Pre-Season Run Size Forecasts for Fraser River Sockeye and Pink Salmon in 2013

presented to: FN Forum
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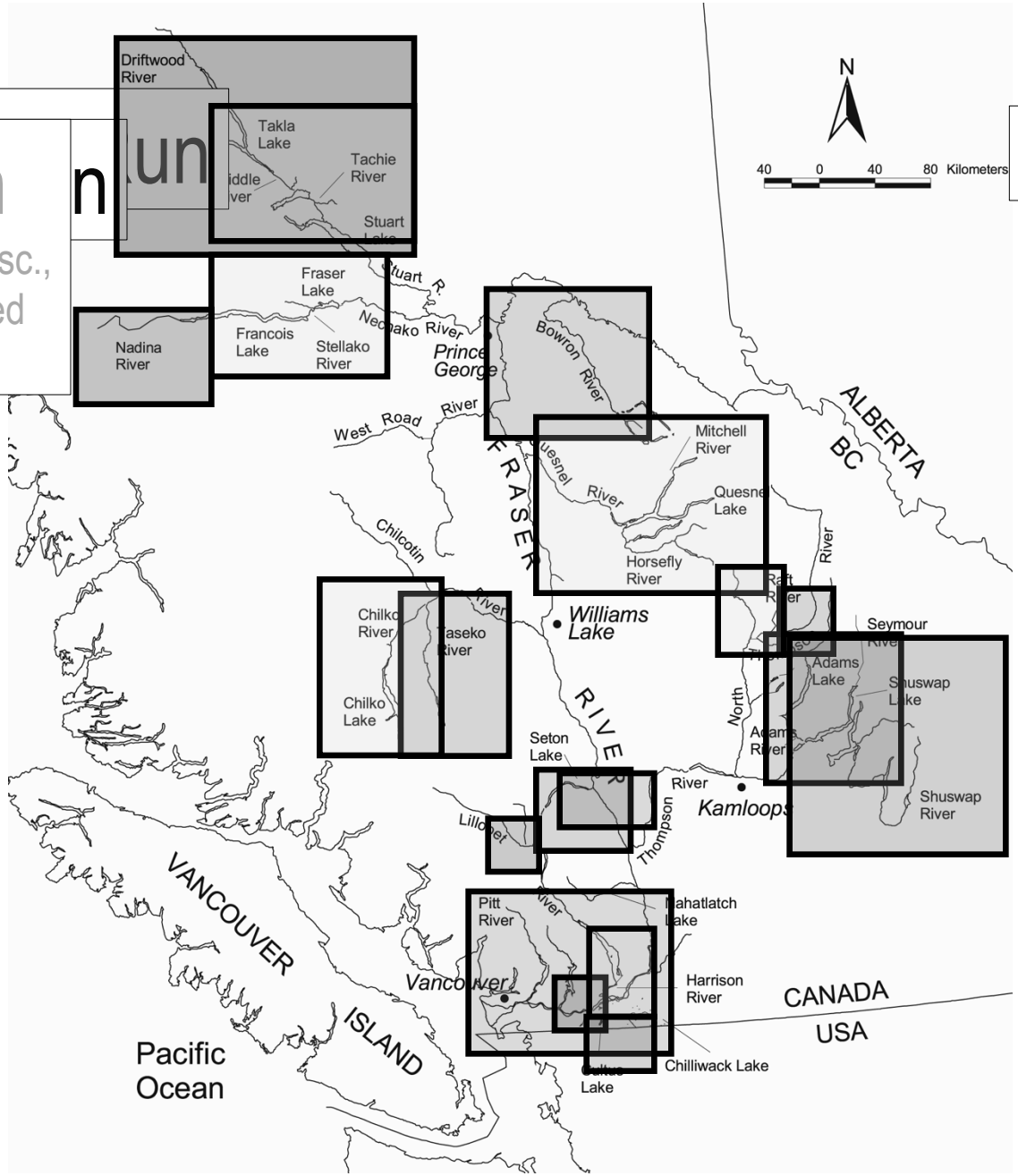
Fisheries and Oceans Canada
Pêches et Océans Canada

Slides extracted from presentation prepared by: S. Grant & B. MacDonald

Summer Run

Late Run

(Raft, North Thompson misc., and Harrison now managed as Summers)

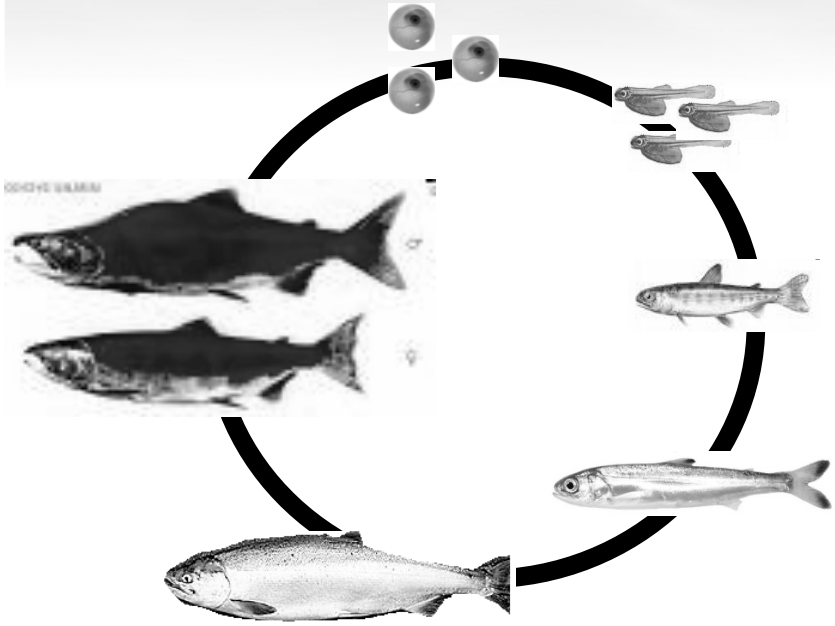


Factors influencing total returns

(Brood Year Escapement)

Age of Maturity

Most sockeye stocks are predominantly age 4_2



Freshwater: 2 winters

- Spawn (eggs): 2009
- Fry emergence: 2010
  (rearing in lakes)

