Evaluating Population Health

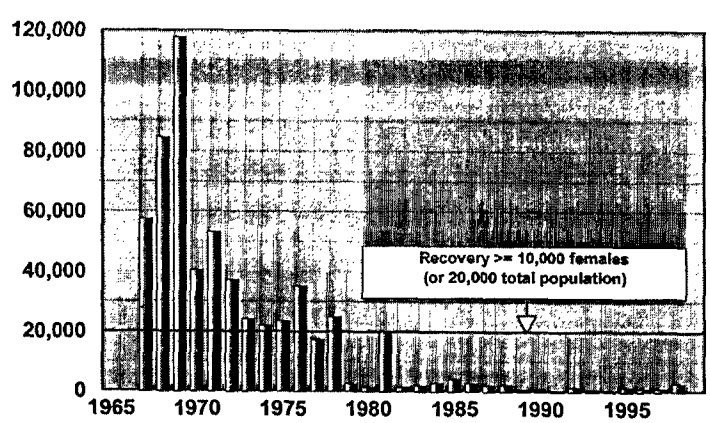
An Approach Using
Winter-run Chinook Salmon
Population Data

Winter-run Chinook Salmon: Recovery Goals

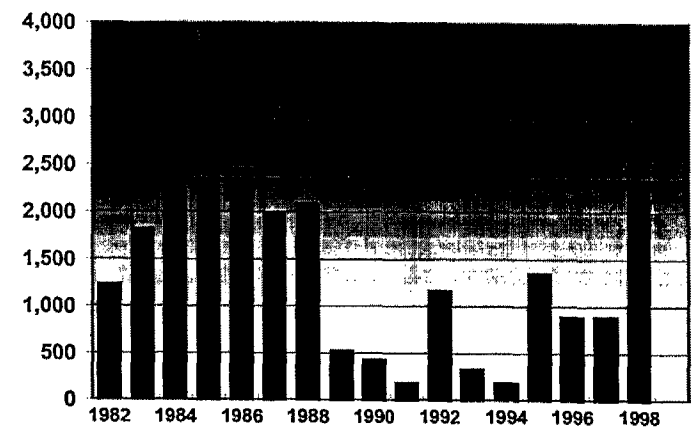
- 10,000 female or 20,000 adult spawners for 13 consecutive years
- Cohort Replacement Rate > 1.0
- Accurate system to measure abundance.

Source: NMFS 1997

Winter-run Chinook Salmon Escapement Estimates, 1967-1998



Winter-run Chinook Salmon Escapement Estimates, 1982-1998



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Cohort Replacement Rate Calculation

$$CRR = \frac{\sum A_2 + A_3 + A_4 + A_5}{N_o}$$

No = parental spawning population estimate

A2 = number of progeny returning at Age 2

A3 = number of progeny returning at Age 3

A4 = number of progeny returning at Age 4

A5 = number of progeny returning at Age 5.

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Example Calculation

$$CRR = \frac{\sum 100+175+25+0}{150} = \frac{300}{150} = 2.0$$

No = parental spawning population estimate = 150

A2 = number of progeny returning at Age 2 =100

A3 = number of progeny returning at Age 3 = 175

A4 = number of progeny returning at Age 4 = 25

A5 = number of progeny returning at Age 5 = 0.

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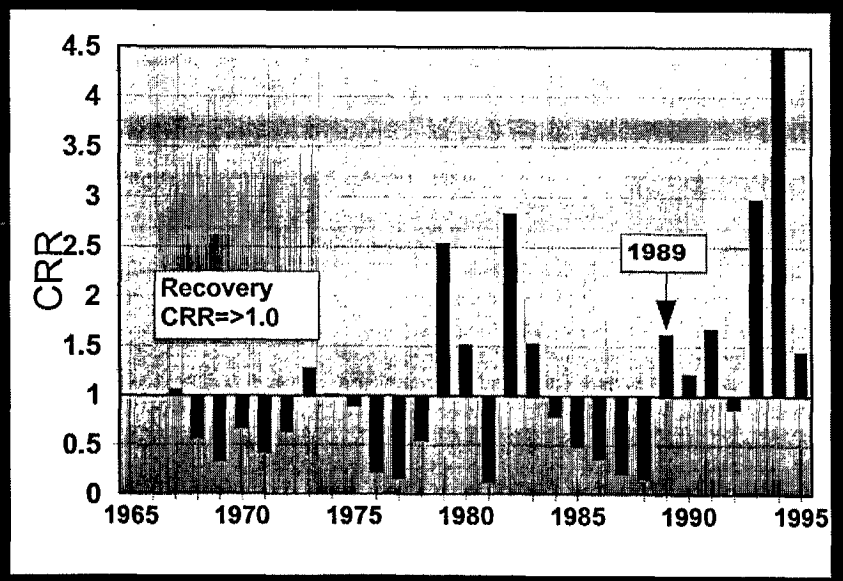
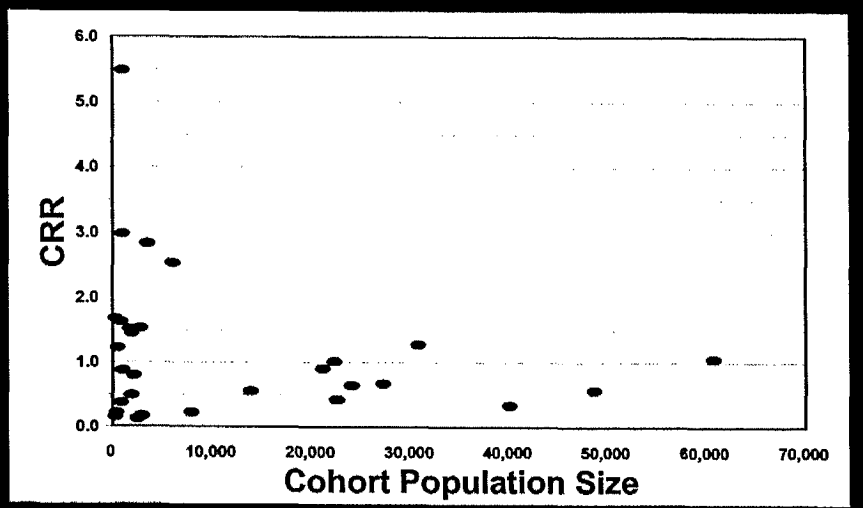
Winter-run Chinook Salmon Cohort Replacement Rates



