

# **Little Susitna River**

## **Salmon History from 1886 to 2012**



**Little Susitna River, Mark Meyer Photography**



**United Cook Inlet Drift Association**

**2013**

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### **Abstract**

The Little Susitna River and salmon history can be characterized by three distinct eras: First, from the late 1880 up until the 1960's; Second, from the 1960's thru 1996; and Third, from 1996 until the present. The first era is the mining era from the 1880's until 1964 (Good Friday earthquake). Lode gold mining with cyanide leaching for gold recovery eventually eliminated native salmon populations from the Little Susitna River. The second era is characterized by development of the Fort Richardson, Fire Lake and Big Lake Hatcheries. All three hatcheries mixed local King and Coho stocks with at least six King and Coho stocks imported from Washington and Oregon, as well as Kodiak, Seward and Petersburg, Alaska. During the second era, 1964-1996, 10-20 million Coho fry/smolt, as recorded, were stocked into the Little Susitna River. Additionally, millions of unreported/undocumented stockings also occurred. The third era, 1996 until present, all reported stockings ceased. Since then, the King and Coho returns to the Little Susitna River have declined, most notably in the last 2 to 3 years. Since the late 1970's, the sport fishing exploitation, 50%, has occurred, even during the last three years of small Coho returns. These smaller, less than 25,000 returns, are the result of public access, Coho availability, hook and release mortality, parasites, diseases, invasive northern pike, warm water temperatures (13°C), blocked culverts, beaver dam blockage, urbanization and impaired water quality. These are all issues occurring in the Little Susitna River today.

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United Cook Inlet Drift Association

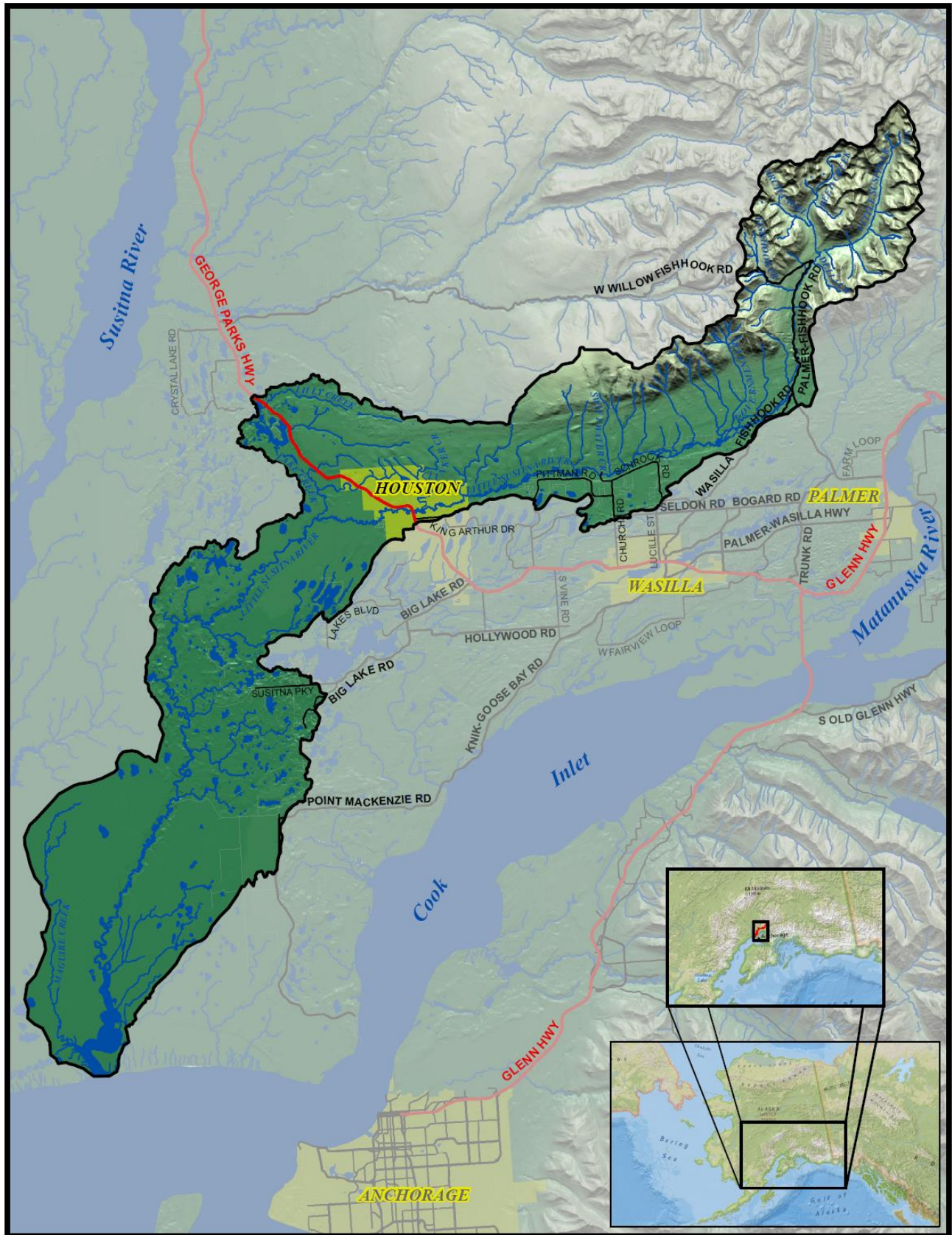
Soldotna, Alaska

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Map of the Little Susitna River Drainage

# **Little Susitna River**

## **Salmon History from 1886 to 2012**

### **1. Location**

The Little Susitna River rises in the Talkeetna Mountains about 60 miles northwest of Anchorage, Alaska. The main stream has its source in Mint Glacier, a small ice field of less than 400 acres area, with its terminus at approximately 4,500 foot elevation. The river flows in a generally southwesterly direction through a typical “U” shaped glacial valley for about 17 miles to the south edge of the Talkeetna Mountains. For the last mile before leaving the mountains, the valley becomes quite confined with two narrow constrictions. Archangel Creek, now named Hatcher Pass, draining an area to the north and west, empties into the river about 10 miles down from Mint Glacier. Fishhook Creek, draining an area to the west, enters the river about three miles further downstream. These two streams are the only tributaries of any size. After leaving the mountains, the river turns southwest to the valley of the Susitna River. It then turns south, parallel to the Susitna River, and flows into Knik Arm, reaching tidewater eight or ten miles east of the mouth of the Susitna River. The area of the entire basin is 416 square miles.

