

Genetic Analysis of Chum Salmon Harvested in the South Peninsula Fisheries

Report to Alaska Board of Fisheries
February 2004

**Division of Commercial Fisheries
Gene Conservation Laboratory
Alaska Department of Fish and Game
Anchorage, Alaska**



140 E

160 E

180

160 W

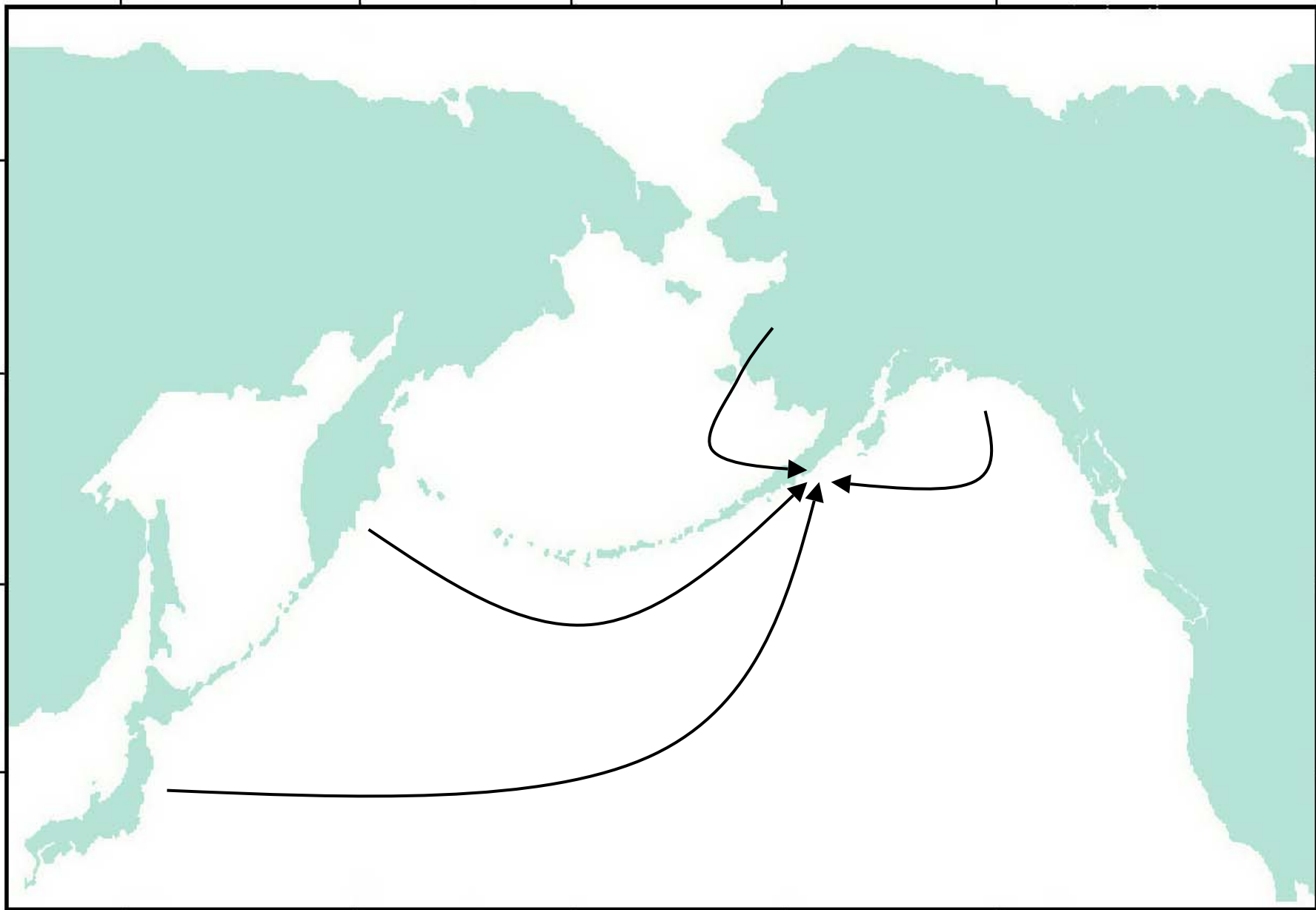
140 W

70 N

60 N

50 N

40 N



Objectives

- Describe genetic diversity within Alaska



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- Develop genetic baseline for Pacific Rim



