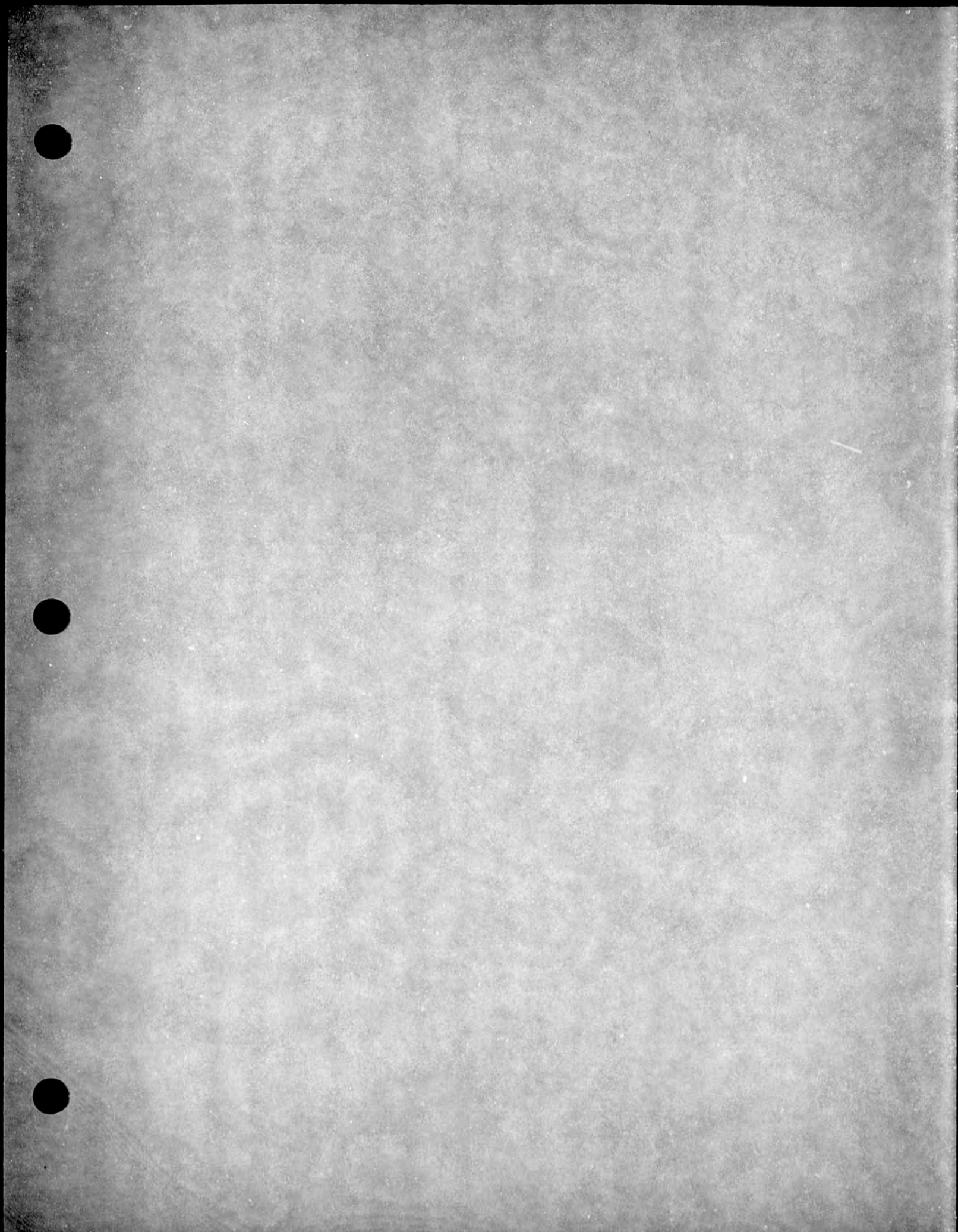


KENAI PENINSULA BOROUGH  
1987 TO 2007

|      | Commercial Harvest | Unemployment | Taxable Sales |
|------|--------------------|--------------|---------------|
| 2007 | \$23.4M            | Unav.        | \$968 M       |
| 2006 | \$13.9M            | 8.4%         | \$887 M       |
| 2005 | \$32.7M            | 8.6%         | \$822 M       |
| 2004 | \$20.7M            | 9.5%         | \$780 M       |
| 2003 | \$12.3M            | 10.0%        | \$733 M       |
| 2002 | \$11.6M            | 9.0%         | \$724 M       |
| 2001 | \$ 7.7M            | 7.9%         | \$705 M       |
| 2000 | \$ 8.1M            | 8.0%         | \$666 M       |
| 1999 | \$21.3M            | 11.1%        | \$640 M       |
| 1998 | \$ 8.6 M           | 9.9%         | \$612 M       |
| 1997 | \$32.4M            | 13.7%        | \$590 M       |
| 1996 | \$29.7M            | 14.2%        | \$564 M       |
| 1995 | \$22.0M            | 12.5%        | \$552 M       |
| 1994 | \$34.5M            | 12.8%        | \$527 M       |
| 1993 | \$30.0M            | 13.2%        | \$492 M       |
| 1992 | \$100.0M           | 15.7%        | \$463 M       |
| 1991 | \$15.2M            | 13.8%        | \$441 M       |
| 1990 | \$40.7M            | 11.9%        | \$430 M       |
| 1989 | \$59.2M            | 9.3%         | \$396 M       |
| 1988 | \$122.2M           | 14.0%        | \$348 M       |
| 1987 | \$101.1M           | 16.8%        | \$328 M       |

Figures came from ADF&G, Alaska Dept. of Labor and Kenai Borough. OBSERVATIONS

1 The great commercial fishing years (1992, 1988 and 1987) had high unemployment rates and the poor years (2001, 2000 and 1998) had low rates. 2 Neither great nor poor commercial fishing years had any significant impact on taxable sales in the Kenai Borough.



# A Primer on Salmon Escapement Goals and Fisheries Management in Alaska

Charles O. Swanton

Alaska Dept. of Fish and Game,

Division of Sport Fish





## **Legal Mandates and Policies**

### **Providing for sustained yield:**

#### **Constitution:**

Article VIII, Sec(4). Fish, forests, wildlife, grasslands, and all other replenishable resources belonging to the State shall be utilized, developed, and maintained on the **sustained yield principle**, subject to preferences among beneficial uses.