The Little Susitna is 110 miles long, of which seventy miles is readily accessible by road, 4x4 trails and water craft. The river passes through numerous subdivisions, communities and municipal areas in the Matanuska-Susitna Borough.

Placer gold was discovered in the Willow Creek Mining District, which includes the Upper Little Susitna River basin, in 1897 and the first gold quartz lode was located in 1906. Gold lode mining has since completely over-shadowed placer mining in this area.

Hatcher Pass still has active recreational gold mining and is also open to the public for recreational mining.



Figure 1. Area Open to Recreational Gold Mining





Figure 2. Recreational Gold Mining in the Little Susitna River

Water Quality (Lawrence, 1949):

“During the summer months, the water of the Little Susitna River is slightly turbid, probably from the rock flour from the Mint Glacier at its headwaters. During the winter the water is clear.

Cottonwood Creek receives most of its flow from ground water and is unpolluted except for animal waste from a few farms. Salmon run up the stream and fingerlings are plentiful in Cottonwood and Wasilla Lakes in the spring.”

**2. Significant Historical and Salmon-Related Events**

**1886** – Gold, a magical word, was discovered southeast of present-day Anchorage attracting thousands of gold seekers to this region.

**1886-1890** – A quarter of a million gold seekers begin a stampede into Southcentral Alaska, including the Susitna River Basin, finding both placer and lode gold deposits.

**1906** – Robert Lee Hatcher discovered and staked the first gold claim in what was called the Willow Creek Valley, later called Willow Creek Mining District.

**1906-1910** – The Independence Lode Gold Mine on Granite Mountain is staked and mining started. (Hatcher Pass) **Cyanide** leaching of the gold-bearing ore started.

– Alaska Free Gold Lode mine on Skyscraper Mountain is staked and gold mining operations started. (Hatcher Pass) **Cyanide** leaching started.



Figure 3. Independence Mine, Hatcher Pass, Alaska

**1938** – Both mines consolidated into the Alaska-Pacific Mining Company. **Cyanide** leaching process used to recover gold at both mines until mine closure in 1951.

**1941** – World War II – Most gold mining in Alaska and the lower 48 is nearly shut down due to the war – the Alaska-Pacific Mine at Hatcher Pass continues operations due to the mining of gold and tungsten. The mined tungsten was needed for making steel and light bulbs.

**1943** – The Independence Mine was ordered to close by the owners.

**1946** – Independence Mine reopens and resumes **cyanide** leaching.

**1949** – Fred F. Lawrence, USGS, reports the following on pages 14 and 15:

“It was reported that all fish life in the stream had been killed in years past by mine waste, possibly **cyanide** from concentrating processes. The mines have not been operating since before the war and small native trout are now plentiful. However, if a favorable change in the price of gold should occur, the mines would resume operation and this type of pollution would again become a problem, particularly for any irrigation development. **Salmon do not run in this stream.**”

**1951** – Independence Mine Closes. No **cyanide** clean-up or remediation occurs at that time or during the last 60 years.

**1958** – Fort Richardson State Fish Hatchery was built

“Hatchery Background: The Fort Richardson State Fish Hatchery is located on Fort Richardson, a U.S. Army post near Anchorage, Alaska. The hatchery sits on the banks of Ship Creek, just downstream of the Glenn Highway. The facility was built in 1958 by the U.S. Army to provide fish for post lakes. [Note: “post” refers to Fort Richardson Army Post lakes, also included Elmendorf Air Force Base lakes.]

The Department of Fish and Game became involved with this hatchery in the early 1960’s, and assumed full operation by the late 1960s. In 1981, a state bond was approved to rebuild and expand the hatchery, and construction ended in 1984.”

**1961-63** – Fire Lake Hatchery construction is started, and reconstructed after the 1964 Good Friday Earthquake.

**1962-63** – Sport Fish Investigators of Alaska; ADF&G, Progress Report F-5-R-4

“Exceptionally good runs of silver salmon ascended two Matanuska Valley salmon streams. Angling success at Wasilla Creek reached two fish per hour of effort in mid-August. Reports were received of high angling success on the lower part of Little Susitna River which is accessible by airplane. One trip was made to the area. Although the peak of the run had passed, large numbers of fish were present and angling success exceeded one fish per hour.”



**1964-65** – Kubik S.; ADF&G, Progress Report F-5-R-6 has the following recorded:

“The King salmon fishery in Cook Inlet had been so seriously depleted in recent years that in 1963 the Alaska Board of Fish and Game declared a closure of King salmon fishing to both commercial and sport fishing in an effort to increase escapement and rebuild the salmon runs.”

Table 4 in Kubik’s 1964 report records only **3 King salmon in the Little Susitna River** during the 1964 foot survey.

**1964-65** – Jones, D.; ADF&G Progress Report F-5-R-6 has the following recorded:

“The March 27 earthquake severely damaged the upstream-downstream control structure on Lower Fire Lake.”

“During July, Fire Creek was surveyed below Lower Fire Lake and two beaver dam barriers were removed. Salmon were present in the stream at this time.”

“The source of both rainbow trout and silver salmon in Lower Fire Lake is no doubt largely due to inadvertent escapement from the hatchery.”

“Two adult male silver salmon were captured on September 25. A survey of Fire Creek, below Lower Fire Lake, in October revealed about 50 spawning silver salmon.”

**In Kubik’s 1970-71 report, the 1965, 1966 and 1967 kings came from the Green River Hatchery in Washington. The 1968 and 1969 cohos came from Big Creek and Eagle Creek in Oregon (See Table 1).**

**1965** – Kubik, S.; ADF&G, Progress Report F-5-R-7 has the following recorded:

“Table 4 records only **3 King salmon in the Little Susitna River** during the 1965 foot survey.”