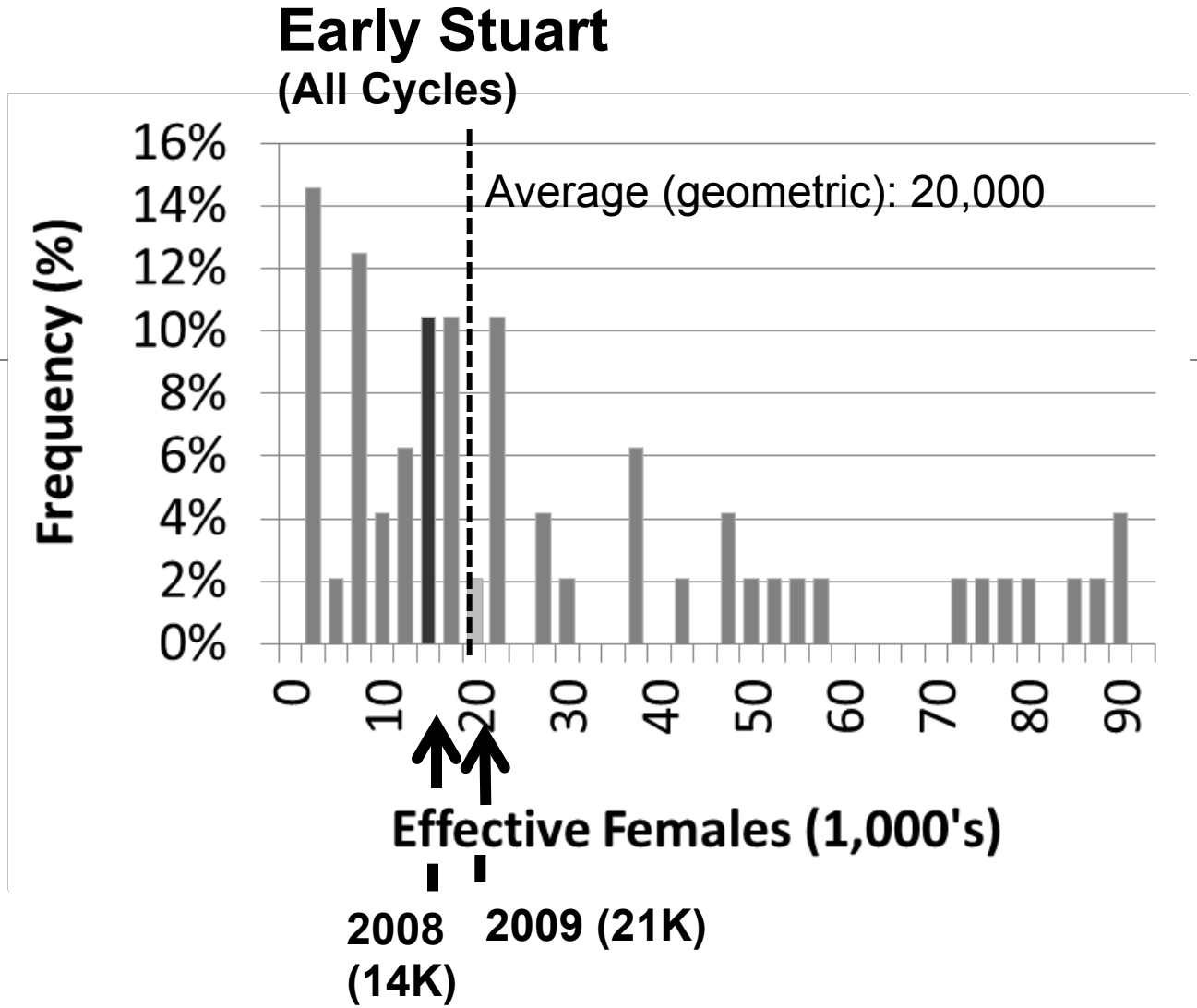
Marine: 2 winters 2011

- Smolt outmigration: 2012
  (rearing in North Pacific)
- Return to FW to spawn: **2013**

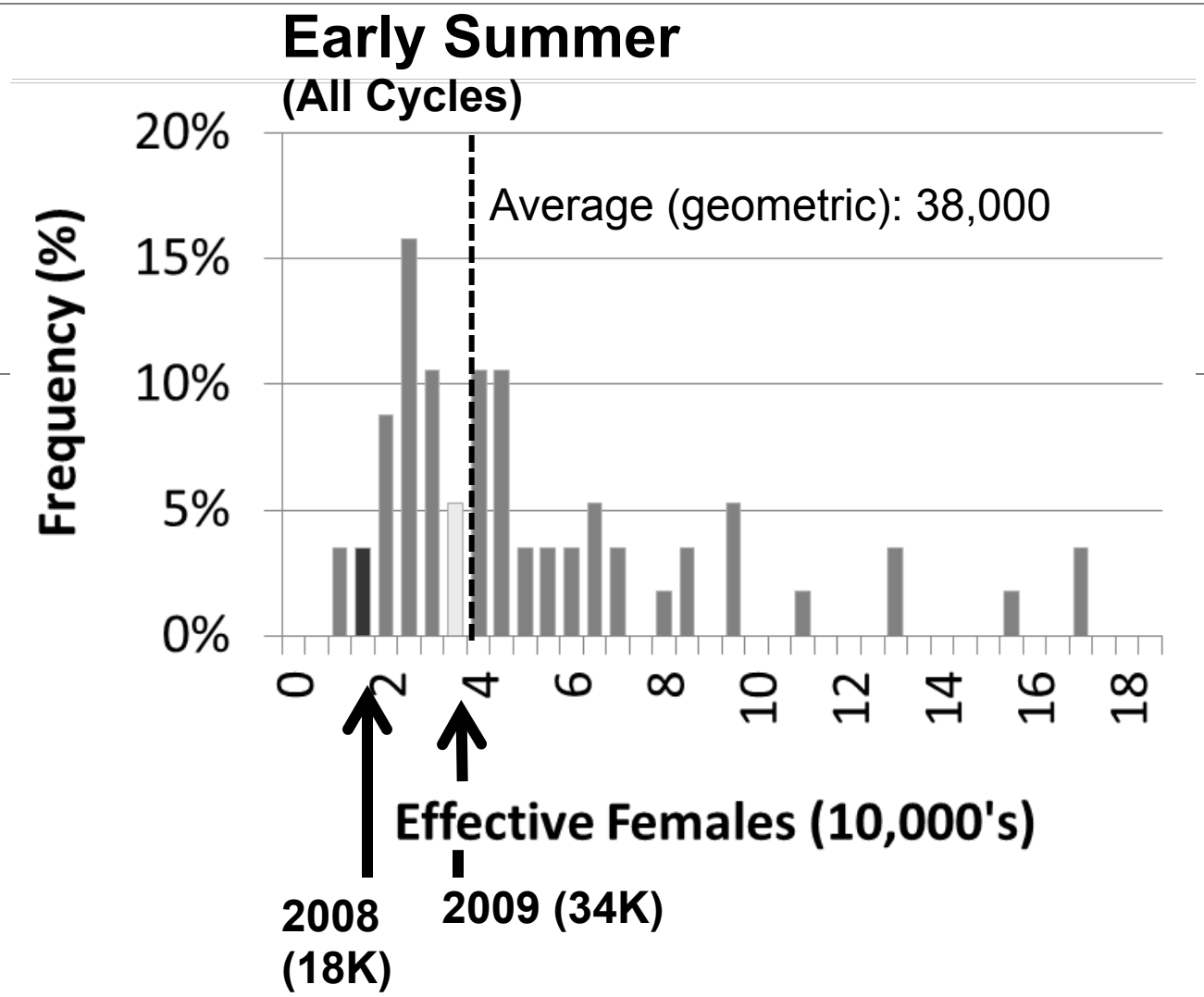
Harrison (3_1 & 4_1)