#### **Statute:**

AS 16.05.020(2). The commissioner (of the Department of Fish and Game) shall manage, protect, maintain, improve and extend the fish, game and aquatic plant resources of the state in the interest of the economy and general well-being of the state.



## **Legal Mandates and Policies**

### **Providing for sustained yield:**

#### **Regulation:**

- Mixed-Stock Salmon Policy, 5 AAC 39.220
- Sustainable Salmon Fisheries Policy, 5 AAC 39.222
- Escapement Goal Policy, 5 AAC 39.223
- Management plans for salmon fisheries

#### **Sustainable Salmon and Escapement Goal Policies:**

- Manage for escapement goals
- Biological Escapement Goal (BEG) and Maximum Sustained Yield (MSY)
- Sustainable Escapement Goal (SEG) and Sustained Yield

## Key Terms and Definitions

- Escapement - annual estimated size of the spawning salmon stock; quality of the escapement may be determined not only by numbers of spawners, but also by factors such as sex ratio, age composition, temporal entry into the system, and spatial distribution within the salmon spawning habitat.
- Return - total number of salmon in a stock from a single brood (spawning) year surviving to adulthood; because the ages of adult salmon (except pink salmon) returning to spawn varies, the total return from a brood year will occur over several calendar years; the total return generally includes those mature salmon from a single brood year that are harvested in fisheries plus those that compose the salmon stock's spawning escapement.
- Run - total number of salmon in a stock surviving to adulthood and returning to the vicinity of the natal stream in any calendar year, composed of both the harvest of adult salmon plus the escapement; the annual run in any calendar year, except for pink salmon, is composed of several age classes of mature fish from the stock, derived from the spawning of a number of previous brood years.

## Key Terms and Definitions

- Yield - number or weight of salmon harvested in a particular year or season from a stock.
- Harvest – number or weight of salmon taken of an annual run from a specific stock.
- Exploitation Rate – fraction of the return by stock taken in a fishery (specific to a brood year).
- Harvest Rate – fraction of an annual run from a stock taken in a fishery.
- Overescapement - escapements that are above the range of the current escapement goal.
- Run timing – calendar date that a stock passes by a fixed geographic reference point (e.g., statistical management area, weir).