**1965-66** – Sport Fish Investigators of Alaska; ADF&G, Progress Report F-5-R-7

“Silver salmon eggs totaling 345,900 were obtained from Fish Creek in the Palmer area. During the spring of 1962, 1,202,600 rainbow trout eggs were

received from **McLeary's Trout Lodge Springs in Washington and 118,000 from Fall River Hatchery in Oregon.**

The 1962 fish stocking program was completely fulfilled. A total of 86,200 silver salmon and 682,000 rainbow trout were stocked in 48 lakes and rivers during the summer. Most of the lakes planted are located in the Matanuska Valley. An additional 10,000 silver salmon and 165,400 rainbow trout were transferred to other hatcheries.

Silver salmon eggs taken at the egg take sites located at **Swanson River near Sterling and from Bear and Dairy Creeks near Seward**, during October and November totaled 1,464,000 eggs. The eggs were brought to the "eyed" stage without difficulty. Treatments with malachite green prevented the formation of fungus. Initial mortality due to handling and non-fertilized eggs was 19 per cent. The silver salmon eggs received on October 5, 1962, began hatching on January 23, 1963, giving a total of 111 days at an average water temperature of 38.6° F. After the initial handling mortality, egg and fry mortalities tapered off to less than one per cent per month."

**1970-71** – Kubik, S.; ADF&G, Project Report F-9-3, G-II report contains the following:

- Ship Creek Kings were used as an egg source for the Fort Richardson Hatchery. [Remember these Coho and Kings came from Fire Lake Hatchery that was damaged in the 1964 Good Friday Earthquake.]
- "King salmon eggs (approx. 260,000) were taken from 32 females trapped at the Chugach Dam fish ladder and Ship Creek weir during July. Fry from these eggs are currently being reared at the Fort Richardson Cooling Pond and the resultant smolts are scheduled for release into Ship Creek during May, 1971.
- A total of 177,000 silver salmon, O. kisutch, and 45,700 King salmon reared to smolt size at the Fort Richardson Cooling Pond were marked with an adipose fin clip and released into Ship Creek during May, 1970.
- A total of 105 marked adult King salmon returned to Ship Creek during 1970. All these fish represented four consecutive annual releases (1966-69). A total of 247 returning King salmon were captured at the Chugach [dam] ladder, of which 16.6% were "jacks".

- Five hundred forty-three silver salmon marked and released during the spring, 1970 were captured at the Chugach Dam facility, returning as “jacks” during the fall 1970. In addition to the “jacks” 204 adult silver salmon were enumerated.”
- “King salmon, Oncorhynchus tshawytscha, have been reared at the Fort Richardson Cooling Pond, marked and released into Ship Creek since 1963 in an effort to enhance the anadromous stocks in that creek. The silver salmon, O. kisutch, program, with the same objective, began in 1968.”
- These **Green River Washington Hatchery Kings** were hybridized with the Fire Lake Kings and possibly native Ship Creek stocks.



Figure 4. Green River Hatchery, Washington State

- These 8,432 King salmon smolt that occurred in 1964 were from an egg transplant from the **Green River/Coos River Hatcheries from Washington.**



– **Bear River (Seward) Coho** were also brought to Fort Richardson Hatchery, raised, released and allowed to hybridize with Fire Lake Hatchery Coho.

Table 1 is reproduced from Kubik, ADF&G, 1970-71, Table 1 page 58

| <b>Table 1 King and Silver Salmon Smolt Releases - Ship Creek - 1964 – 1970</b> |                |                  |                       |                       |             |                        |
|---|----------------|------------------|-----------------------|-----------------------|-------------|------------------------|
| <b>Year</b>   | <b># Kings</b> | <b># Silvers</b> | <b>Origin</b>         | <b>Dates Released</b> | <b>Size</b> | <b>Mark</b>            |
| 1964  | 428            |                  | Ship Creek            | 6/3                   | 76mm        | Right Pelvic & Adipose |
| 1965  | 352            |                  | Ship Creek            | 3/18                  | 76mm        | Adipose                |
| 1965  | 8,432          |                  | <b>Green River **</b> | 8/6                   | 99mm        | Left Pectoral          |
| 1966  | 166,870        |                  | <b>Green River **</b> | July                  | 98/lb       | Half-Dorsal            |
| 1967  | 63,852         |                  | Ship Creek            | 5/8 thru 5/12         | 18.6/lb     | Adipose                |
| 1967  | 474,516        |                  | <b>Green River **</b> | 5/22 thru 6/21        | 58.4/lb     | Adipose                |
| 1968  |                | 129,318          | <b>Big Creek*</b>     | 4/15 thru 4/22        | 19.9/lb     | Adipose                |
| 1968  | 81,316         |                  | Ship Creek            | 5/23 thru 5/24        | 28.5/lb     | Adipose                |
| 1969  |                | 101,300          | <b>Eagle Creek*</b>   | 5/5 to 5/16           | 13.7/lb     | Adipose                |
| 1969  | 95,900         |                  | Ship Creek            | 5/5 to 5/16           | 16.6/lb     | Adipose                |
| 1970  |                | 177,240          | Bear Creek            | 5/18 thru 5/27        | 10 to 11/lb | Adipose                |
| 1970  | 45,690         |                  | Ship Creek            | 5/18 thru 5/27        | 29/lb       | Adipose                |
| <b>*Oregon</b>  |                |                  |                       |                       |             |                        |
| <b>**Washington</b>   |                |                  |                       |                       |             |                        |

**1973-74** – Kalb, C.; ADF&G, Performance Report F-9-6, G-III-D

“Recommendation – Determine survival, growth and total yield of fry and fingerling plants of **Winthrop, Washington and Ennis, Montana strains of rainbow trout** in Long, Seymour, and Short Pines Lakes, and of **Kodiak, Alaska and Green River, Washington strains of Coho** in Loon Lake.

A sixth lake was selected to conduct a similar evaluation of two Coho stocks. Equal numbers of **salmon from Kodiak, Alaska, and Green River, Washington**, measuring 143 and 133 per lb., respectively, were planted in Loon Lake at a density of 300 per acre. Stocks are identified by left and right ventral fin clips. This comparison will hopefully provide information on the growth and survival of Coho in a landlocked lake and the sustainability of out-of-state stocks in Alaskan waters.

