

## APPENDIX B5. NUMBER AND SIZE OF TARGET FISH SPECIES

## 1. INTRODUCTION

This appendix provides information on the number and size of target fish species anticipated to potentially need passage at Watana Dam. The target species identified in Appendix B1 include Arctic grayling, burbot, Chinook salmon, Dolly Varden, humpback whitefish, longnose sucker, and round whitefish. Of these seven target species only Chinook salmon are considered to have obligate anadromous life history. Humpback whitefish are usually, but not always considered anadromous (Morrow, 1980) and Dolly Varden are considered to have a facultative anadromous life history pattern, but primarily exhibit a resident life history in the Middle Susitna River (Jennings 1985). Schmidt et al. (1983) suggested anadromous Dolly Varden may be present in the Susitna River, but no empirical evidence is available to confirm this life history pattern.

## 2. ARCTIC GRAYLING

### 2.1. Estimated Numbers

- Numbers of Arctic grayling that might utilize passage facilities is unknown.
- Arctic grayling appear to be most abundant fish species in the Upper River, particularly in tributaries; however, the likelihood of migration between the Upper and Middle River Segments is uncertain.
- 6,027 Arctic grayling were tagged during 1981/1982 in tributaries upstream of the three impediments and there were 953 recaptures (15.8%).
  - 871 (91.4%) of recaptures were in the tributary where tagged.
  - 82 (8.6%) of the recaptures were in a tributary or slough upstream or downstream of the tributary where tagged.
    - 61 (6.4%) moved to a tributary or slough downstream.
    - 21 (2.2%) moved to a tributary or slough upstream.
    - 19 of 5593 (0.3%) tagged upstream of Watana Dam site moved to downstream of Watana Dam Site; farthest movement was Jay Creek to Fog Creek.
    - 7 of 434 (1.6%) tagged downstream of Watana Dam site (one from Fog Creek, 6 from Tsusena Creek) moved to upstream of Watana Dam site; farthest movement was from Fog Creek to Oshetna River.
- One fish tagged in Jay Creek during 1981 was recaptured during 1982 by an angler 75 miles upstream in Salt Creek, which drains to Tyone Lake.

### 2.2. Size

- Arctic grayling live up to 10 years of age in the Susitna River; Age 5 represented about 31 percent of the sample population collected by angling during 1982.

- Maximum size 420 mm of sampled fish upstream of Devils Canyon during 1982.
- Length at age from 1981 and 1982 depicted in Figure B5-1.
- Length frequency of Arctic grayling collected during 2012 depicted in Figure B5-2.
- No weight information from the Susitna River.

### **3. BURBOT**

#### **3.1. Estimated Numbers**

- Numbers of burbot that might utilize passage facilities is unknown.
- 88 burbot were captured by trotline during 1981 near tributary mouths upstream of Devils Canyon; maximum catch rate was 1.14 fish per trotline; average 0.68 fish per trotline.
- 135 burbot captured by trotline during 1982 at mainstem sites upstream of Devils Canyon with a maximum catch rate of 3.5 fish per trotline and average 0.7 fish per trotline.
- For comparison, 130 trotlines were set at 17 DFH sites in the Middle and Lower River during 1982 with a maximum catch rate of 2.7 burbot per trotline and average of 0.4 burbot per trotline.

#### **3.2. Size**

- Burbot in the Susitna River can live up to 14 years; up to Age 10 were captured upstream of Devils Canyon in 1981 and 1982; maximum size of burbot captured downstream of Devils Canyon was 900 mm in 1981; maximum recorded upstream of Devils Canyon was 740 mm in 1981 (Figure B5-3).
- No weight information from the Susitna River.