# Key Terms and Definitions

## **Fishery-Related Effects**

Based on year of fishery

Run or Total Run

Harvest Rate

Harvest

Realized Escapement

$\text{Harvest} \div \text{Run} = \text{Harvest Rate}$

$\text{Run} - \text{Harvest} = \text{Escapement}$

## **Biological Effects**

Based on brood year

Return or Total Return

Exploitation Rate

Yield

Brood Year Escapement

$\text{Yield} \div \text{Return} = \text{Exploitation Rate}$

$\text{Return} - \text{Escapement} = \text{Yield}$

## ESCAPEMENT GOAL POLICY

- Development
- Terms and Examples
- Elements and principles
- Goal Development

## ESCAPEMENT METHODS USED

## SUSTAINABLE SALMON FISHERIES POLICY

- Policy Development
- Inputs, Terms and Definitions
- Initial implementation

## SUSITNA RIVER SOCKEYE SALMON

## Options for Statewide Salmon Escapement

• Policy development initiated in 1989-memo

- Central theme-"to achieve a constant level of escapement, regardless of run strength"
- As information improves escapement goals will be improved and developed for increasing sustained harvest level.
- A professional and scientific approach is required for establishing and changing goals.

The 1992 working draft included:

Data quality, scientific methods, informing the public and users, allocation implications directed to BOF.

## **Codified Escapement Goal Policy: Key Elements**

- 1) Establish BEGs and SEGs for stocks that are actively managed.
- 2) Document all analyses used to establish goals.
- 3) Establish SETs if needed.
- 4) Review goals within a region every BOF cycle.

## BEG: Biological Escapement Goal

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- A goal that provides the greatest potential for MSY;
- Primary management Objective;
- Based on best available biological information;
- Expressed as a range;
- Seek to maintain escapements evenly within the range.



# Building a Brood Table

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- Escapement Estimates
- Harvest Estimates
- Age Composition of Escapement and Harvest
- Stock Identification and Run Reconstruction
- ~15+ years of DATA

## Spawner-Recruit Data (chum salmon)



| Year | Escapement | Return    |
|------|------------|-----------|
| 1972 | 457,800    | 362,587   |
| 1973 | 249,015    | 856,936   |
| 1974 | 411,133    | 1,338,657 |
| 1975 | 900,967    | 843,132   |
| 1976 | 511,475    | 2,926,444 |
| 1977 | 358,771    | 1,321,297 |
| 1978 | 307,270    | 1,187,305 |
| 1979 | 280,537    | 979,514   |
| 1980 | 492,676    | 1,744,558 |
| 1981 | 1,486,182  | 2,779,191 |
| 1982 | 444,581    | 988,061   |
| 1983 | 362,912    | 1,220,480 |
| 1984 | 891,028    | 2,928,193 |
| 1985 | 1,080,243  | 1,141,620 |
| 1986 | 1,189,602  | 1,203,367 |
| 1987 | 455,876    | 1,480,599 |
| 1988 | 1,125,449  | 628,815   |
| 1989 | 636,906    | 1,318,363 |
| 1990 | 403,627    | 1,300,412 |
| 1991 | 847,772    | 1,588,212 |
| 1992 | 775,626    | 1,233,719 |
| 1993 | 517,409    | 467,159   |

## SEG: Sustainable Escapement Goal

- Level of escapement indicated by an index or escapement estimate that is known to provide for sustained yields over a 5-10

- Stated as a range taking into account uncertainty

OEC: Optimal Escapement



# OEG: Optimal Escapement Goal

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- A specific management objective for salmon escapement that considers biological and allocative factors.
- Expressed as a range with lower bound above that of an SET
- Set by the Board of Fish (not ADFG)
- Example: lower a goal to allow for subsistence harvest; or raise a goal because of data uncertainty.