Short Pine Lake, located on the Kenai Peninsula, was **stocked with Ennis[, Montana] and Winthrop[, Washington] strains** of approximately equal size. By isolating a group of **Winthrop[, Washington] fry** early in the summer and promoting accelerated growth, it was possible to approximate the size of **Ennis[, Montana] fingerling**, allowing comparison of both stocks under similar conditions. Each stock composed half of the total plant of 15,600 fish at a combined density of 300 per acre. At the time of planting **Winthrop[, Washington] fish** measured 125 per lb and the **Ennis[, Montana] group** were 112 per lb. To make identification possible, both groups received opposing fin clips.”

In addition to Kings and Coho salmon, **rainbow trout from Ennis, Montana and Winthrop, Washington** were all brought to the Fort Richardson Hatchery for rearing, stocking, hybridization and brood stock development.

Table 2 is reproduced from Kalb, ADF&G, 1973-74, Table 1 page 7

| <b>Table 2 Rainbow Trout Stock Origins, 1973</b> |  |                              |                    |                       |
|--|--|------------------------------|--------------------|-----------------------|
| <b>Lake</b>                                      | <b>Date Stocked</b>                      | <b>Strain</b>                | <b>Fish per lb</b> | <b>Number of Fish</b> |
| Long   | July 6, 1973                             | <b>Winthrop, WA</b>          | 1,178              | 41,700                |
|  |  | <b>Ennis, MT</b>             | 107                | 11,100                |
| Christiansen                                     | Lake remained toxic - stocking postponed |                              |                    |                       |
| Seymore  | July 6, 1973                             | <b>Winthrop, WA</b>          | 1,178              | 257,600               |
| Marion   | Lake remained toxic - stocking postponed |                              |                    |                       |
| Short Pine                                       | July 26, 1973                            | <b>Winthrop, WA</b>          | 125                | 7,800                 |
|  |  | <b>Ennis, MT</b>             | 112                | 7,800                 |
|  |  | Coho Salmon - origin unknown |                    |                       |
| Loon   | August 8, 1973                           | <b>Kodiak, AK</b>            | 143                | 16,270                |
|  |  | <b>Green Lake, WA</b>        | 133                | 16,135                |

**1973-74** – McHenry et al.; ADF&G, Project Report F-9-6-, G-II-H

- Fish Creek Weir constructed and operational (Big Lake, Mat-Su Valley)
- Helicopter Survey of the Little Susitna River records:
  - 374 King salmon
  - 0 Coho salmon

“As previously noted, precipitation during the year 1950 was the lowest recorded during the 1943-1972 period in the Palmer area, and was also one of the lowest precipitation years in Talkeetna. Coho escapements into Fish Creek were 277 and 71 in 1952 and 1953, respectively. Prior to 1973 these were the two lowest escapements recorded in Fish Creek. It appears that the lowest precipitation in 1950 may have had an adverse effect on the two-year classes residing in the system during 1950.”

“The Cook Inlet commercial Coho harvest also declined substantially during the 1971-1973 period (Table 3). The commercial Coho catch in 1972 was the lowest since 1951, the first year complete records were available, yet the harvest in 1968, the parent year of the 1972 population, was the highest on record. Commercial harvests, although a useful index of run strength, cannot be directly compared from year to year because of unmeasured fluctuations in fishing time and effort.”

Table 3 is reproduced from McHenry, 1974, Table 4 page 54

| <b>Table 3* Numbers of Coho Escapement Index Areas (Foot Counts),<br/>Upper Cook Inlet, 1968 - 1973</b> |      |       |      |        |      |      |                      |
|---|------|-------|------|--------|------|------|----------------------|
| Creek   | 1968 | 1969  | 1970 | 1971   | 1972 | 1973 | Average<br>1968-1973 |
| Wasilla Creek   | ---  | ---   | 101  | 104    | 19   | 28   | 63                   |
| Cottonwood Creek  | 22   | 9     | 5    | 29     | 21   | 10   | 16                   |
| Birch Creek   | 125  | 142   | 206  | 138    | 69   | 106  | 131                  |
| Fish Creek  | 35** | 852   | 176  | 141*** | 118  | 75   | 233                  |
| Meadow Creek  | 54   | 109   | 49   | 9      | 27   | 14   | 44                   |
| Question Creek  | ---  | ---   | ---  | ---    | ---  | 59   | ---                  |
| Total   | 236  | 1,112 | 537  | 421    | 254  | 292  |                      |
| * Averages recalculated   |      |       |      |        |      |      |                      |
| ** Count made after peak of spawning  |      |       |      |        |      |      |                      |
| *** Due to high water a boat count was necessary  |      |       |      |        |      |      |                      |

Comment: Little Susitna River is not included in above Coho escapement counts.



**1976-77** – Kramer, M.; ADF&G, Project Report F-9-6, G-III-J, Concerning Silver Salmon Stocking in interior Alaska, in Harding and Birch Lakes [near Fairbanks].

Table 4 is reproduced from Kramer; ADF&G, 1976-77, Table 1 page 109

| <b>Table 4 Summary of Silver Salmon Stocking Into and Recovery From Nursery Lakes</b> |                   |                                     |                    |                     |                       |                      |                     |
|---|-------------------|-------------------------------------|--------------------|---------------------|-----------------------|----------------------|---------------------|
| <b>Lake</b>   | <b>Date</b>       | <b>Origin of Stock</b>              | <b>No. Stocked</b> | <b>Fish/lb (kg)</b> | <b>Date Recovered</b> | <b>No. Recovered</b> | <b>Fish/lb (kg)</b> |
| Little Harding Lake   | 8/29/72           | <b>Delta Clearwater, AK</b>         | 78,400             | 253 (536)           | 5/22/73               | 20,207               | 36.3 (80)           |
|   | 7/13/73           | <b>Green River, WA</b>              | 40,000             | 440 (970)           | ---                   | 0                    | ---                 |
|   | 8/28/74           | <b>Seward, AK</b>                   | 40,570             | 120 (265)           | 5/28/75               | 2,301                | 14.0 (31)           |
|   | 8/26/76 - 8/31/76 | <b>Blind Slough, Petersburg, AK</b> | 48,400             | 75 (165)            | ---                   | ---                  | ---                 |
| Lost Lake   | 7/11/73 - 7/13/73 | <b>Green River, WA</b>              | 200,820            | 440 (970)           | 5/31/74               | 18,567               | 49.3 (109)          |
|   |                   |                                     |                    |                     | 5/28/75               | 5,907                | 26.0 (57)           |