### **4. CHINOOK SALMON**

#### **4.1. Estimated Numbers**

- Adults – unknown with any precision.
  - Chinook adults migrating upstream passage above Watana Dam are unlikely to be more than a few hundred. The highest peak spawning count was 16 fish in Kosina Creek during 2012 (HDR 2013). No adult Chinook observed upstream of the proposed Watana Dam site during surveys from 1981-1985 (ADF&G 1981, ADF&G 1983, Barrett et al. 1984, Barrett et al. 1985, Thompson 1986).
  - On the order of 10,000 to 20,000 adult Chinook escapement to Curry fishwheel (RM 120) during 1983-1985 (ADF&G 1981, ADF&G 1983, Barrett et al. 1984, Barrett et al. 1985, Thompson 1986).

- Approximately 90+ percent of Middle River Chinook escapement to Indian River and Portage Creek (ADF&G 1981, ADF&G 1983, Barrett et al. 1984, Barrett et al. 1985, Thompson 1986).
- In 2012 317 Chinook salmon were radio-tagged at Curry. For those with mainstem or tributary final destinations, 26 (8.2%) passed the first impediment, 22 (6.9%) passed the second impediment, 12 (3.8%) passed all three impediments, and 6 (1.9%) had final destinations upstream of the proposed Watana Dam site (LGL 2013).
- Fry – unknown.
  - Chinook fry have been infrequently observed in low numbers upstream of proposed Watana Dam site (Kosina Creek – 3 fish, Oshetna River – 3 fish; Buckwalter 2011).
  - Observations of Chinook young of year during 2012 in Cheechako Creek and an unnamed tributary downstream of the proposed Watana Dam site (HDR 2013).
- Age 1+ – unknown.
  - All Chinook juveniles observed have been young-of-year less than 75 mm (Buckwalter 2011).

## 4.2. Size

- Adults.
  - 10 Chinook radio-tagged at Curry that passed the third impediment were 66 to 101 cm FL (mean 83.9 cm).
  - 492 Chinook captured at Curry during 2012 were 33 to 123 cm FL (mean 71 cm)
  - No empirical weight information from the Susitna River.
  - Age of Chinook returns to fishwheels during the 1980s varied considerably from year to year. Age 4, 5 and 6 typically predominate with some Age 3 and relatively few Age 7 (ADF&G 1981, ADF&G 1983, Barrett et al. 1984, Barrett et al. 1985, Thompson 1986).
- Fry.
  - Emergence at approximately 32 mm.
  - By late September young of year are typically 50 to 85 mm (weighted average 63.2 mm; Roth and Stratton 1985, Roth et al. 1986).
- Age 1+ (Roth et al. 1985)
  - Typically 65 to 120 mm at Middle and Lower River outmigrant traps during 1984, weighted average 86.1 mm.

## 5. DOLLY VARDEN

### 5.1. Estimated Numbers

- Numbers of Dolly Varden that might utilize passage facilities is unknown.
- Few (17) Dolly Varden were captured in the Susitna River and tributaries upstream of Devils Canyon during 1981 and 1982.
- HDR (2013) captured 246 Dolly Varden in the Susitna River and tributaries upstream of Devils Canyon during 2012.
  - 243 (98.8%) of the Dolly Varden were captured in tributaries by backpack electrofishing (210 fish), minnow trap (20 fish), or angling (13 fish).

### 5.2. Size

- Maximum size of Dolly Varden captured during 1981 and 1982 was 205 mm.
- During 2012 the size range was 26 – 366 mm (Figure B5-4).

## 6. HUMPBACK WHITEFISH

### 6.1. Estimated Numbers

- Numbers of humpback whitefish that might utilize passage facilities is unknown.
- During 1981, 1982 and 2013 three humpback whitefish were captured upstream of Devils Canyon, one each year.

### 6.2. Size

- Size of humpback whitefish captured upstream of Devils Canyon ranged from 231 (captured 2013) to 347 mm (captured 1981); size of humpback whitefish captured in 1982 not reported.
- In the Lower and Middle Susitna River downstream of Devils Canyon, humpback whitefish live up to Age 13.
  - Lower River fish tend to be larger than fish from the Middle River.
  - The maximum size captured in the Lower River was an Age 8 fish 489 mm in length.
  - The maximum size captured in the Middle River was an Age 8 fish 437 mm in length.
- No empirical weight information is available.