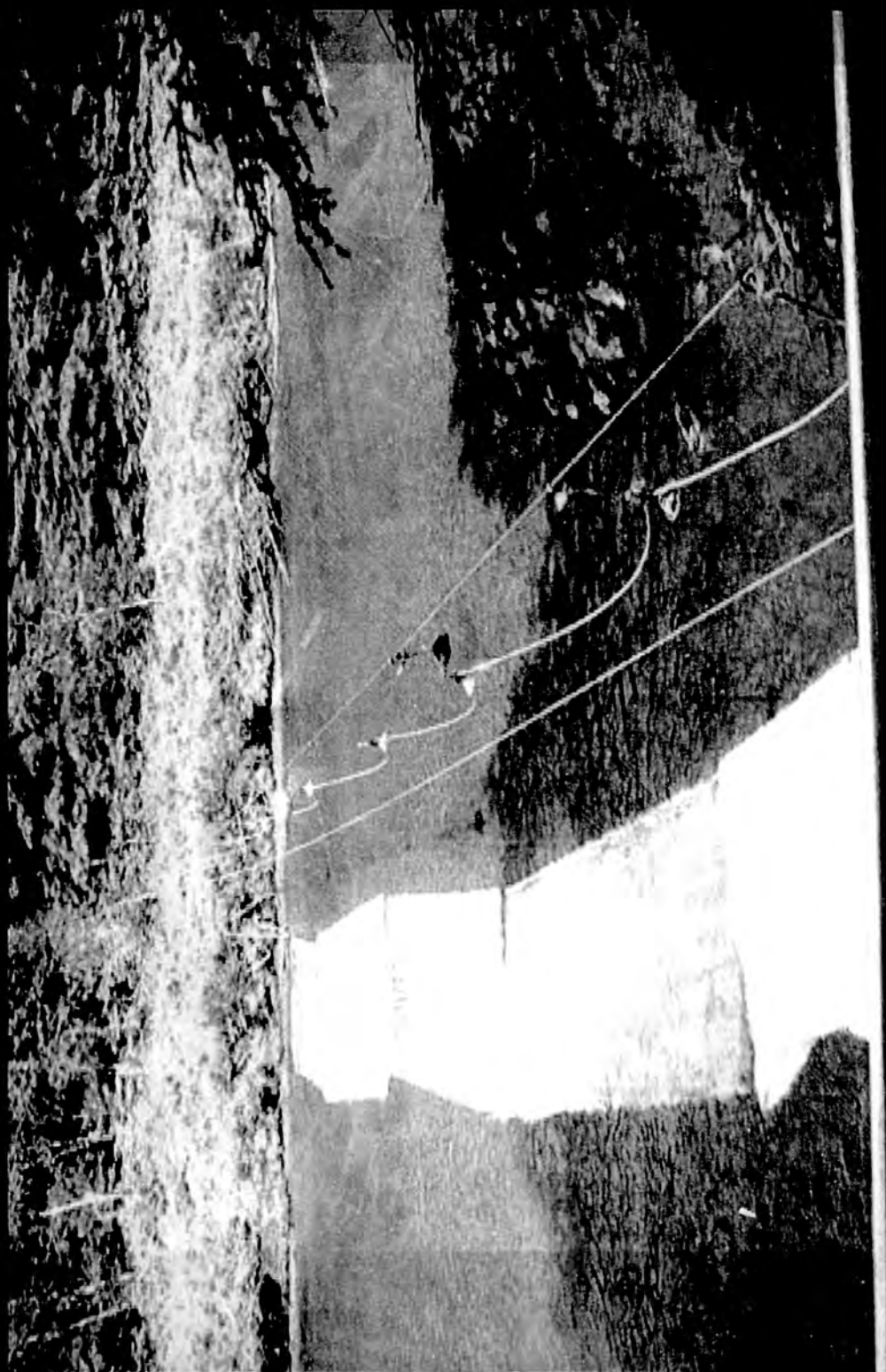
# Picket Weir