Fraser Sockeye Brood Year Escapement

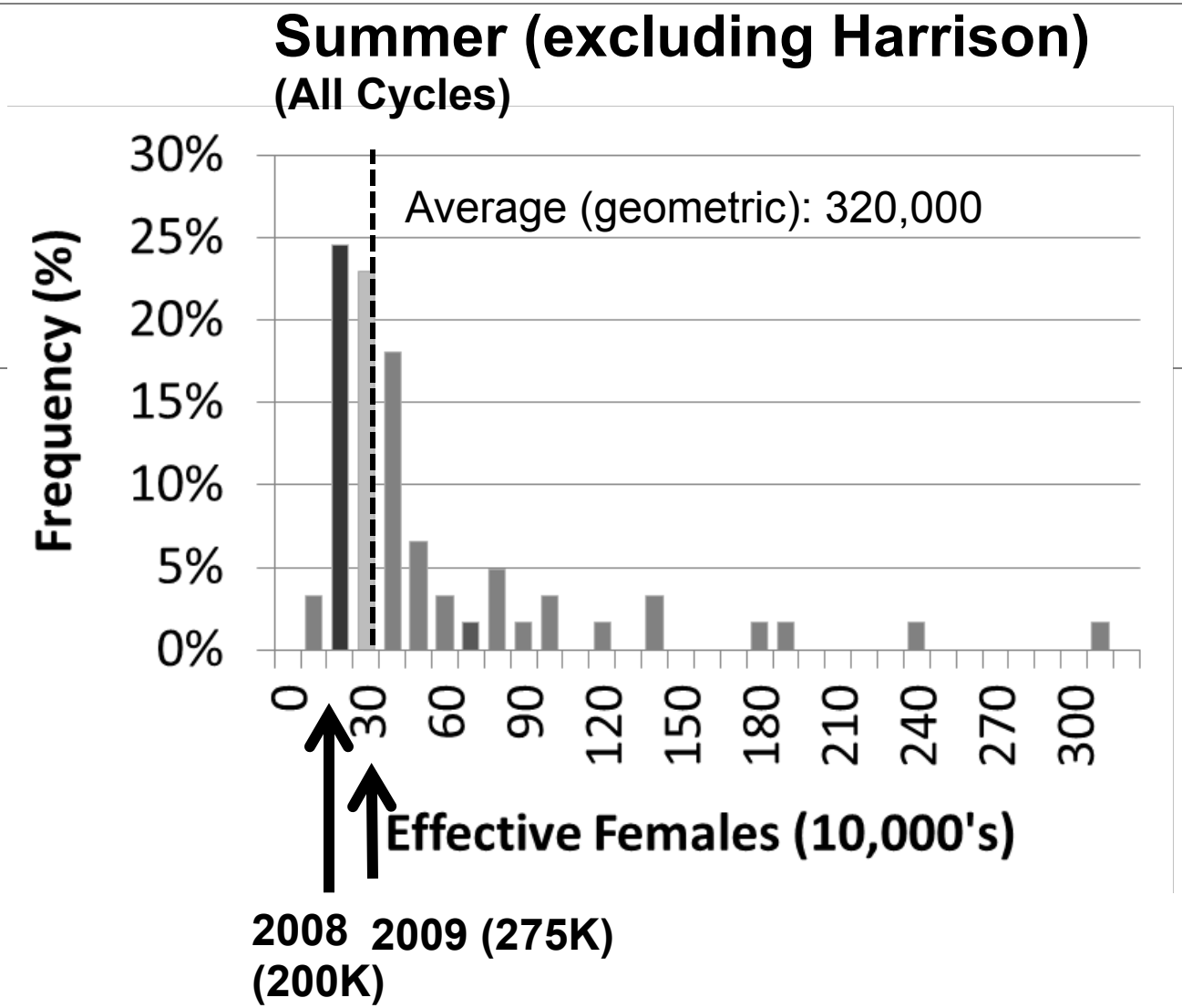
Adult Spawners



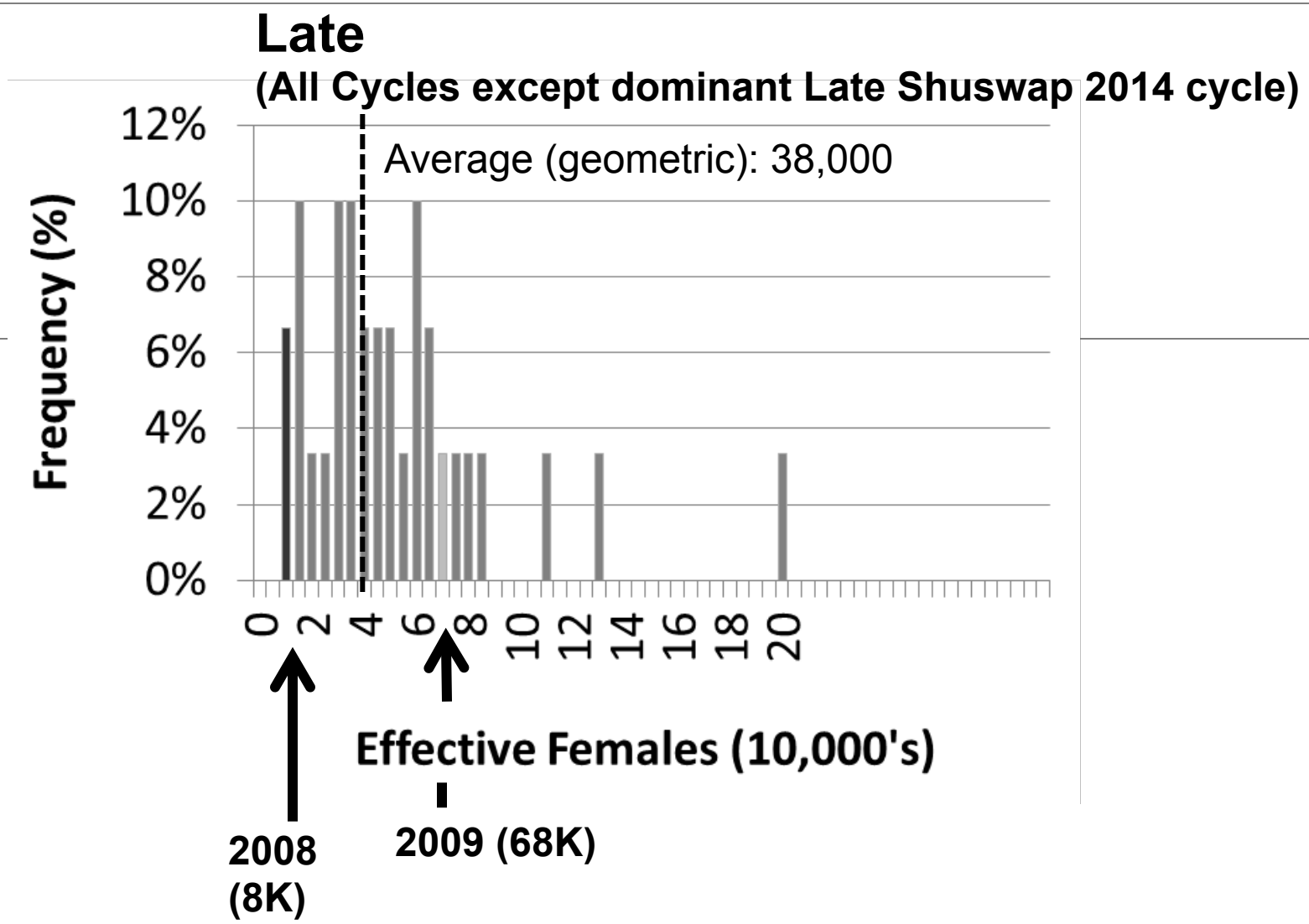
Adult Spawners



Adult Spawners

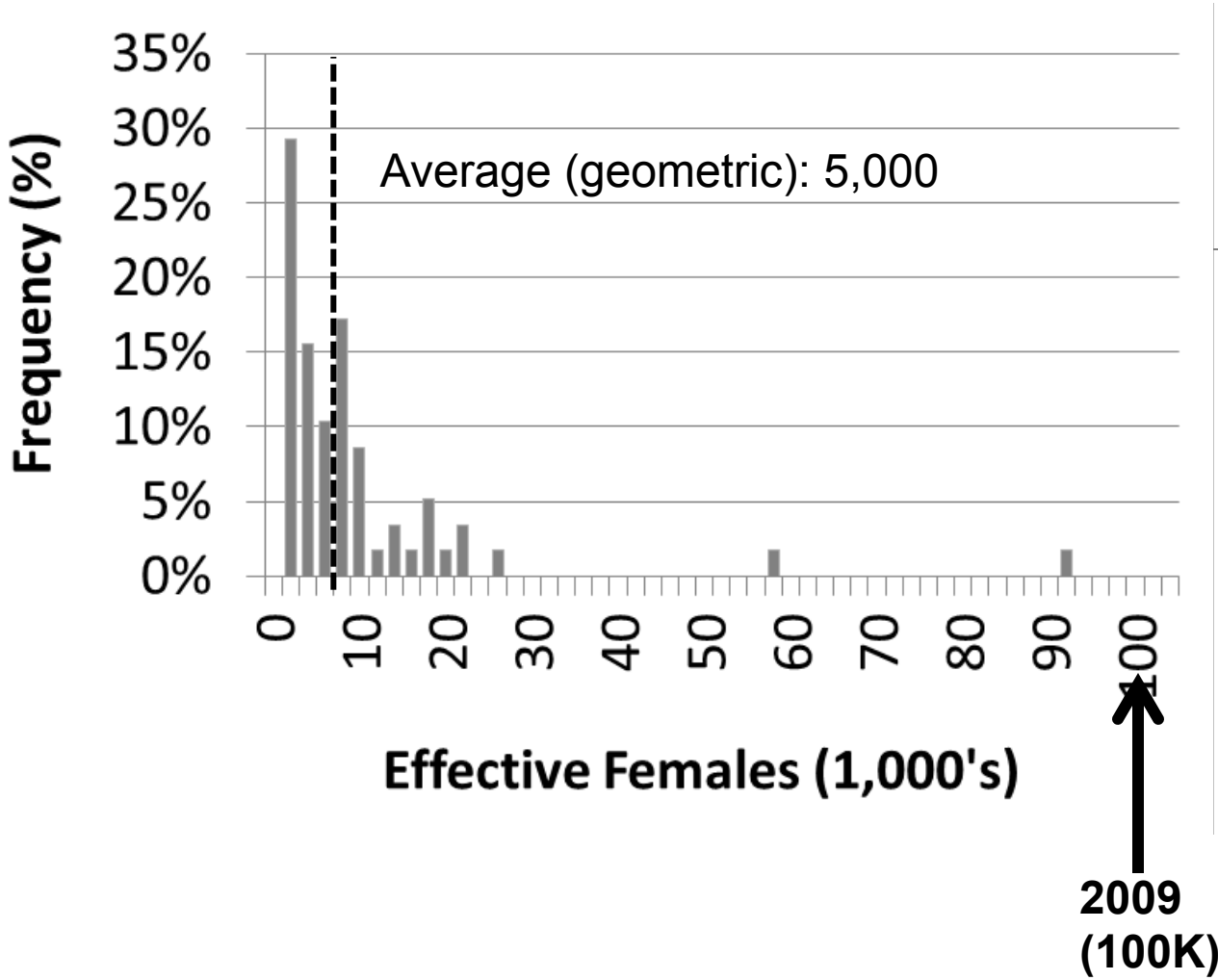


Adult Spawners



Adult Spawners