## **7. LONGNOSE SUCKER**

### **7.1. Estimated Numbers**

- Numbers of longnose sucker that might utilize passage facilities is unknown.
- During 1981, 144 longnose suckers were captured near tributary mouths upstream of Devils Canyon by gillnet.
- During 1982, 66 longnose suckers were captured by gillnet at four of seven mainstem sampling sites.
- During 2012, 32 longnose suckers were captured primarily by backpack electrofishing within mainstem habitats (20 fish) or tributary plumes by boat electrofishing (8 fish).
- Movement patterns of longnose sucker upstream of Devils Canyon are unknown.

### **7.2. Size**

- Longnose sucker in the Susitna River live up to Age 11.
- Range of longnose suckers captured upstream of Devils Canyon during 1981 was 105 to 505 mm (Figure B5-5).
- Range of longnose suckers captured upstream of Devils Canyon during 1982 was 210 to 495 mm.
- Range of longnose suckers captured in the Upper Susitna River during 2012 was 20 to 404 mm.

## **8. ROUND WHITEFISH**

### **8.1. Estimated Numbers**

- Numbers of round whitefish that might utilize passage facilities is unknown.
- During 1981, 33 round whitefish were captured near tributary mouths upstream of Devils Canyon by gillnet.
- During 1982, 5 round whitefish were captured by gillnet at one of seven mainstem sampling sites upstream of Devils Canyon.
- During 2012, 14 round whitefish were captured primarily by backpack electrofishing within mainstem habitats (20 fish) or tributary plumes by boat electrofishing (8 fish).
- Movement patterns of round whitefish upstream of Devils Canyon are unknown.

### **8.2. Size**

- Round whitefish in the Susitna River live up to Age 12 (Schmidt et al. 1984).
- Range of round whitefish captured upstream of Devils Canyon during 1981 was 315 to 440 mm (Figure B5-6).

- Size of round whitefish captured upstream of Devils Canyon during 1982 was not reported.
- Maximum size of round whitefish captured downstream of Devils Canyon during the 1980s was 444 mm.
- Range of round whitefish captured in the Upper Susitna River during 2012 was 20 to 404 mm.