**1976** – Big Lake Hatchery is constructed on Fish creek, tributary to the Little Susitna River.



Figure 5. 2012 Resurrection Bay Salmon Stocking Program

**1981-82** – Bentz, R.; ADF&G, Project Report F-9-14, G-I-D

“This was the first year Chinook salmon were stocked in landlocked lakes in this area.

A Coho salmon creel census was initiated on Cottonwood Creek and the Little Susitna River. An estimated 5,222 Coho salmon were harvested in 4,380 man-days of effort at the Little Susitna River, with a catch rate of 0.31 fish per hour. At Cottonwood Creek, a weekend-only fishery, 1,396 Coho and 1,945 sockeye salmon, Oncorhynchus nerka (Walbaum), were harvested in 3,344 man-days of effort, with catch rates of 0.136 and 0.189 fish per hour, respectively. Age determination of 189 Coho salmon scales identified 92 percent as Age 2.1 fish. Little Susitna River Coho salmon averaged 10.4 centimeters and 2.9 pounds larger in length and weight respectively than Cottonwood Creek Coho salmon.

The importance of this system as a high quality, productive sport fishery is reflected in that a Coho salmon stock enhancement program on the Little Susitna River is the number one priority in the Plan for Supplemental Production of Salmon and Steelhead for Cook Inlet Recreational fisheries, 1981.

An [Coho] enhancement program developed by the Fisheries Rehabilitation Enhancement and Development (FRED) Division was initiated in 1977 to augment natural production in the Cottonwood system. Eggs were taken from Fish Creek Coho salmon and incubated at the Alaska Department of Fish and Game (ADF&G), Big Lake Hatchery complex. The resulting fry were released throughout the system in favorable lentic rearing areas. **The fry releases have continued on an annual basis since 1977 to the present, with an average number of 320,000 fry released each year.”**

Both the Fort Richardson and Big Lake Hatcheries are rearing and stocking Kings and Coho. The initial King and Coho stocks for Big Lake Hatchery were from the Fort Richardson/Ship Creek/Fire Lake stocks that included:

- **Green River, Washington Hatchery Kings**
- Ship Creek Kings, Alaska
- **Green River, Washington Hatchery Coho**
- **West Side Kodiak Island Coho (Ayakulik or Karluk), Alaska**

- Ship Creek Coho, Alaska
- **Fort Richardson Hybrid Coho (Washington, Oregon)**
- Bear Creek Coho, Seward, Alaska
- Blind Slough, Petersburg, Alaska
- Delta Clearwater, Alaska
- **Eagle Creek, Oregon**
- **Big Creek, Oregon**

**1985-86** – Bentz, R.; ADF&G, Project Report S-32-6 Reports:

“...the Little Susitna River...angling effort at the lower river fishery has increased 666 percent, from 933 angler-days in 1981 to 7,142 in 1985, making it the fastest growing segment of the Coho sport fishery. This rapid growth is a direct result of improvements over the past 3 years to the road that accesses this portion of river. Fishing effort is expected to continue to increase substantially as additional improvements are completed. Coho spawning escapement was estimated by helicopter and foot surveys at 4,500 fish. The total in-river return was estimated at 9,086 Coho.

The value placed on this system as a high quality productive sport fishery is reflected by Alaska Department of Fish and Game (1981a); this publication lists a Coho salmon stock enhancement program on the Little Susitna as the number one priority. In response to this priority, the Fisheries Rehabilitation, Enhancement, and Development (F.R.E.D.) Division began a brood stock enhancement and egg-take program in 1981. Over 4.1 million eggs have been collected from Little Susitna River Coho from 1981 through 1985. Coho fingerlings resulting from these egg-takes have been released into five connecting lake systems since 1982. Coho smolts have also been released since 1985. The first significant adult returns from this stocking program are anticipated in 1986, when over 2,100 hatchery-reared adult Coho salmon are expected to enter the Little Susitna River.”

These Coho average 2 rm of upstream migration. It takes 30-40 days for these Coho to move from salt water to spawning areas. During these 30-40 days, these Coho are readily accessible to the sportfishing public.

**1990** – Original Little Susitna Escapement Goal established at 7,500 Coho past the weir based on hybrid Washington/Oregon/Kodiak stocks.

**1991** – Bartlett, L.; ADF&G, Fisheries Data Series No. 91-46



“The Little Susitna River has had the highest sport fishery effort in the Matanuska-Susitna Valley since 1981 and currently supports the second largest freshwater Coho salmon *Oncorhynchus kisutch* fishery in the state (Mills 1979-1990). The harvest of Coho salmon in the Little Susitna River has increased 450% since 1977. In response to the large increases in effort and harvest, the Little Susitna River has been stocked annually with Coho since 1982 (ADF&G 1981, Chlupach 1989). **Eventually, 11,838,251 Coho fry or smolt were stocked in the Little Susitna River from 1982-1993.**

A weir was constructed across the Little Susitna River at rkm 52. Daily and cumulative counts of five salmon species *Oncorhynchus* were recorded from 18 July through 9 September as the salmon passed through the weir...

#### Escapement

From 18 July through 9 September 15,511 Coho salmon; 3,224 chum salmon; *O. keta*; and 7,604 pink salmon *O. gorbuscha* were passed through the weir at rkm 52 [rm32.6]. Forty-five Chinook salmon *O. tshawytscha* and 1,045 sockeye salmon *O. nerka* were also passed but the counts for these species are incomplete because high spring runoff prevented the weir from being installed until after the majority of the fish of these species were upstream of the weir site.”