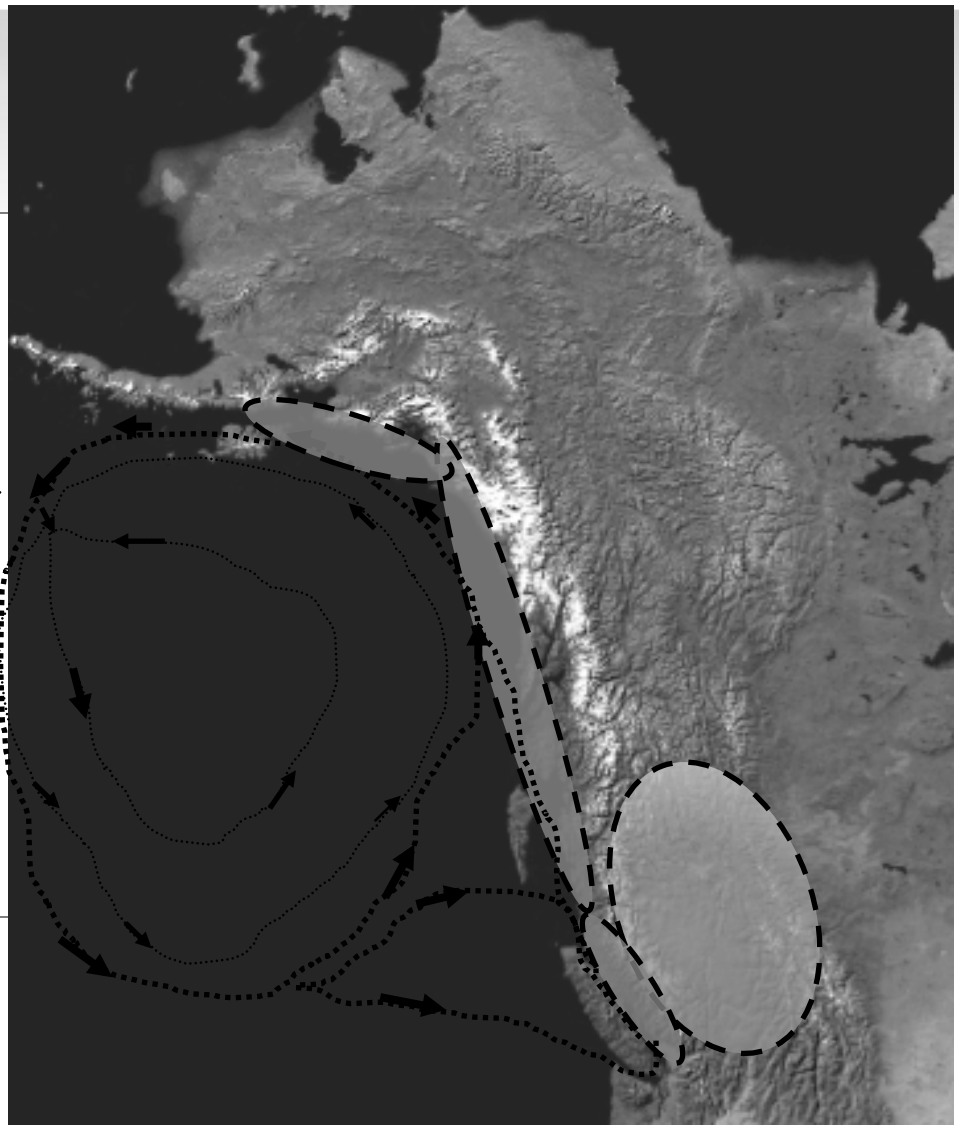
Harrison



Fraser Sockeye Survival

Survival

Marine
1-3 Winters

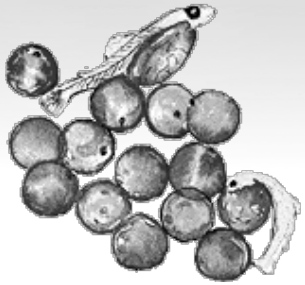


Freshwater
Two Winters

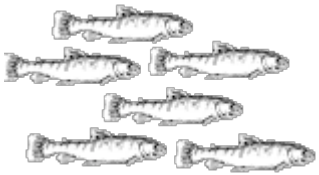
Tucker et al. 2009 (2012)
Trans. Am. Fish. Soc. 138: 1458-1480