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## 10. FIGURES

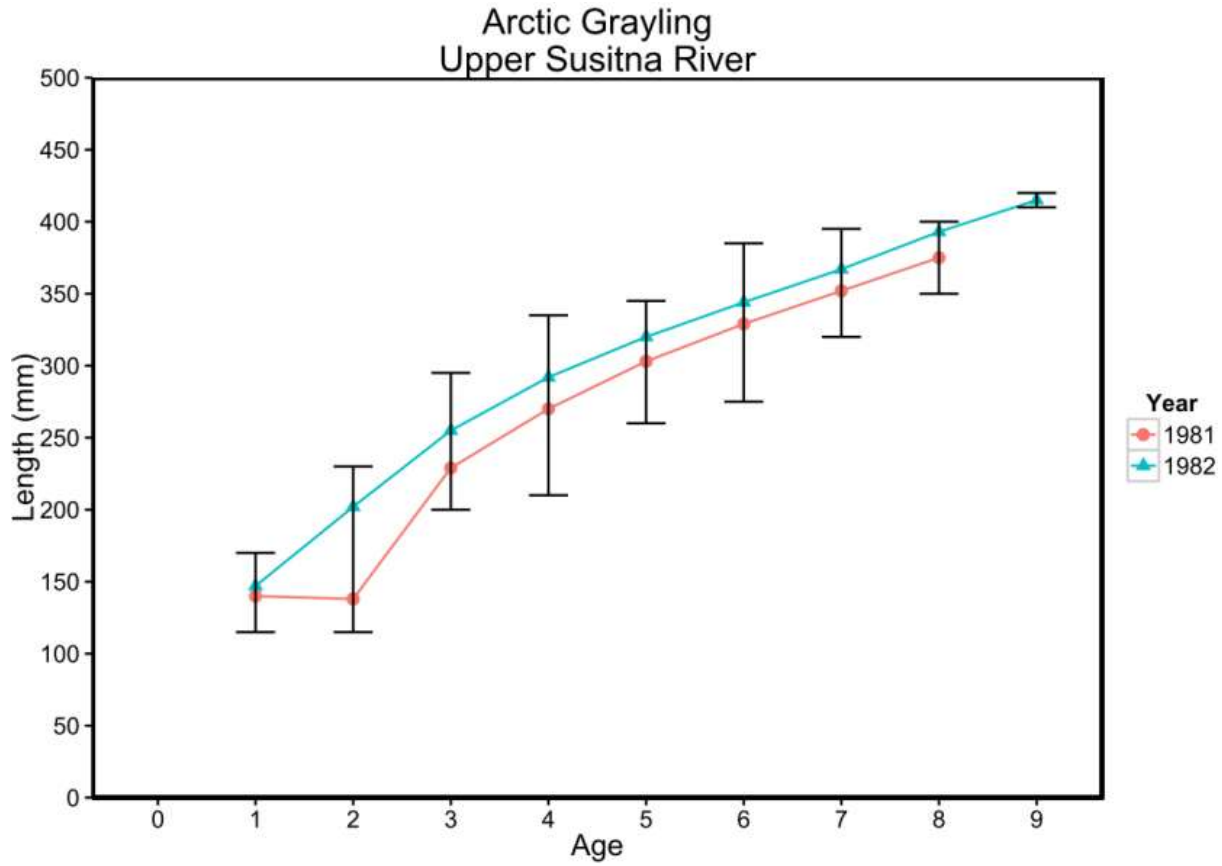


Figure B5-1. Age and length of Arctic grayling collected in the upper Susitna River during the open water seasons of 1981 and 1982. Data Source: Delaney et al. (1981), Sautner and Stratton (1983).

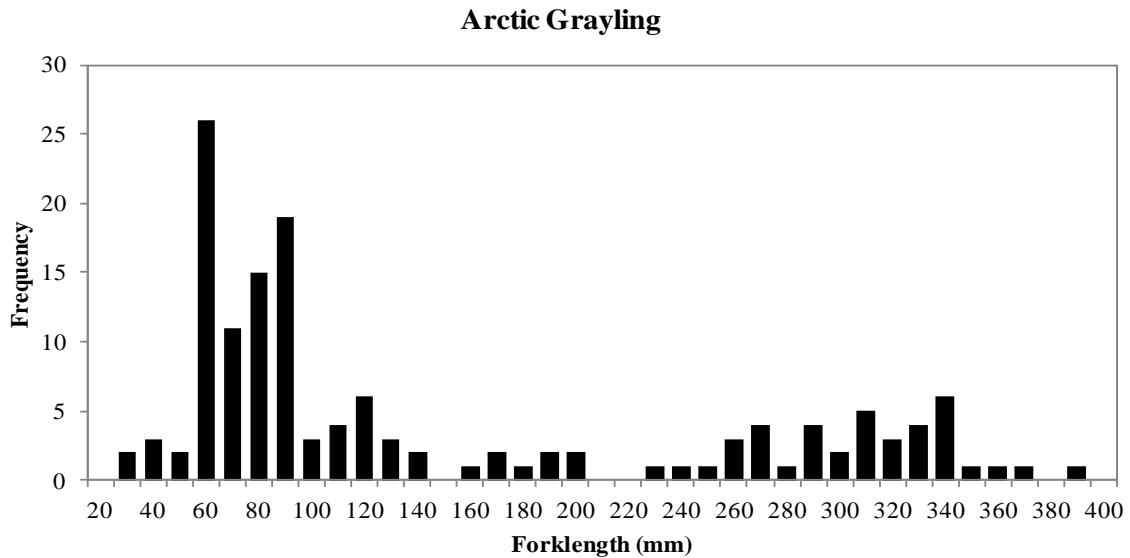


Figure B5-2. Length Frequencies for Arctic Grayling (n=143) captured in tributary, tributary plume, and lake habitats in the Upper Susitna River study area, July-August, 2012. Fish were captured by boat-mounted electrofisher, backpack electrofishing, minnow traps, angling, and fyke nets. Source: HDR (2013).