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- Describe genetic diversity within Alaska
- Develop genetic baseline for Pacific Rim
- **Estimate stock contributions to South Alaska Peninsula fisheries**



Background

- Study duration 1993-1997
- Monitored
 - June fishery 1993-1996
 - Post June fishery 1996-1997
 - June & July test fisheries 1996



Reporting History

Board Report Date	Location	Fishery	Years
Feb 1995	S. Unimak	June	1993-1994
Winter 1998	S. Unimak	June	1995-1996
	Shumagins	June	1994-1996
Spring 2000	Mainland Area	Post June	1996-1997
	Shumagins	Post June	1996-1997
		Test Fisheries	1996-1997

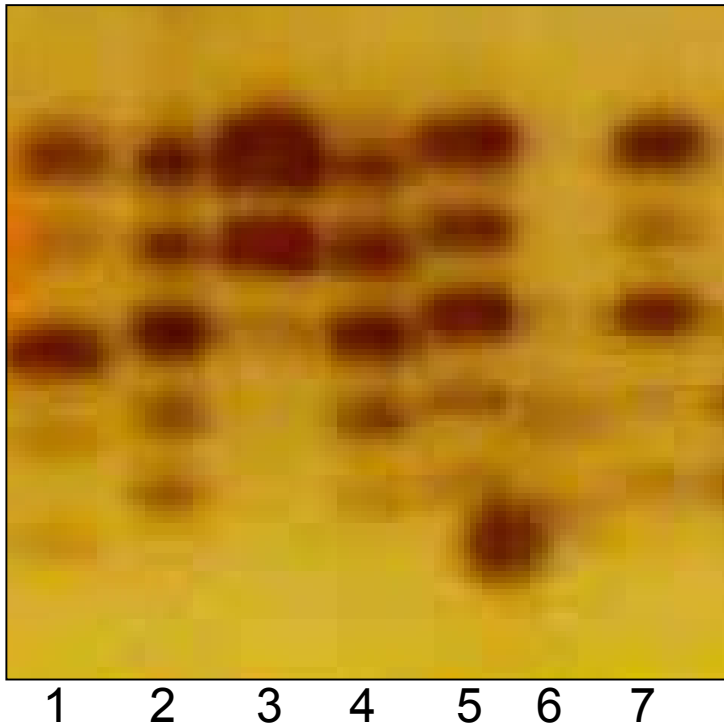
Pertinent Publications

- Seeb, L. W. and P. A. Crane. 1999. Allozymes and mitochondrial DNA discriminate Asian and North American populations of chum salmon in mixed-stock fisheries along the south coast of the Alaska Peninsula. Transactions American Fisheries Society. 128:88-103. ([Link](#))
- Seeb, L. W. and P. A. Crane. 1999. High genetic heterogeneity in chum salmon in Western Alaska, the contact zone between northern and southern lineages. Transactions American Fisheries Society 128:58-87. ([Link](#))
- Seeb, L. W., P. A. Crane, C. M. Kondzela, R. L. Wilmot, S. Urawa, N. V. Varnavskaya and J. E. Seeb. 2004. Migration of Pacific Rim chum salmon on the high seas: insights from genetic data. Environmental Biology of Fishes. In Press.