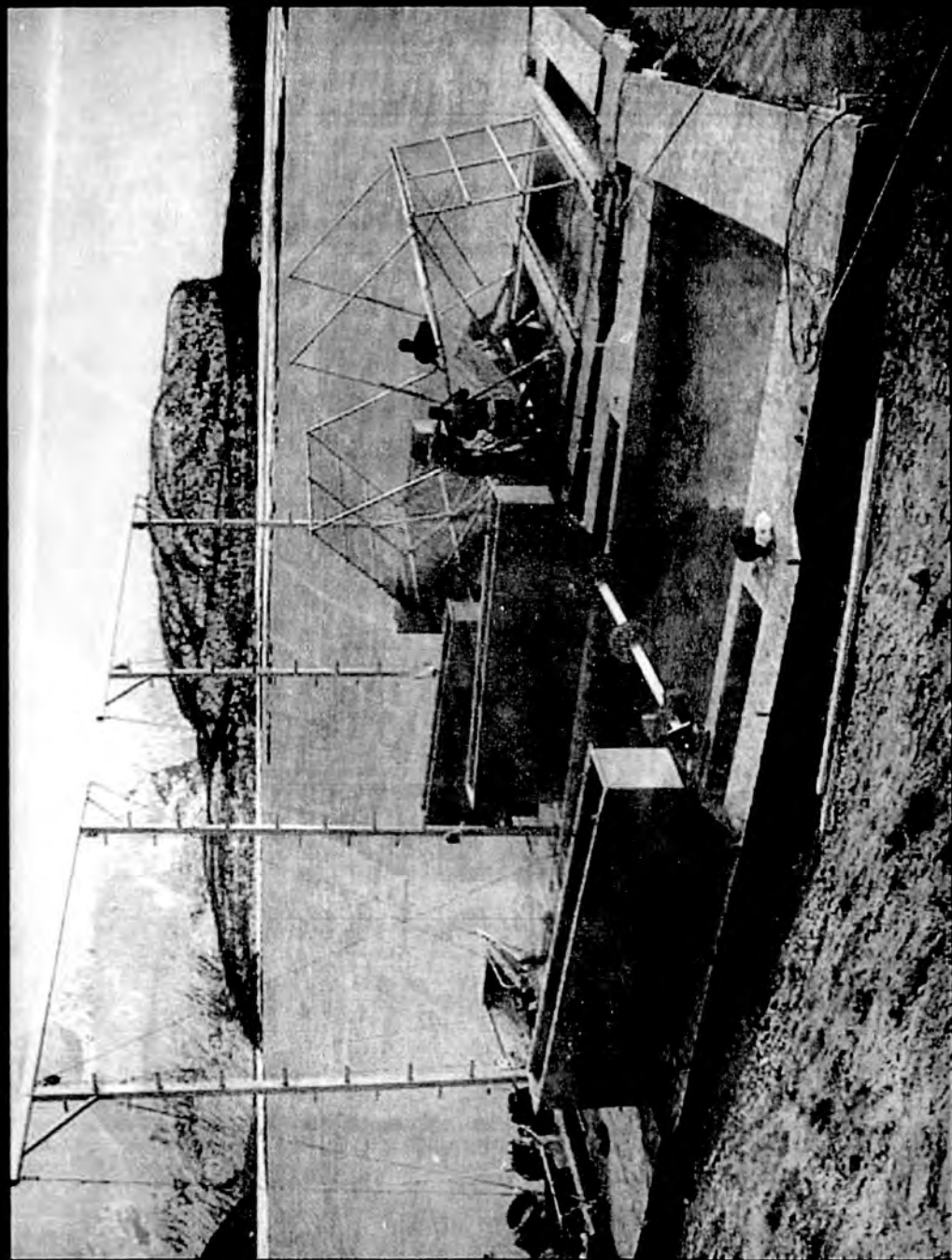
# Floating Weir



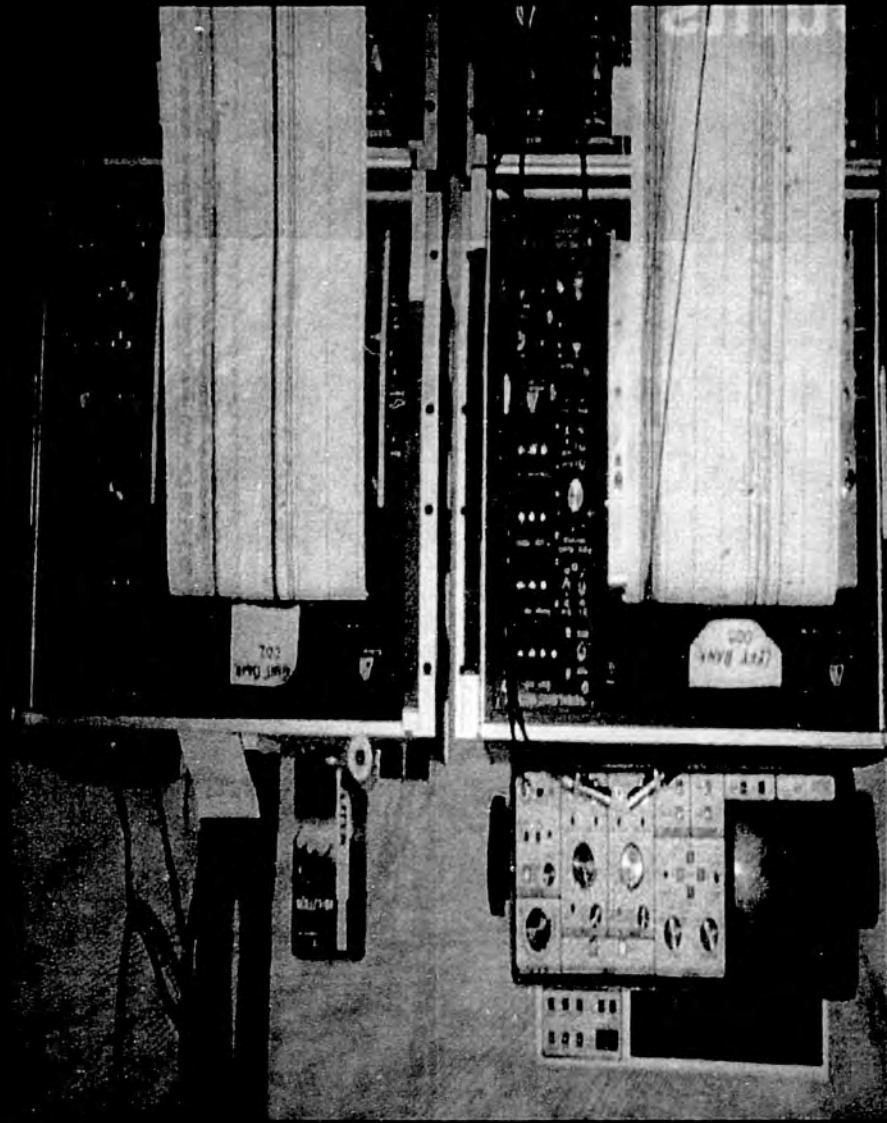