Preikshot et al. (2012)
Mar. & Coast. Fish. 4: 438-449

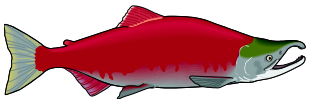
Total Survival

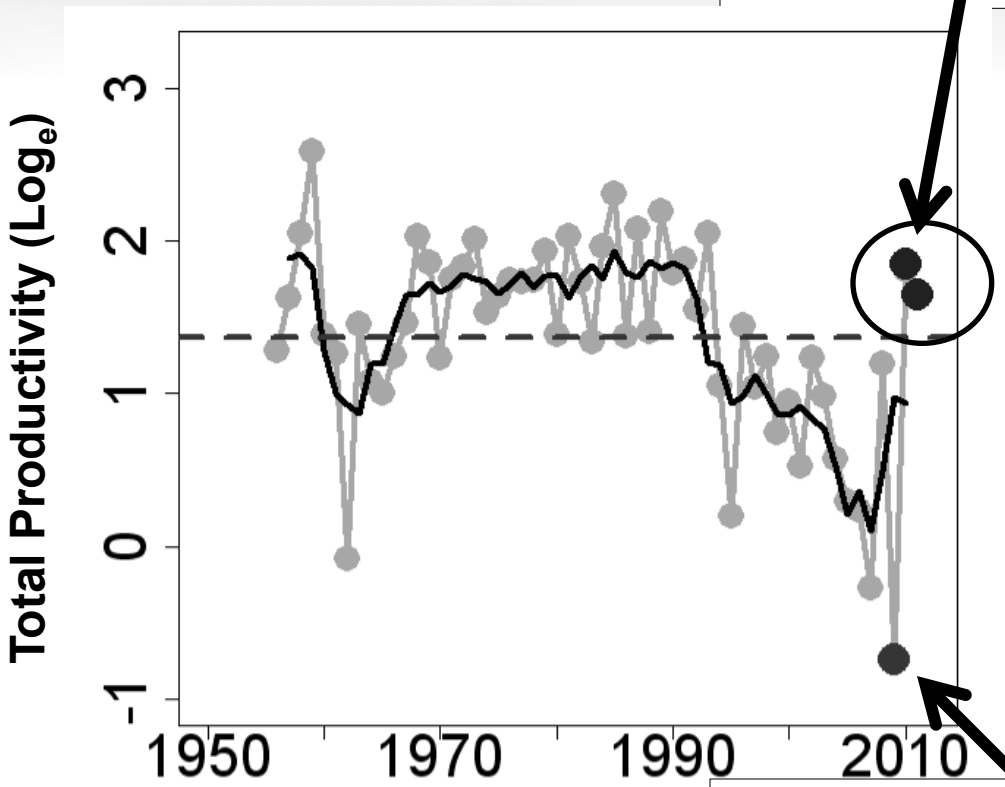


Freshwater



Marine





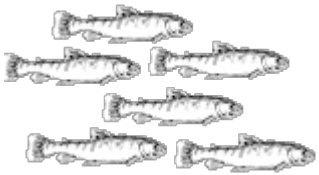
2006-2007 brood years (respectively, 2010 to 2011 returns)

2005 brood year (respectively, 2009 & 2010 returns)