See <http://www.genetics.cf.adfg.state.ak.us/>



Chum Salmon Genetic Databases



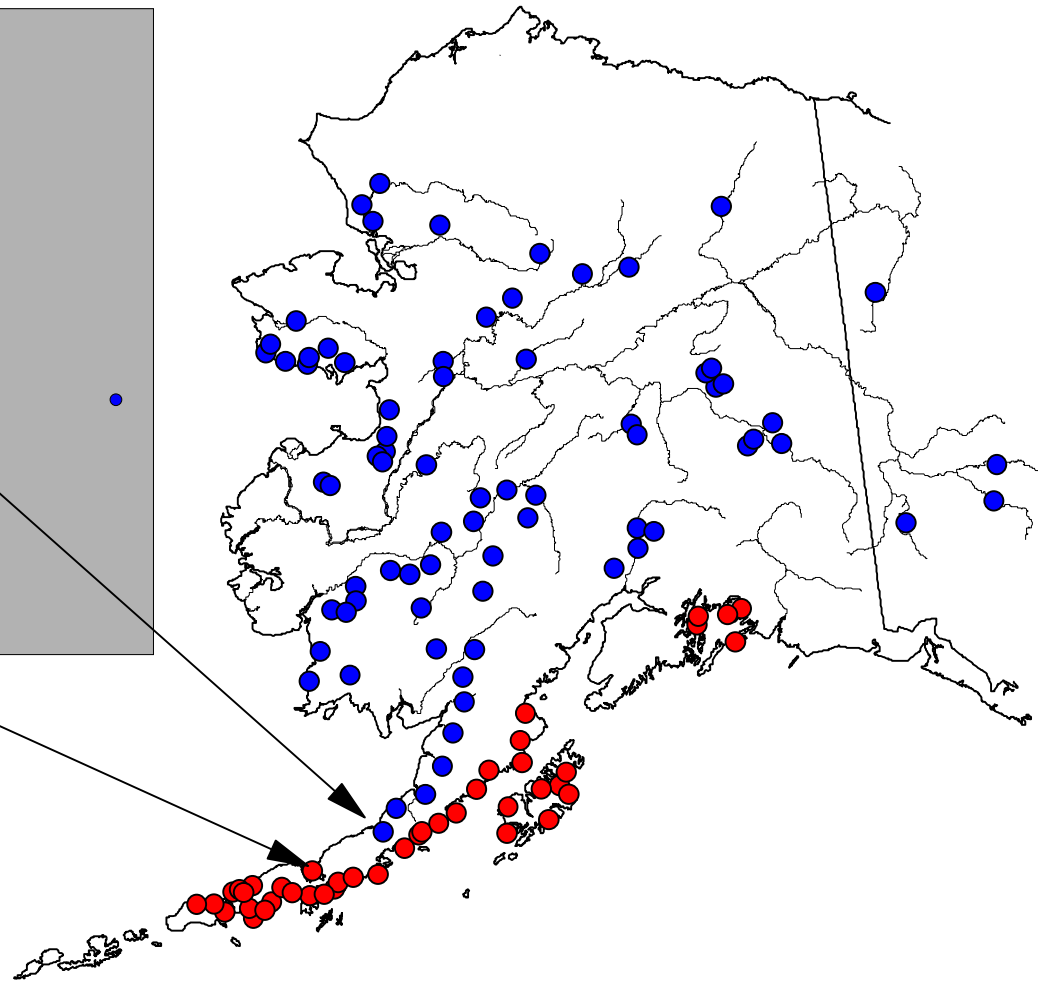
Genotypes from 7 chum salmon

- Ongoing international effort
- Pacific NW to Japan
- 197 populations, 109 “pooled” groups
- 20 allozyme (protein) loci
- Database maintained by ADF&G
- Transition to DNA SNP loci