All five species of salmon are present; however, the record is silent as to stocking rates and origin of these salmon. It is reported that local area ADF&G staff regularly planted salmon fry/smolt at numerous road/bridge crossings in the Susitna Valley. ADF&G stocked an additional 11,000,000 more Coho fry/smolt than the record indicates.

“A total of 22,311 Coho salmon were accounted for in the Little Susitna River during 1990. The actual inriver return is somewhat greater than this due to fishing effort by anglers who access the sport fishery through the Port of Anchorage and were not surveyed during 1990. This estimate is based on an estimated escapement of 14,310 Coho salmon above the weir, and the estimated sport harvest of 1,201 Coho salmon above the weir, and an estimated sport harvest of 6,800 Coho salmon below the weir. Based on a total estimated sport harvest of 8,001, this represents a minimum inriver exploitation rate by the sport fishery of about 36%.

Hooking mortality and a small number of salmon that pass upstream after the weir is removed also add to the uncounted number of Coho salmon in the return. Studies by Vincent-Lang et al. (*Unpublished*) show that the mortality of hooked and released Coho salmon in the intertidal waters of the Little Susitna River is as high as 69%. A 69% mortality of the released fish would comprise about 6% (395 fish) of the total catch of Coho salmon by anglers fishing downstream of the Burma Road access."



Figure 6. Excessive limit of coho salmon

**1996** – Bartlett, L.; ADF&G, Fisheries Data Series No. 96-16, 1986-1994 Data Analysis

“The resultant estimated proportional contribution of both [Fort Richardson and Big Lake Hatchery] releases of fish was about 25% of the total harvest.”

Table 5 is adapted from Bartlett, ADF&G, 1996, Table 8 page 18

| <b>Table 5 Escapement Index Counts of Coho Salmon<br/>in the Little Susitna River, 1981-1994</b> |          |              |        |
|--|----------|--------------|--------|
| Year   | Hatchery | Non-Hatchery | Total  |
| 1981   |          |              | 6,750  |
| 1982   |          |              | 6,800  |
| 1983   |          |              | 2,666  |
| 1984   |          |              | 20,991 |
| 1985   |          |              | 3,540  |
| 1986   |          |              | 7,511* |
| 1987   |          |              | 4,865  |
| 1988   | 4,428    | 16,063       | 20,491 |
| 1989   | 6,862    | 8,370        | 15,232 |
| 1990   | 3,370    | 10,940       | 14,310 |
| 1991   | 8,322    | 29,279       | 37,601 |
| 1992   | 2,690    | 19,492       | 22,182 |
| 1993   | 9,189    | 25,633       | 34,822 |
| 1994   | 4,162    | 24,786       | 28,948 |
| * Weir washed out in flood from 21 July - 29 July 1986   |          |              |        |

“September and October of 1994 were characterized by low stream flows. These low flows allowed the construction and maintenance of new dams by beavers *Castor Canadensis*. Beaver dams inhibited the upstream migration of sockeye and Coho salmon on two (and possibly more) Coho salmon index streams.”

### **1996 – Recommendations (Bartlett, ADF&G, 1996)**

The following points relative to this study are suggested:

1. **“Suspend enhancement of the Little Susitna River with hatchery fish** until it is demonstrated that the non hatchery stock can not sustain the sport fishery (and use the freed hatchery space to establish a Coho salmon fishery in Moose Creek, a tributary to the Matanuska River, or in the Knik River ponds). If recent levels of nonhatchery escapement



continue, the inriver return from a release of 126,000 smolt will not provide enough fish to the sport fishery to make a noticeable difference.

5. Investigate anecdotal **reports of northern pike in the Little Susitna River** drainage. Set a gillnet at the outlet of Nancy Lake in the early spring of 1996 to test for the presence of pike during their spring spawning migration. If pike are present in small numbers, develop a program to attempt extermination.”

**1996** – Bartlett, L.; ADF&G, Fisheries Data Series No. 96-39, 1995 Data Analysis summarizes Coho stocking into the Little Susitna River.

– **6,809,092 Coho salmon fry were released 46 times into lakes in the Mat-Su Valley from 1982 to 1990.**

– **5,029,159 Coho salmon smolt were released 17 times into the Little Susitna drainage from 1983 to 1993.**

**“Data collected during this project also aid in assessing the stocking program. The stocking program has contributed up to 75% (an estimated 10,660 fish) of the sport harvest (1989) and has added an inestimable number of angler-days to the sport fishery.”**

**“The estimated proportional relative contribution from tag code 32-23-01 to the 1995 harvest of Little Susitna River Coho salmon by boat anglers exiting the Burma Landing sport fishery was 20.1%.”**

– **The Little Susitna River stocking programs from 1964-65 thru 1993 were discontinued.**

– All these multiple millions of stocked Coho and Kings were introduced as hybrid stocks **from Washington, Oregon, Kodiak, Bear Lake and Blind Slough.**

**1999** – The Little Susitna River Coho escapement goal was raised to 9,600 – 19,200 from the original escapement goal of 7,500. Included stocked Coho run components.

**2001** – The Little Susitna River Coho escapement goal was raised again to an SEG of 10,100 – 17,700 from 9,600 – 19,200. Included stocked Coho run components.

Table 6 outlines the yearly inriver run / angler-days and in-river exploitation rates from 1977 thru 2011. It is clear that the 2007-2011 averaged are significantly below the 1977-2011 or the 2000-2010 averages in all parameters, except for the inriver exploitation rate. Even though 2007-2011 the inriver run averages had decreased by 40%, the inriver

exploitation rate only decreased by 3-4%. There was not a corresponding decrease between inriver runs and inriver sportfishing exploitation. Had there been an equal reduction in the inriver sportfish exploitations, escapement goals would have been achieved. In 2009, the inriver run was down 48.9% (from the 2000-2010 average), while the inriver exploitation rate was up 4%. The result was a Coho escapement of 9,523, which was 577 Coho below the 10,100 escapement goal minimum. Had the inriver exploitation rate just remained at the 2000-2010 average, .502 or 50.2%, the spawning Coho escapement would have been within the 10,100 escapement goal.