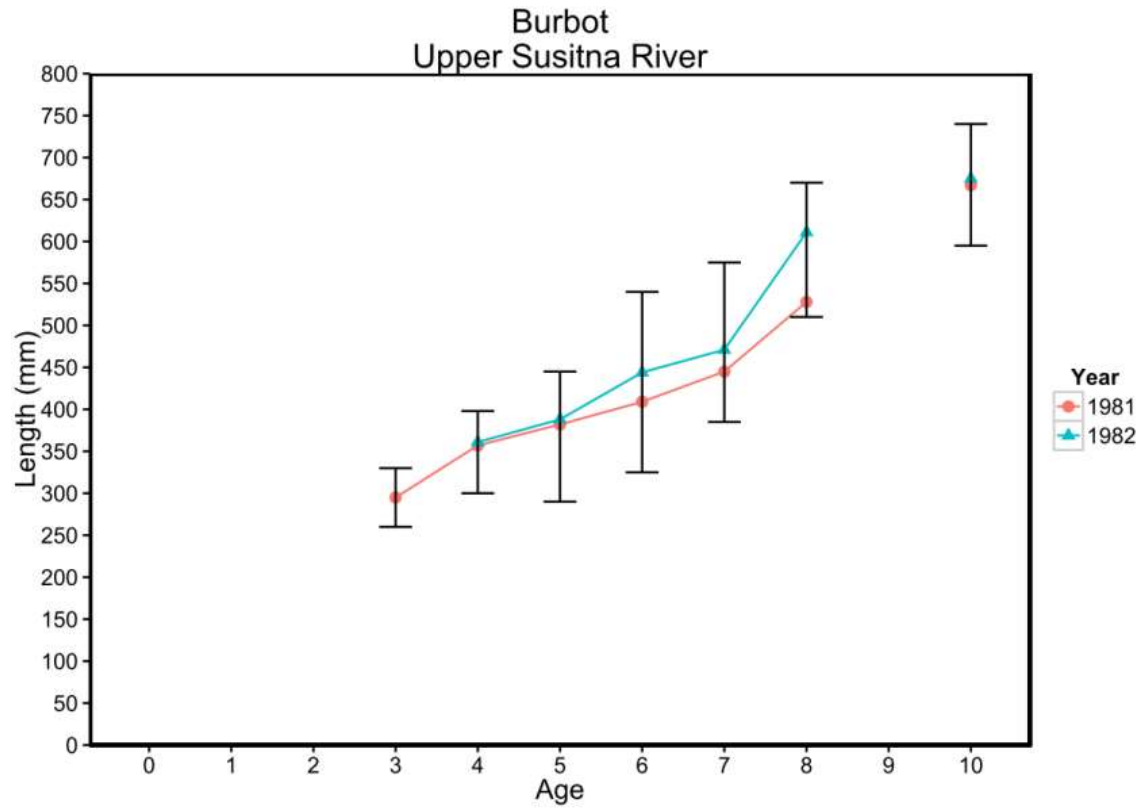


Figure B5-3. Age and length of burbot collected upstream of Devils Canyon during the open water seasons of 1981 and 1982. Data Source: Delaney et al. (1981), Sautner and Stratton (1983).