Two Lineages of Chum Salmon in Western Alaska

Southern

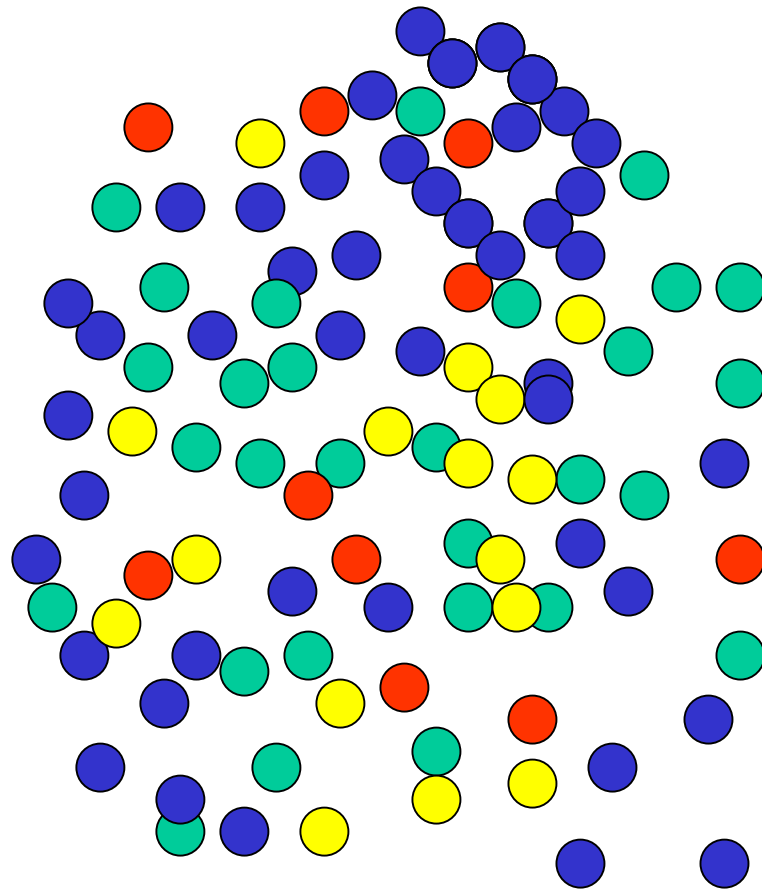
Northern



$F_{st}=0.12, P<0.001$

9% of observed variation