It is very clear that if the inriver exploitation rate had been lowered by 48.9%, equal to the smaller Coho return, an overall lowered exploitation rate of .250 or 25% would occur. The 2009 inriver run of 19,925 Coho at the 25% parity exploitation rate would yield a Coho escapement of about 14,900, which is within the 10,100 – 17,700 escapement goal range for the Little Susitna River.

In years of smaller, less than 15,000 total inriver runs, the escapement goal would have been achieved if the total inriver exploitation rates had been lowered.



Figure 7. Public Use Facility Boat Launch, Little Susitna River

In 2011, as shown in Table 6, even though the angler-days were reduced to about 1/3 of the 1977-2011 average angler days, the exploitation rate remained high, 48.5%.

| <b>Table 6 Little Susitna River Sport Harvest by Year, 1977-2011<br/>Not including Nancy Lake (Approximate Numbers)</b> |                        |                            |                         |                               |                            |                         |                                  |
|---|------------------------|----------------------------|-------------------------|-------------------------------|----------------------------|-------------------------|----------------------------------|
| <b>Year</b>   | <b>Angler<br/>Days</b> | <b>Coho<br/>Escapement</b> | <b>Coho<br/>Harvest</b> | <b>70 Percent<br/>Release</b> | <b>Total<br/>Mortality</b> | <b>In-River<br/>Run</b> | <b>In-River<br/>Exploitation</b> |
| 1986  | 45,770                 | 7,511                      | 6,039                   |                               | 6,039                      | 13,550                  | 0.446                            |
| 1987  | 35,659                 |                            | 13,003                  |                               | 13,003                     | 13,003                  |                                  |
| 1988  | 49,731                 | 21,437                     | 19,009                  |                               | 19,009                     | 40,446                  | 0.470                            |
| 1989  | 54,798                 | 15,855                     | 14,129                  |                               | 14,129                     | 29,984                  | 0.471                            |
| 1990  | 40,159                 | 15,511                     | 7,497                   | 3,434                         | 10,931                     | 26,442                  | 0.413                            |
| 1991  | 50,838                 | 39,241                     | 16,450                  | 3,284                         | 19,734                     | 58,975                  | 0.335                            |
| 1992  | 49,304                 | 21,182                     | 20,033                  | 5,572                         | 25,605                     | 46,787                  | 0.547                            |
| 1993  | 42,249                 | 34,822                     | 27,610                  | 7,412                         | 35,022                     | 69,844                  | 0.501                            |
| 1994  | 45,149                 | 28,948                     | 17,665                  | 3,203                         | 20,868                     | 49,816                  | 0.419                            |
| 1995  | 41,119                 | 12,266                     | 14,451                  | 3,781                         | 18,232                     | 30,498                  | 0.598                            |
| 1996  | 24,575                 | 15,803                     | 16,753                  | 4,370                         | 21,123                     | 36,926                  | 0.572                            |
| 1997  | 27,883                 | 9,894                      | 7,756                   | 2,663                         | 10,419                     | 20,313                  | 0.513                            |
| 1998  | 22,108                 | 15,159                     | 14,469                  | 2,906                         | 17,375                     | 32,534                  | 0.534                            |
| 1999  | 20,437                 | 3,017                      | 8,864                   | 2,125                         | 10,989                     | 14,006                  | 0.785                            |
| 2000  | 39,556                 | 15,437                     | 20,357                  | 7,812                         | 28,169                     | 43,606                  | 0.646                            |
| 2001  | 33,521                 | 30,587                     | 17,071                  | 5,296                         | 22,367                     | 52,954                  | 0.422                            |
| 2002  | 40,346                 | 47,938                     | 19,278                  | 7,913                         | 27,191                     | 75,129                  | 0.362                            |
| 2003  | 31,993                 | 10,877                     | 13,672                  | 5,584                         | 19,256                     | 30,133                  | 0.639                            |
| 2004  | 33,819                 | 40,199                     | 15,307                  | 6,772                         | 22,079                     | 62,278                  | 0.355                            |
| 2005  | 27,490                 | 16,839                     | 10,203                  | 2,271                         | 12,474                     | 29,313                  | 0.426                            |
| 2006  | 28,547                 | 8,786                      | 12,399                  | 5,711                         | 18,110                     | 26,896                  | 0.673                            |
| 2007  | 35,636                 | 17,573                     | 11,089                  | 2,664                         | 13,753                     | 31,326                  | 0.437                            |
| 2008  | 31,989                 | 18,485                     | 13,498                  | 3,584                         | 17,082                     | 35,567                  | 0.480                            |
| 2009  | 28,151                 | 9,523                      | 8,346                   | 2,056                         | 10,402                     | 19,925                  | 0.522                            |
| 2010  | 24,846                 | 9,214                      | 10,662                  | 1,504                         | 12,166                     | 21,380                  | 0.569                            |
| 2011  | 12,779                 | 4,826                      | 2,452                   | 968                           | 3,420                      | 8,246                   | 0.415                            |
| <b>Ave. 1977-2011</b>   | <b>35,710</b>          | <b>18,837</b>              | <b>13,722</b>           | <b>4,131</b>                  | <b>17,267</b>              | <b>35,380</b>           | <b>0.502</b>                     |
| <b>Ave. 2000-2010</b>   | <b>32,354</b>          | <b>20,496</b>              | <b>13,807</b>           | <b>4,652</b>                  | <b>18,459</b>              | <b>38,955</b>           | <b>0.503</b>                     |
| <b>Ave. 2007-2011</b>   | <b>21,850</b>          | <b>11,924</b>              | <b>9,209</b>            | <b>2,155</b>                  | <b>11,364</b>              | <b>23,288</b>           | <b>.485</b>                      |

The apparent failure to meet the bottom end of the 10,100 – 17,700 Coho escapement goal is directly attributable to a lack of parity reductions between the inriver exploitation rates and harvests. The Coho were in the river. The Central and Northern District commercial fishermen provided Coho for adequate spawning only to be overharvested by the inriver removals.