# Counting Towers



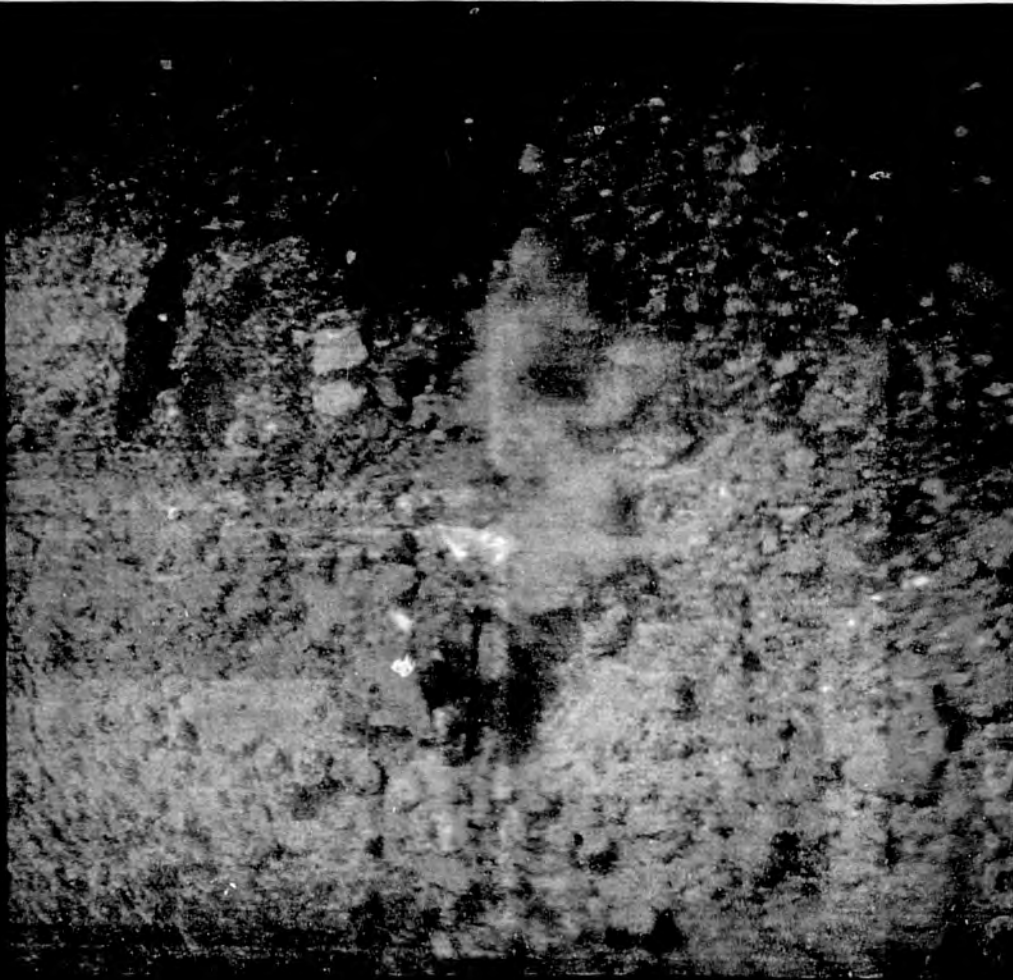