due to between-lineage
component

Mixture analysis



Fishery Sample

*Maximum
Likelihood
Estimation*

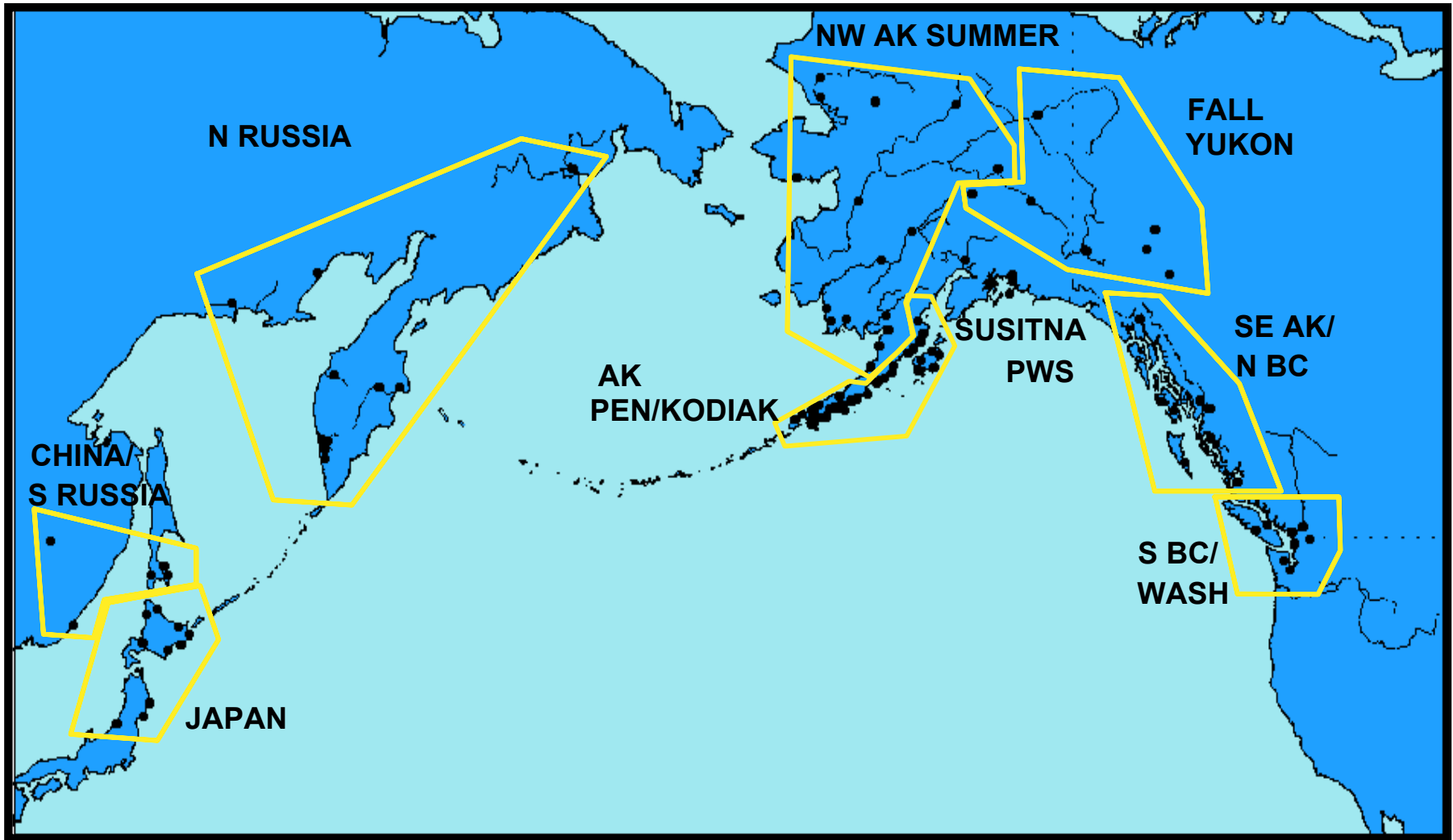


● **35%**

● **35%**

● **20%**