Of the 35 ADF&G inventoried culverts on Little Susitna tributaries, 66% (23) were categorized as “red”, or culverts that are inadequate for juvenile fish passage, and 29% (10) as “gray”, culverts that require additional data and analysis to categorize fish passage. “Green” culverts are assumed to allow juvenile fish passage.

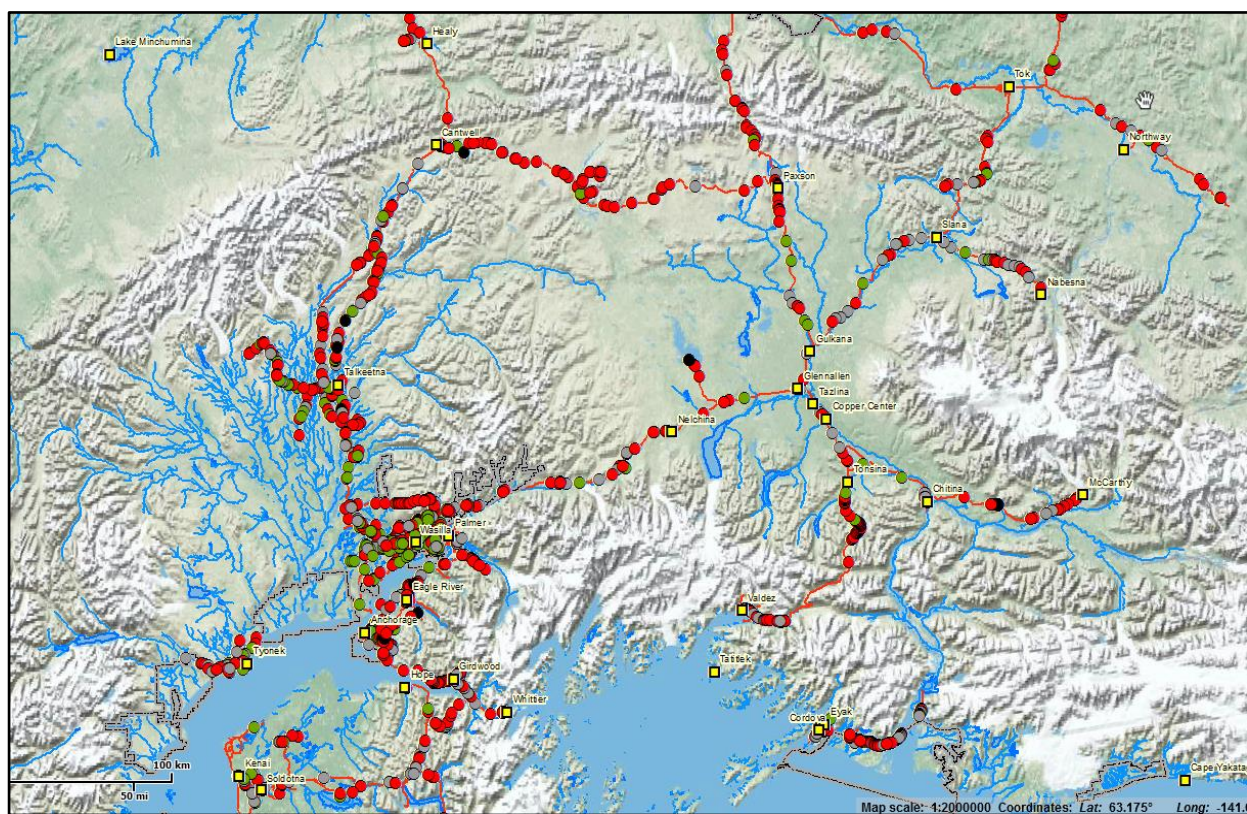
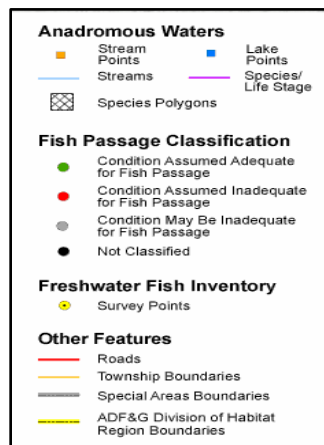


Figure 8. Alaska Department of Fish & Game Interactive Map





### 3. Summary of Little Susitna Coho Stock

- A. Original native salmon stocks were probably destroyed by mining activities that used **cyanide** leaching processes from around 1900 thru the early 1960's.
- B. **Kodiak, Alaska, Green River, Washington Coho and Kings, Oregon Coho, Bear Lake Coho and Blind Slough Coho** were selected and brought to Fire Lake and Fort Richardson and later to Big Lake Hatcheries. All these stocks were hybridized together in various combinations.
- C. **The Kodiak and Green River Coho stocks and the Seward/Bear Lake Coho** were hybridized and developed as brood stocks at Fort Richardson and Big Lake Hatcheries.
- D. These hybrid Coho stocks were introduced into the Little Susitna River many times. Numerous other streams, rivers and lakes in Southcentral Alaska were also stocked from 1972-1993. These hybrid Coho displayed hybrid vigor and exotic introduced vigor and reproduced quickly.
- E. In addition to these hybrid Coho stocked in the Little Susitna River, there were 10-15 million additional hatchery fry and smolt releases that added to the system's production. Harvesting of these hybrid Coho occurred in both the commercial and sport fisheries. Hatchery stockings slowed and were discontinued in 1993.
- F. The original BEG of 7,500 in 1990 was based on weir counts and harvest data that included both **hybrid spawners** and millions of additional hybrid fry and smolt hatchery contributions.
- G. The 1999 BEG of 9,600 – 19,200 was based on the years including these maximum returns returning from these maximum hybrid hatchery fry and smolt releases.
- H. The 2001 SEG of 10,100 – 17,700 was based on the same data set that included maximum hybrid hatchery fry and smolt releases.
- I. A new SEG needs to be determined using the post-stocking (1996) Coho data.
- J. Establish a new OEG of 3,000 – 12,000 for the Little Susitna Coho stocks.
- K. Establish a new Coho indicator system isolated from the effects of urbanization.
- L. Resume the Little Susitna Coho and King stocking programs.

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