Validating Length-at-Date run assignments for Central Valley Chinook salmon

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California Dept Water Resources
Aquatic Ecology
Acknowledgments
Michael Banks, OSU Marine Fisheries Genetics Laboratory
Sheila Greene, Westlands Water District (formerly DWR)

Staff at:
CVP and SWP Fish Salvage Facilities
DFG Tissue Archive
OSU Marine Fisheries Genetics Laboratory
IEP Salmon Genetics PWT
What is the Length-at-Date approach?
Length-at-Date
- Identifies Chinook run origin
Length-at-Date
- Identifies Chinook run origin
- 1989: Winter Run ESA listed
Length-at-Date

- Identifies Chinook run origin
- 1989: Winter Run ESA listed
- CVP/SWP take limits
Length-at-Date
- Identifies Chinook run origin
- 1989: Winter Run ESA listed
  CVP/SWP take limits
Who’s my Daddy?
South Delta Fish Salvage Facilities
High Economic Stakes
1989: Length at Date approach conceived

Fisher’s length-at-date chart from Stevens (1989 memo report)

relationship between length and weight. Since the graph depicts average growth rates at 15°F under hatchery conditions, actual sizes of winter run fish may deviate somewhat from the estimated range due to variations in river temperature, food availability and individual growth potential. Length distributions of other runs also may overlap those of the winter run due to minor overlaps in spawning periods and growth variations not considered in this analysis.
1989: Length at Date approach conceived

Fisher’s length-at-date chart from Stevens (1989 memo report)
1989: Length at Date approach conceived

Fisher's length-at-date chart from Stevens (1989 memo report)

relationship between length and weight. Since the graph depicts average growth rates at 55°F under hatchery conditions, actual sizes of winter run fish may deviate somewhat from the estimated range due to variations in river temperature, food availability and individual growth potential. Length distributions of other runs also may overlap those of the winter run due to minor overlaps in spawning periods and growth variations not considered in this analysis.
1989: Length at Date approach conceived

\[ \ln(FL) = 0.006 \times \text{days} \]

Fisher’s length-at-date chart from Stevens (1989 memo report)
Current Fisher Model Size Criteria
Current Fisher Model Size Criteria

The diagram illustrates the seasonal size criteria for fish, with different months marked as FALL, LATE FALL, WINTER, SPRING, and FAL. The graph shows the relationship between fork length and time, with specific dates and seasonal markers.
Current Fisher Model Size Criteria

![Graph showing size criteria for different seasons and dates.](image-url)
Current Fisher Model Size Criteria

The graph illustrates the size criteria for different seasons and dates. The x-axis represents dates from December 8 to July 20, and the y-axis represents fork length. The graph includes lines for different seasons: Fall, Late Fall, Winter, Spring, and Fall. Each season has a line that shows the corresponding fork length criteria over time.
River Current Fisher Model Size Criteria
1997: Delta Model adopted for Salvage ONLY
Delta Model based on Delta catch data

\[ \ln(FL) = 0.008 \times \text{days} \]

\[ \ln(FL) = 0.006 \times \text{days} \]
Criteria developed for Winter Run
Criteria developed for Winter Run

Model Assumptions

1. spawning runs segregated in time
2. same constant growth rate (except winter run)
3. juvenile FL ranges segregated
Criteria developed for Winter Run

**Model Assumptions**

1. spawning runs segregated in time
2. same constant growth rate (except winter run)
3. juvenile FL ranges segregated
1993: Genetic testing initiated

Collect Tissue From Here
## Juveniles tested by each genetic method

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## Chinook tested by each method

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**Total:** 19,119
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**Total:** 11,307
Genetic Test Accuracy

(Michael Banks et al., in review, Animal Genetics)
Genetic Test Accuracy

(Michael Banks et al., in review, Animal Genetics)
Genetic Test Accuracy

(Michael Banks et al., in review, Animal Genetics)
Genetic Test Accuracy

(Michael Banks et al., in review, Animal Genetics)
Fall Run or Feather River Spring?
Genetic Fall Run

Frequency

Fork Length

Dec 8  Dec 22  Jan 5  Jan 19  Feb 2  Feb 16  Mar 2  Mar 16  Mar 30  Apr 13  Apr 27  May 17  May 25  Jun 8  Jun 22  Jul 6  Jul 20

Frequency

Genetic Fall Run

Fork Length

Dec 8  Dec 22  Jan 5  Jan 19  Feb 2  Feb 16  Mar 2  Mar 16  Mar 30  Apr 13  Apr 27  May 17  May 25  Jun 8  Jun 22  Jul 6  Jul 20
Genetic Fall Run

Frequency

Fork Length

0 50 100 150 200 250

FALL LATE FALL WINTER SPRING FALL LATE FALL WINTER
Genetic Fall Run
Genetic Fall Run

Frequency

Fork Length

0 50 100 150 200 250

Dec 8 Dec 22 Jan 5 Jan 19 Feb 2 Feb 16 Mar 2 Mar 16 Mar 30 Apr 13 Apr 27 May 17 May 25 Jun 8 Jun 22 Jul 6 Jul 20

FALL LATE FALL WINTER SPRING
Genetic Winter Run

Frequency

Fork Length

- January
- February
- March
- April
- May
- June
- July
- August
- September
- October
- November
- December

- Winter
- Late Fall
- Fall
- Spring
Segregated Fork Length Ranges?
Fall Run
Apparent Growth
Fall Run
Apparent Growth
Winter Run
Apparent Growth
Bad News
- Delta Model assumptions unsupported
- Feather River spring run undetectable

Relationship between length and weight. Since the graph depicts average growth rates at SF under hatchery conditions, actual sizes of winter run fish may deviate somewhat from the estimated range due to variations in river temperature, food availability, and individual growth potential. Length distributions of other runs also may overlap those of the winter run due to minor overlaps in spawning periods and growth variations not considered in this analysis.
Good News
- Delta Model works for Winter Run
Good News
- Delta Model works for Winter Run
- Rapid genetic assays forthcoming

Who’s my Daddy?
Thank You