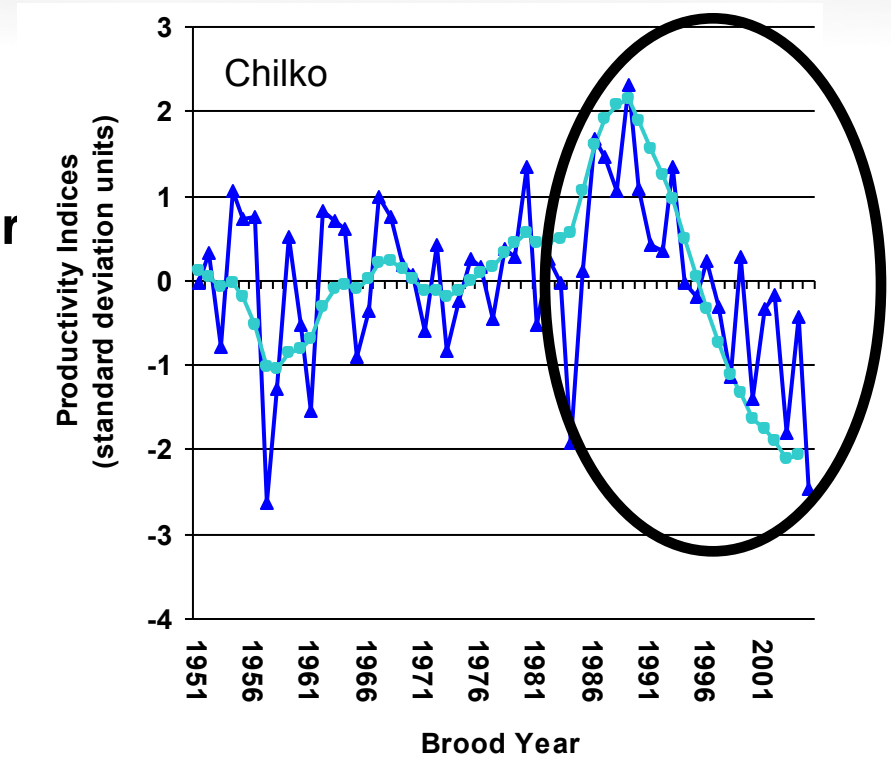
Total Survival

Most Summer Run Stocks and Pitt and Birkenhead

Freshwater

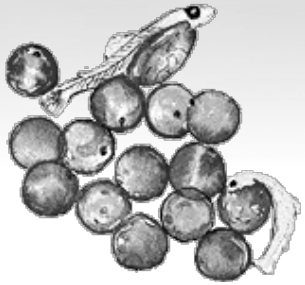


Marine

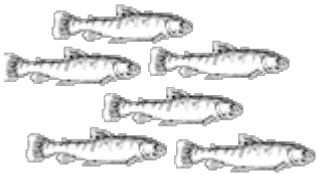


Grant et al. (2010) CSAS Res. Doc. 2010/042

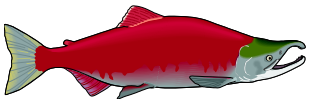
Total Survival



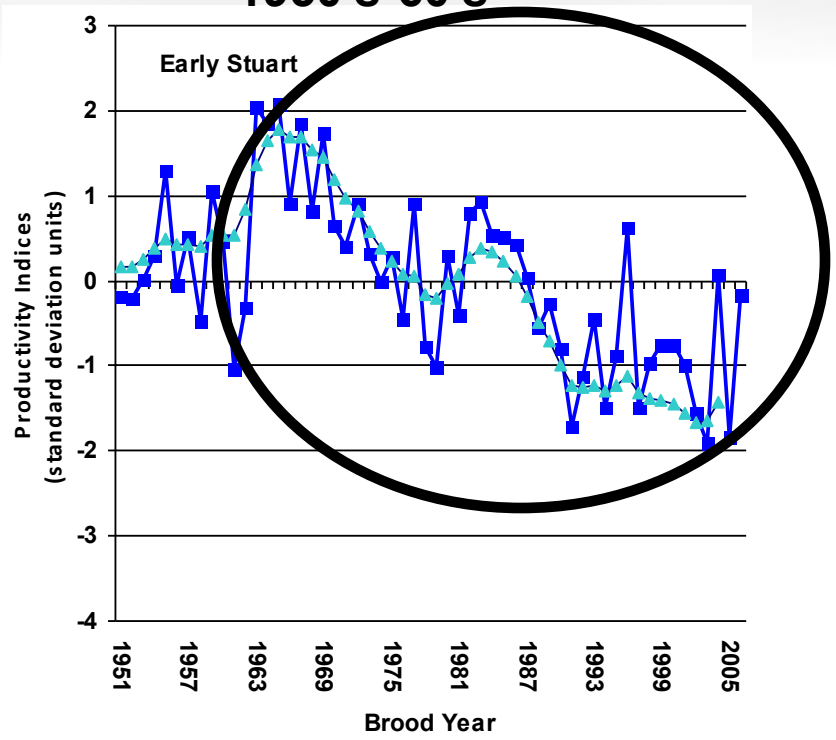
Freshwater



Marine

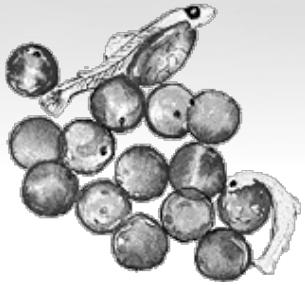


Early Stuart and Most Early Summer Stocks and Portage and Cultus 1950's-60's

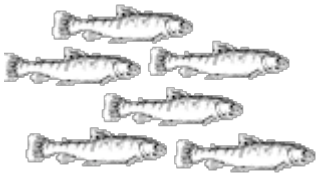


Grant et al. (2010) CSAS Res. Doc. 2010/042

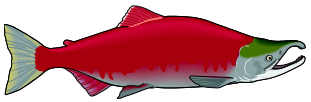
Total Survival



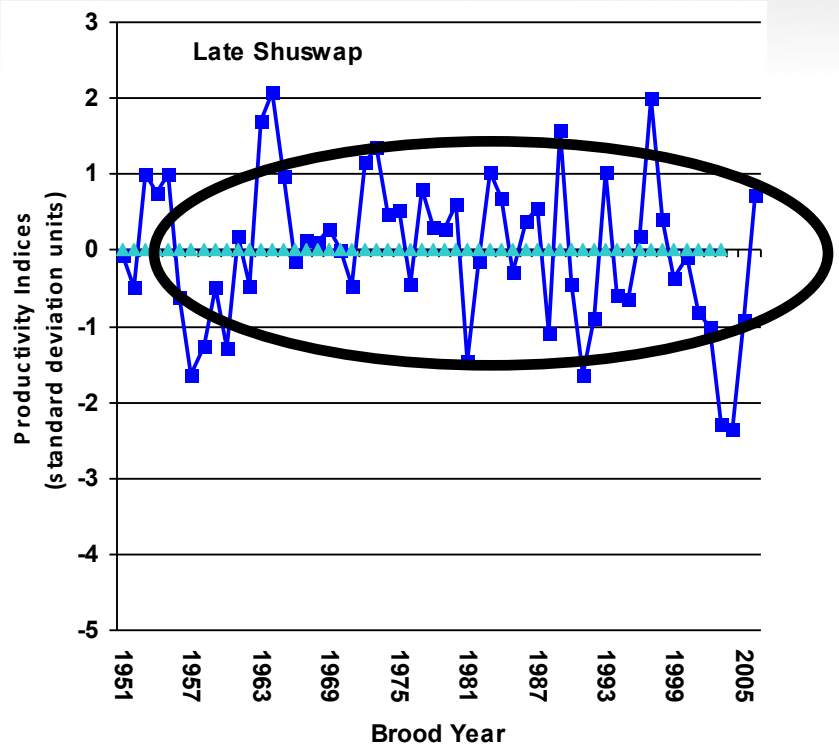
Freshwater



Marine

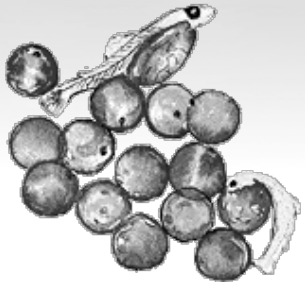


Late Shuswap, Raft & Weaver

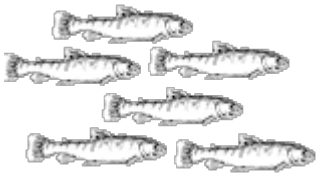


Grant et al. (2010) CSAS Res. Doc. 2010/042

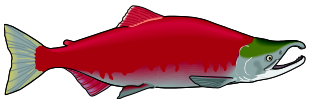
Total Survival



Freshwater

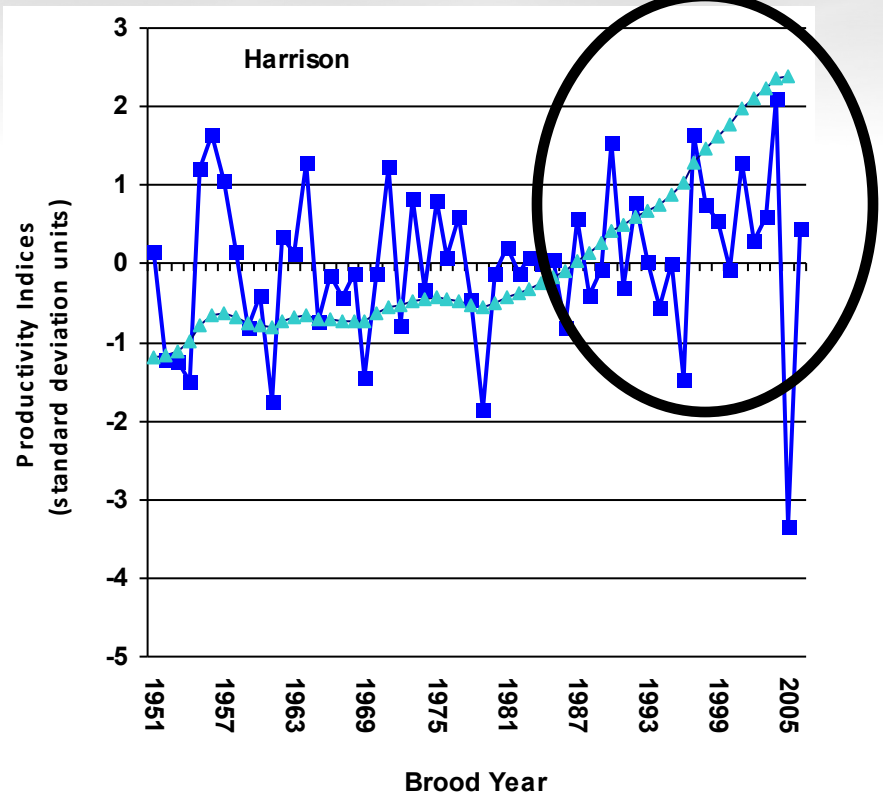


Marine



Harrison

1990's



Grant et al. (2010) CSAS Res. Doc. 2010/042

Forecast Methods

2013 Forecast Methods

- One forecast table: **'Long-term Model Performance'**
  Plus scenario if low productivity of 1997-2005 brood years resume

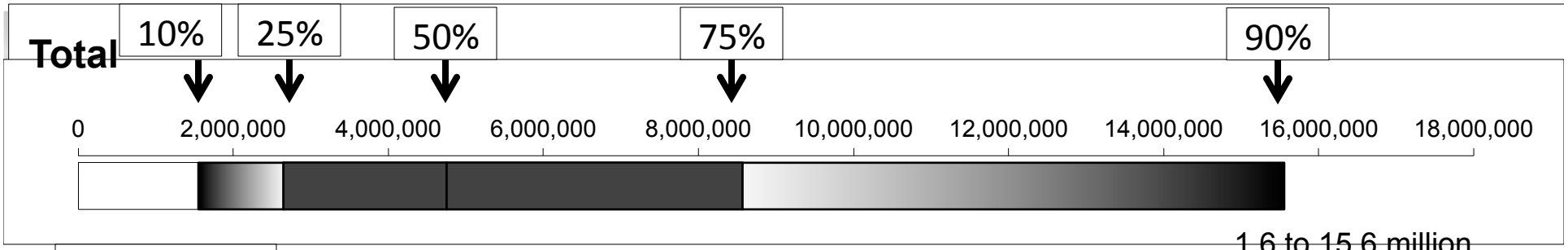
- Evaluated performance over full set of jack-knife forecasts (MacDonald & Grant 2012)