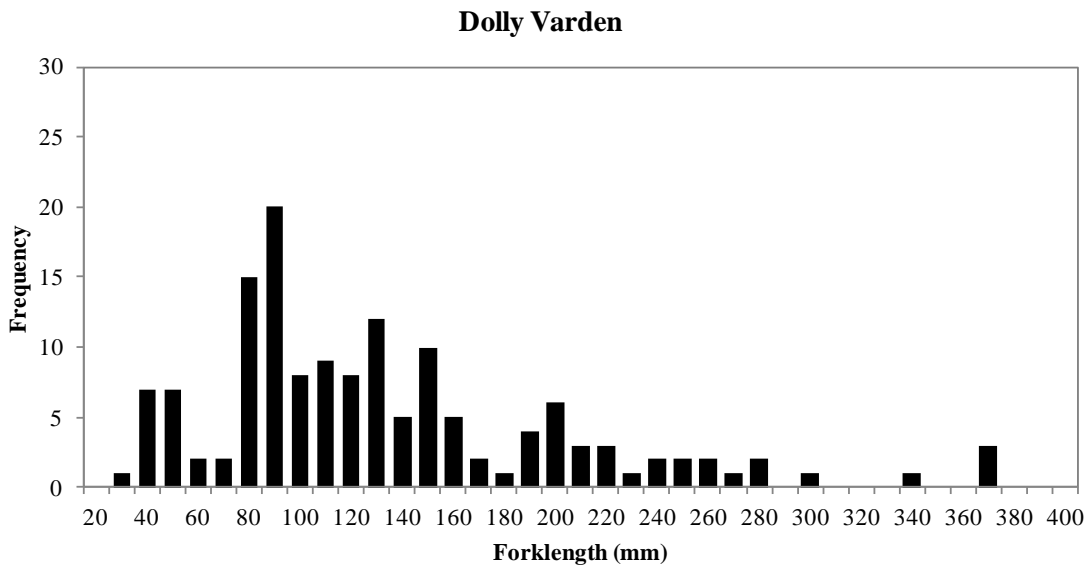


Figure B5-4. Length Frequencies for Dolly Varden (n=145) captured in tributary, tributary plume, and lake habitats in the Upper Susitna River study area, July-August, 2012. Fish were captured by boat-mounted electrofisher, backpack electrofishing, minnow traps, angling, and fyke nets. Source: HDR (2013)