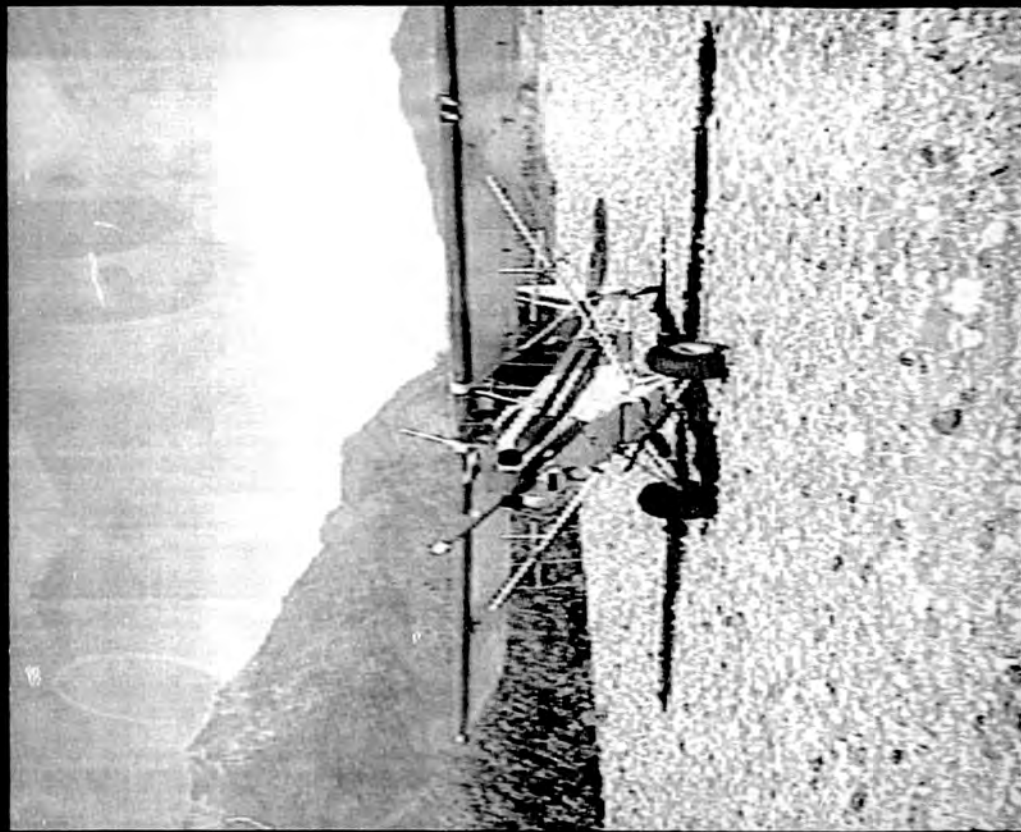
# Mark-Recapture