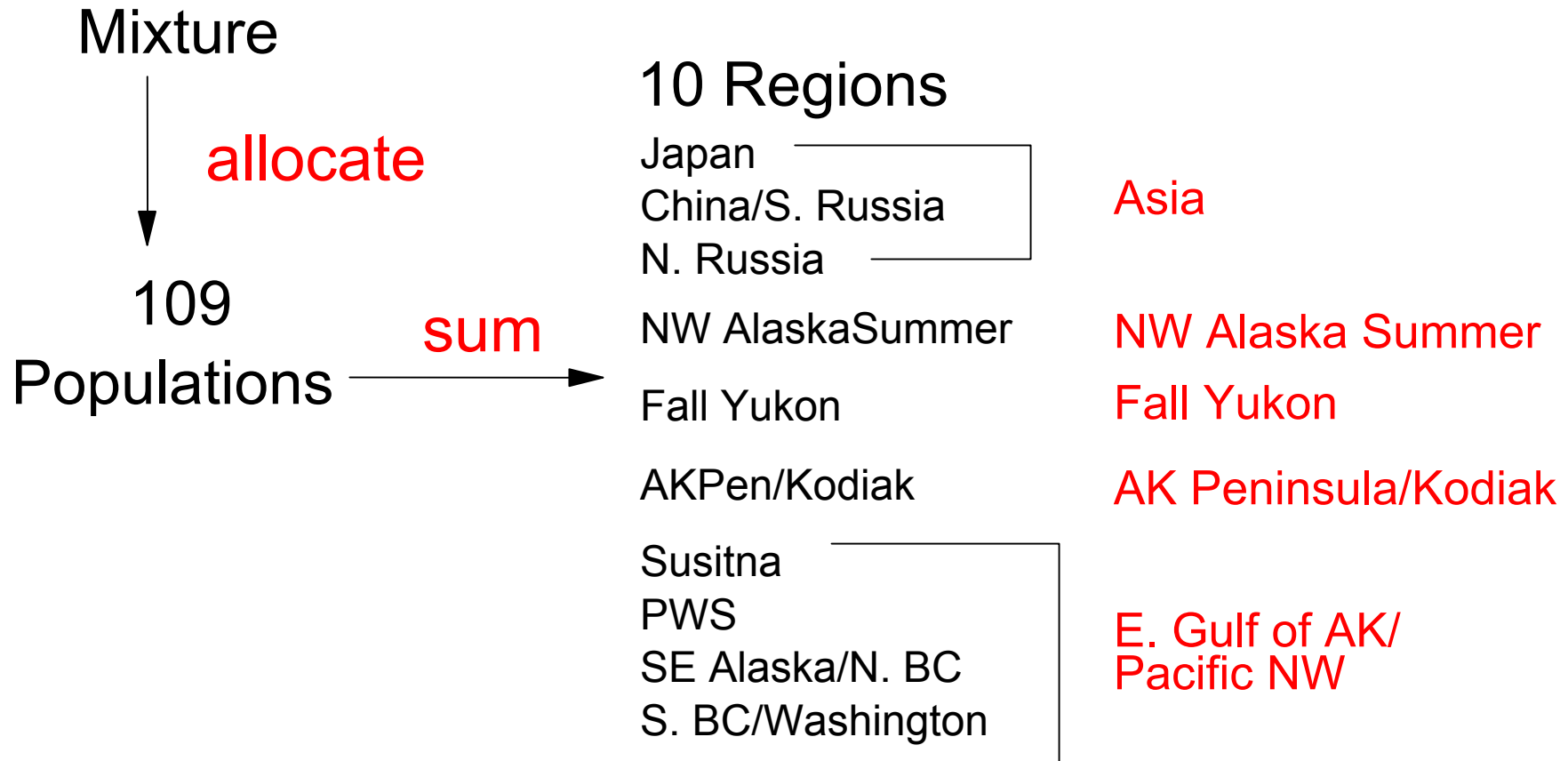
● **10%**



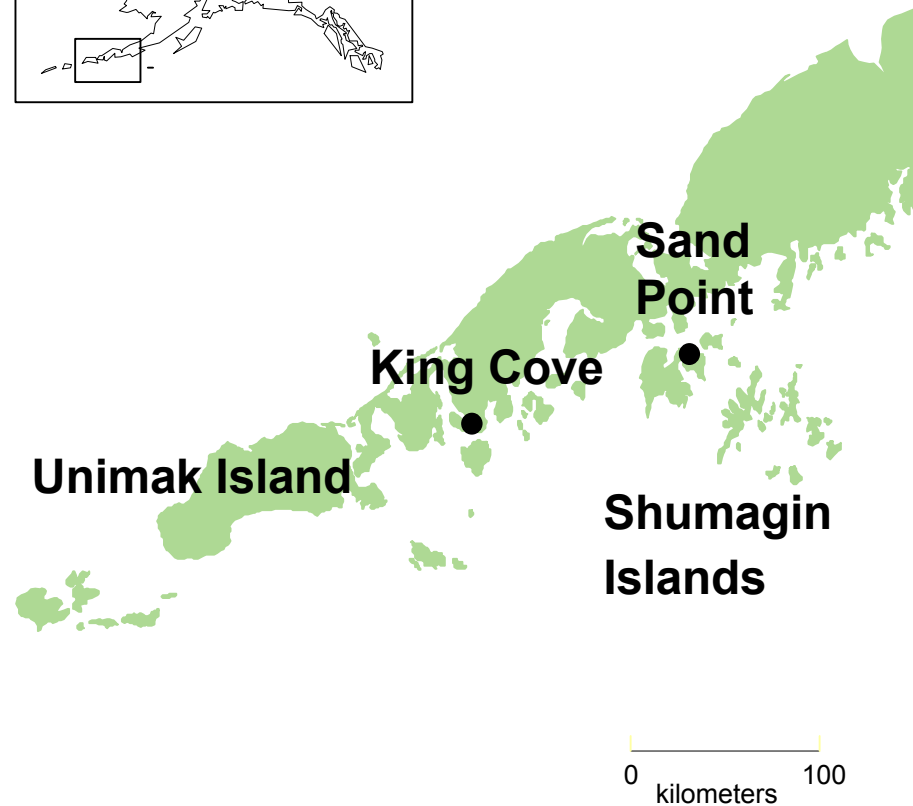
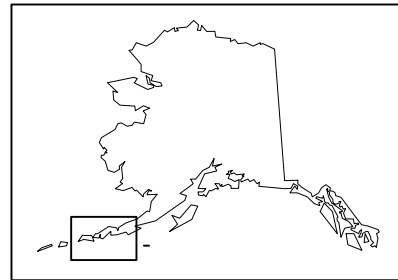
Reporting Groups 1997 Baseline