- Models consistent with previous forecasts (except excluded RS4yr, RS8yr, KF)
  (Grant et al. 2010, Grant & MacDonald 2011; MacDonald & Grant 2012)

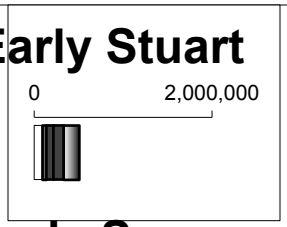
- Data up to the 2005 brood year (RSA process on-going)

- Model selection criteria (generate forecasts for top 3 models):
  - average rank across performance measures (MacDonald & Grant 2012)
  - consistency of rank (MacDonald & Grant 2012)
  - brood year escapement
  - error check

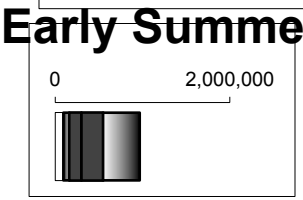
2013 Fraser Sockeye Forecasts



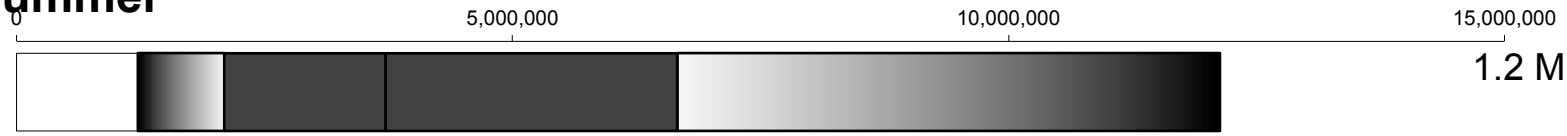
1.6 to 15.6 million



92K to 507 K

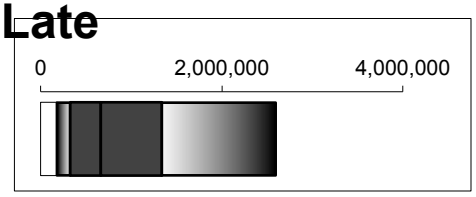


73K to 844K



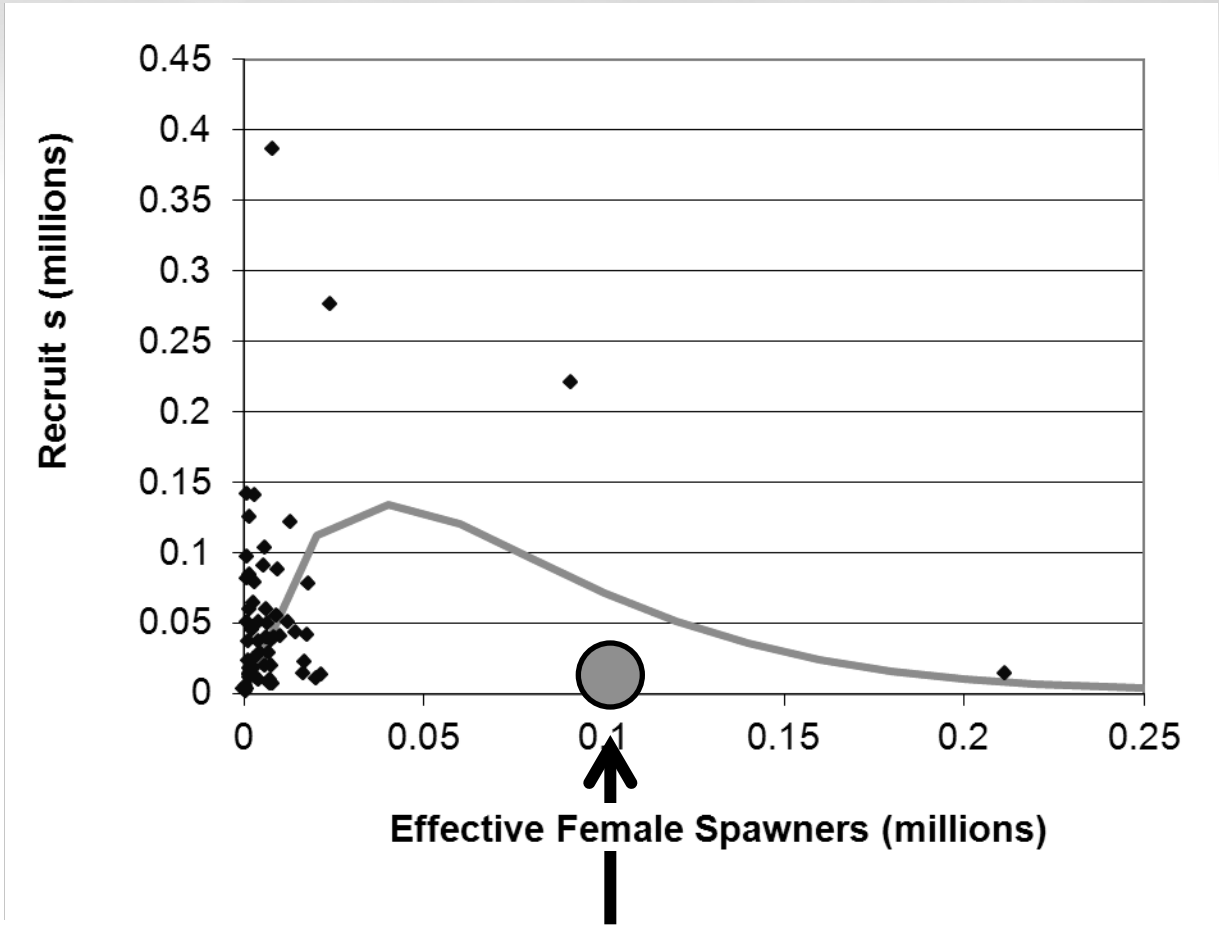
1.2 M to 12.1 M

****Harrison Sockeye???**



167 K to 2.1 M

Harrison Sockeye

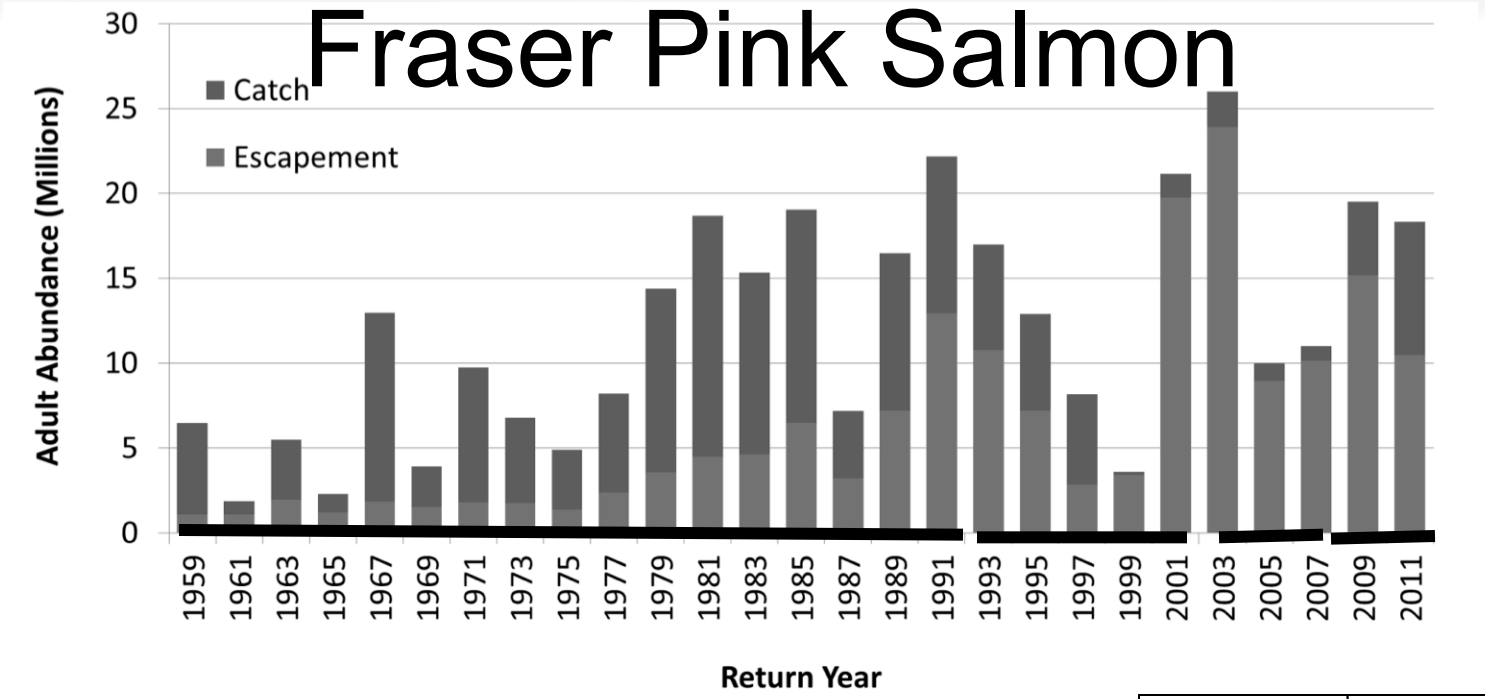


2009 (100K)
(2012 4 yr olds)

2010 (400K)
(2013 3 yr olds)

Fraser Pink Salmon

Fraser Pink Adult Abundance (Escapement + Catch)



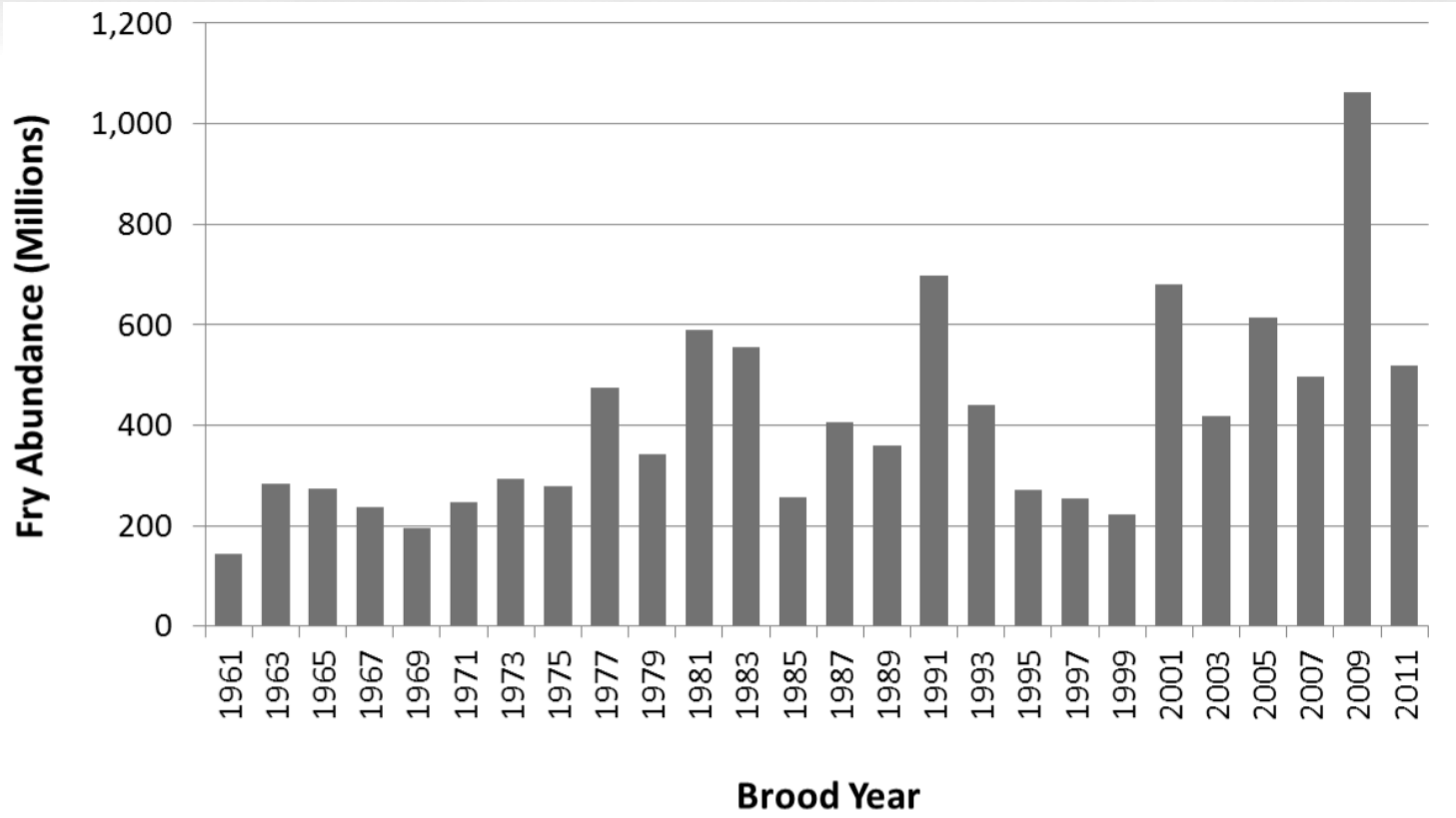
mark recapture or visual programs conducted on individual systems

Fraser River system-wide mark-recapture

test fishery estimates of total return minus catch

Hydrdroacoustic estimate

Fraser Pink Fry Abundance



Fraser Pink Forecast

Mean Run Size	Probability that Return will be at/or Below Specified Run Size [a]				
	10%	25%	50%	75%	90%
12,580,000	4,794,000	6,401,000	8,926,000	12,473,000	17,111,000

- **Top Ranked model:** Power model with sea surface salinity covariate

- **Brood Year (2011) fry abundance was 520,000,000**
  (average: 408,000,000)

- **Recruitment data uncertain:** method changes through time

Fraser Sockeye Conclusions

- due to lower brood year escapements
  (however, there is a 1 in 4 chance returns could be above average)

- The 2013 forecast distribution is higher than the 2012 forecast distribution

- currently understanding survival conditions remains complex for Fraser Sockeye, in contrast to other species that have a narrow marine distribution

- Forecast uncertainty is captured as probability distributions

Fraser Pink Conclusions

- Pink abundances below cycle average (three in four chance)
- Forecast uncertainty is particularly high