# Sonar



# Aerial Counts



Ideal – Weir near marine water to count escapement, sample fish, provide information for inseason fisheries management



# **Sustainable Salmon Fisheries Policy Development: 1997-1999**

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- ADF&G/BOF Sustainable Fisheries Committee
- Synthesis of published scientific information
- Department panel for technical review
- Public advisory panel
- Over 30 public meetings
- External scientific peer review conducted

# PARTS OF THE POLICY

- I. Principles and criteria for sustainable salmon fisheries management
- II. Implementation Steps
- III. Definitions of terms
- IV. Courtship & subsequent marriage to BEG policy (Feb 2001)

# Principles

- Protect wild salmon and habitat to ensure sustained yields.
- Manage for escapement ranges that sustain production & maintain normal ecosystem functioning.
- Apply effective management systems which regulate human activities.
- Encourage public support and involvement.
- Manage conservatively commensurate with uncertainty.

# General policy Implementation

- At BOF meetings/work sessions (normal cycle) ADF&G provides stock by stock review for consistency with principles and criteria.
- Each stock status report will discuss escapement goals, habitat issues, and Identify concerns.
- If concern is identified, ADF&G/BOF crafts an action plan.

# Terms and Definitions

44 terms are defined

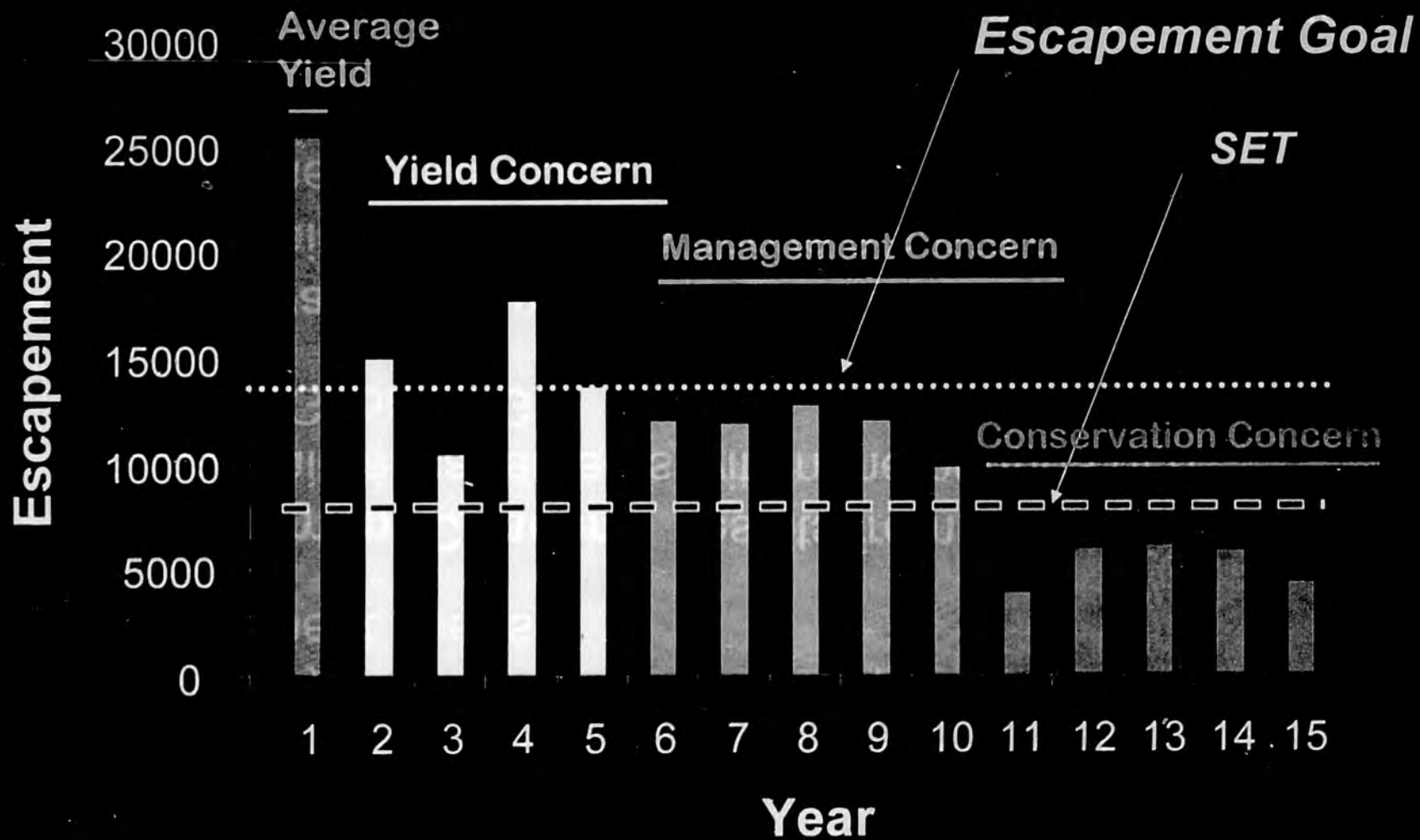
- MSY
- Burden of conservation
- Stock
- Yield
- 3 types of Escapement goals (BEG, SEG, OEG)
- 3 levels concern (yield, management, conservation)

# Levels of Concern

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- **Yield Concern:** results from a chronic inability to maintain yields or harvestable surplus above escapement needs
- **Management Concern:** results from a chronic inability to maintain escapements within the bounds of a BEG, SEG, or OEG.
- **Conservation Concern:** results from a chronic inability to maintain escapements above a sustainable escapement threshold (SET).

*Chronic inability* - continuing or anticipated inability to meet escapement threshold (goals) over 4-5 year period (generation time of most spp.) despite use of specific management measures.



# Action Plan Elements

- **Habitat restoration, protection measures**
- **Stock rebuilding goals, objectives**
- **Management actions**
- **Performance measures**
- **Research plan**
- **Communication with other agencies**

# Sustainable Salmon Fisheries Policy

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- Provides an analytical structure for the BOF process
- Articulates ADF&G and BOF approach to salmon management
- Encompasses a large geographic, multi-stock, multi-species scope
- Is implemented in a public forum - the Board of Fisheries process

# Susitna River Sockeye Salmon Escapement

Lack information on the total escapement of sockeye salmon into the Susitna River

- Sonar unknown proportion of total escapement (Bendix vs. DIDSON).
- Weir counts and mark-recapture estimates greater than sonar.
- Complicates management and estimation of both harvest and exploitation rates.

# Susitna River Sockeye Salmon Escapement

Current escapement goal will be evaluated

- Historical basis for goal.
- Data uncertainty – escapement, harvest, spatial and temporal distributions.
- Improve stock assessment to better understand stock production and formulate management strategies based more on science.