Mixture analysis

20 Markers 1997 Baseline

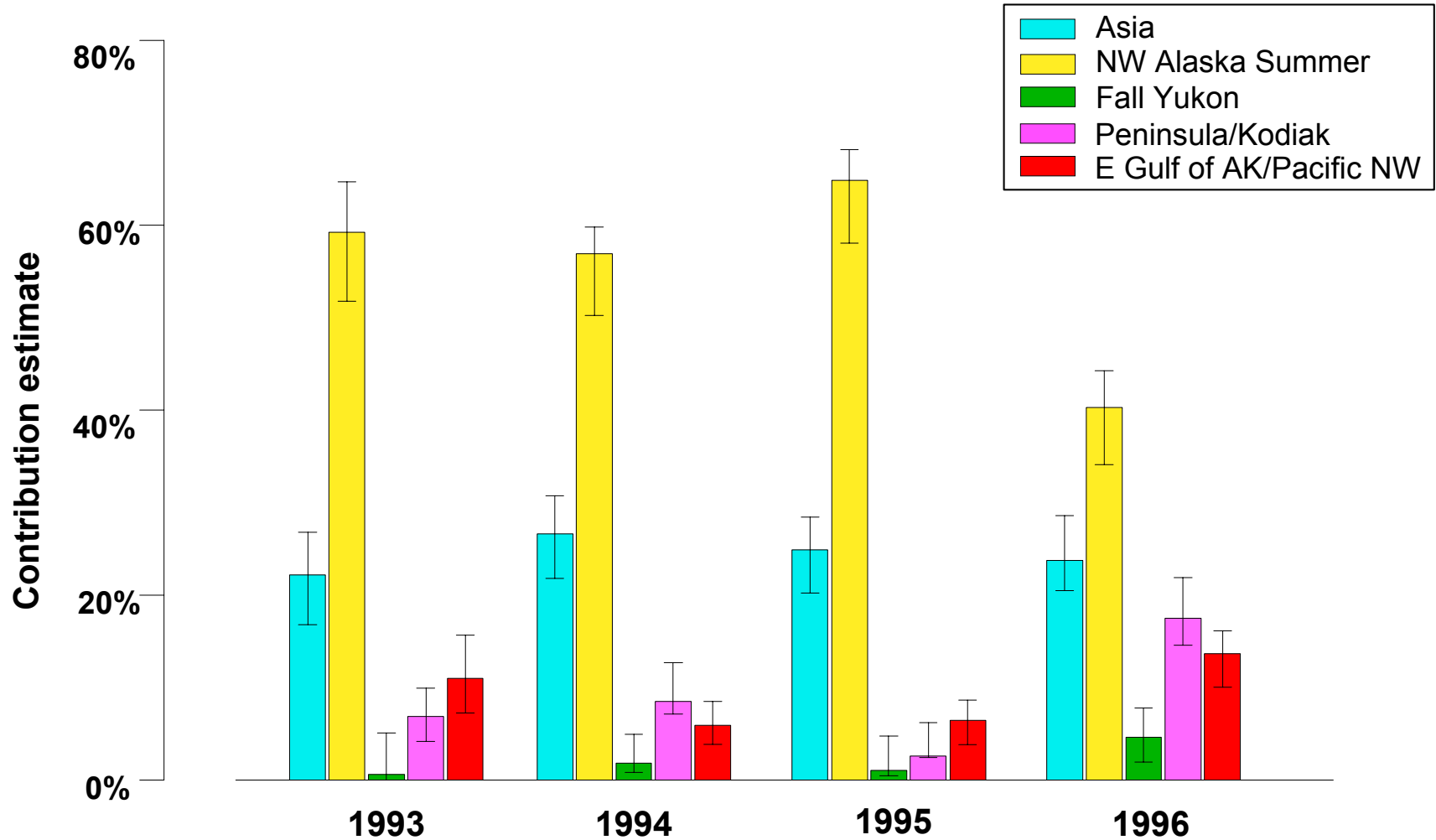