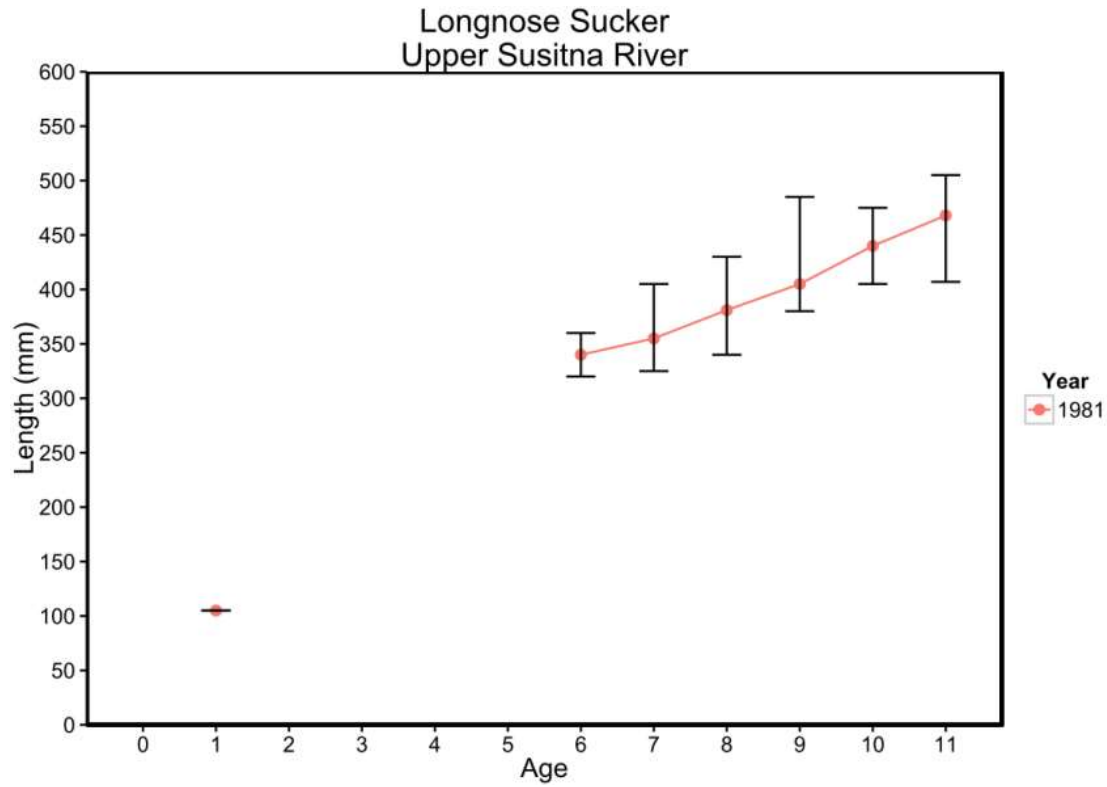


Figure B5-5. Age and length of longnose sucker collected in the upper Susitna River during the open water season of 1981. Data Source: Delaney et al. (1981).

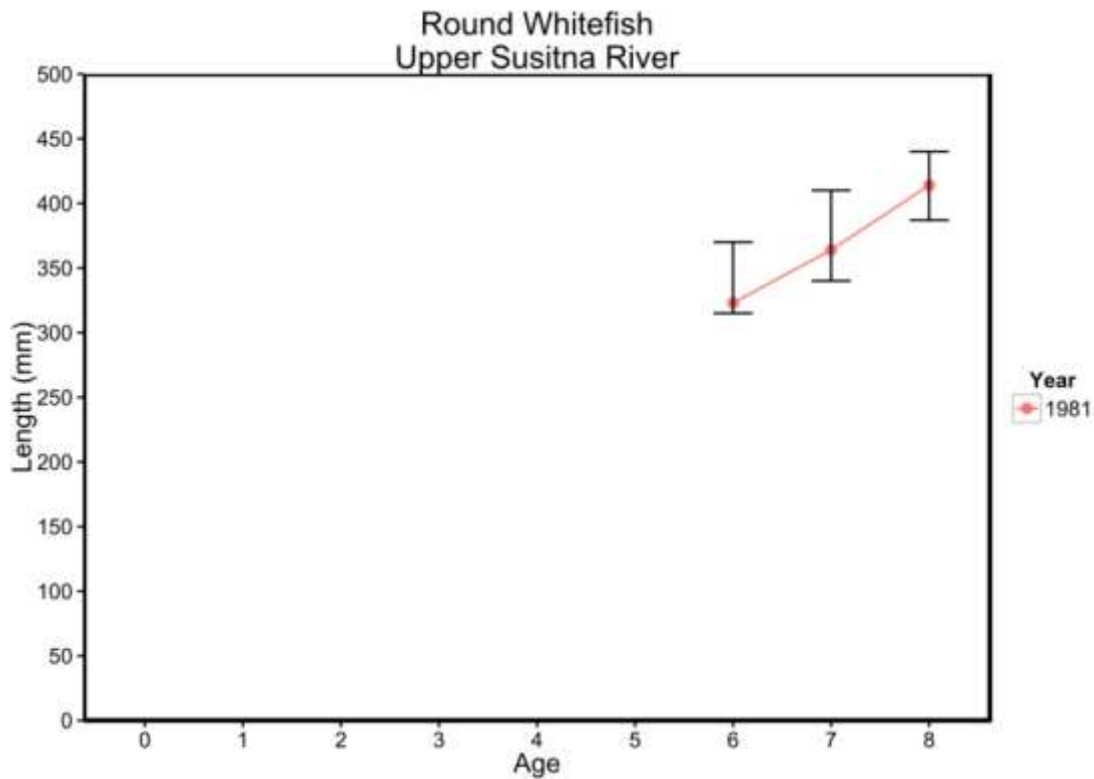


Figure B5-6. Age and length of round whitefish collected in the upper Susitna River during the open water season of 1981. Data Source: Delaney et al. (1981).