Winter-run Chinook Salmon: CRR vs Population Size



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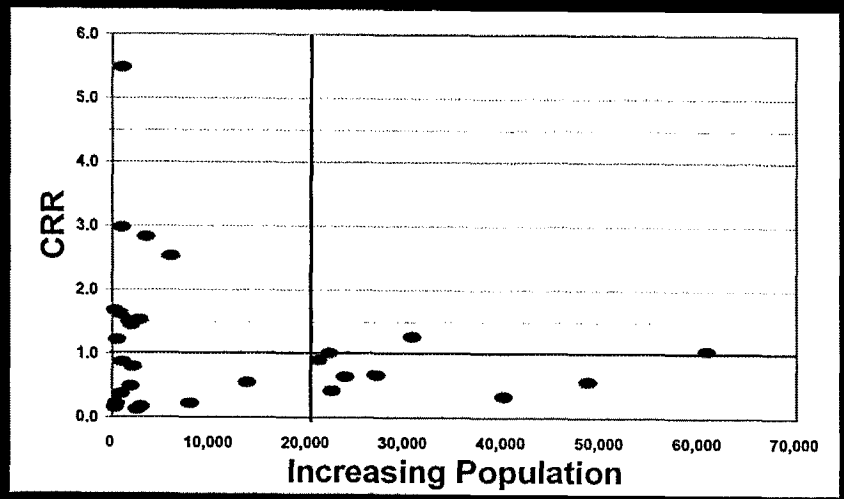
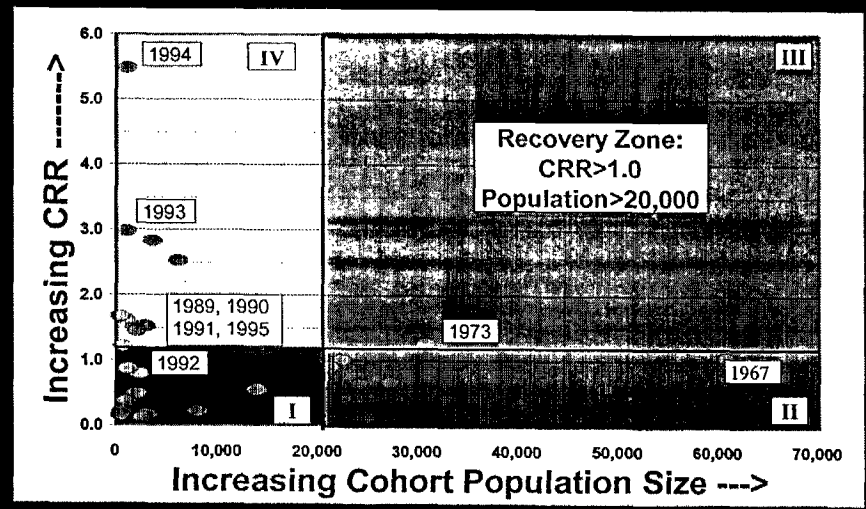
Winter-run Chinook Salmon: CRR vs Population Size



Winter-run Chinook Salmon: CRR vs Population Size



Attributes of CRR Approach

- Uses existing recovery goals
- Metric-based
- Simple presentation
- Can be applied to other chinook runs
- Ecosystem-level evaluation

Next Steps

- Peer review
- Revise age structure computations

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