Fishery Sampling



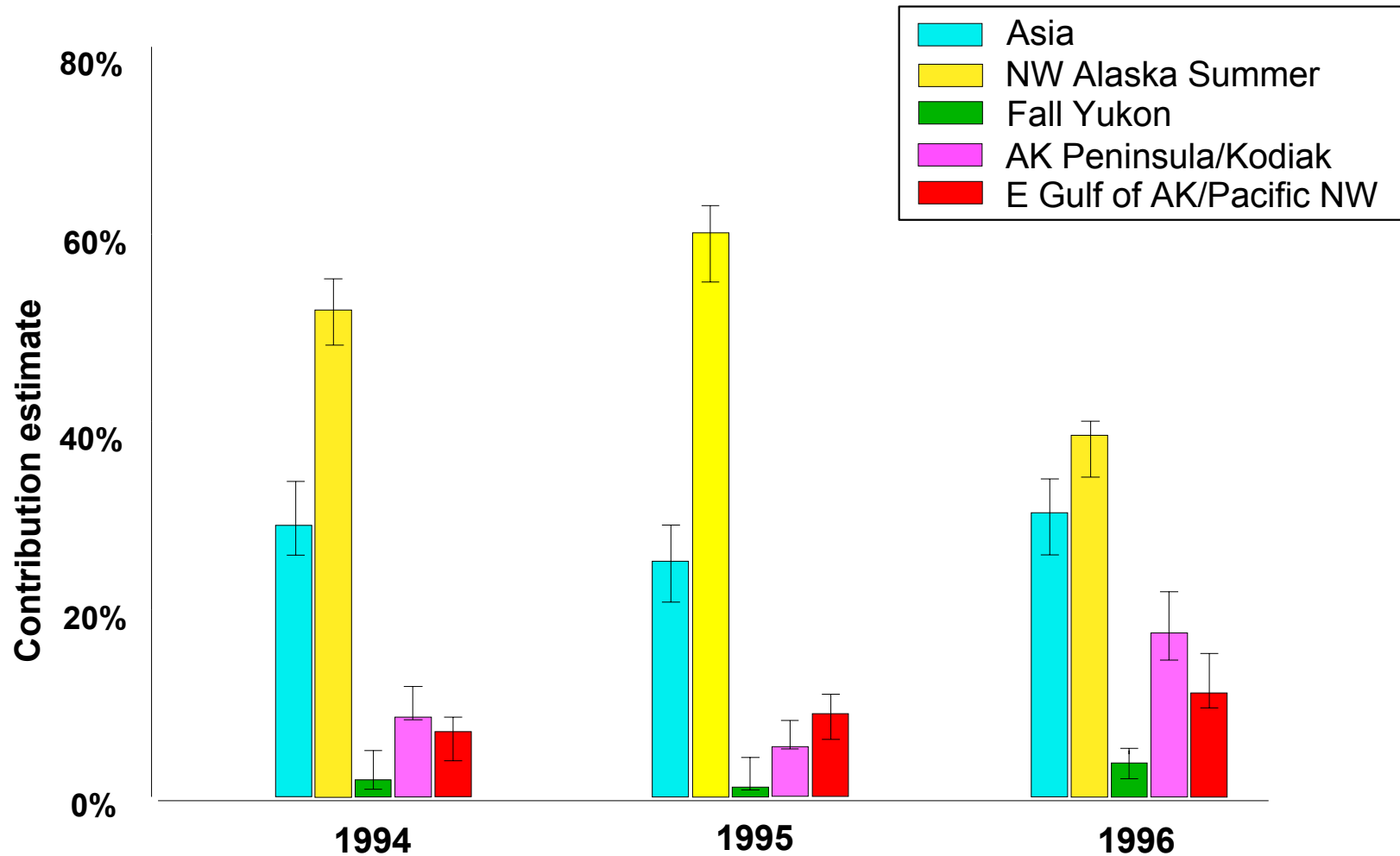
June Fishery

South Unimak

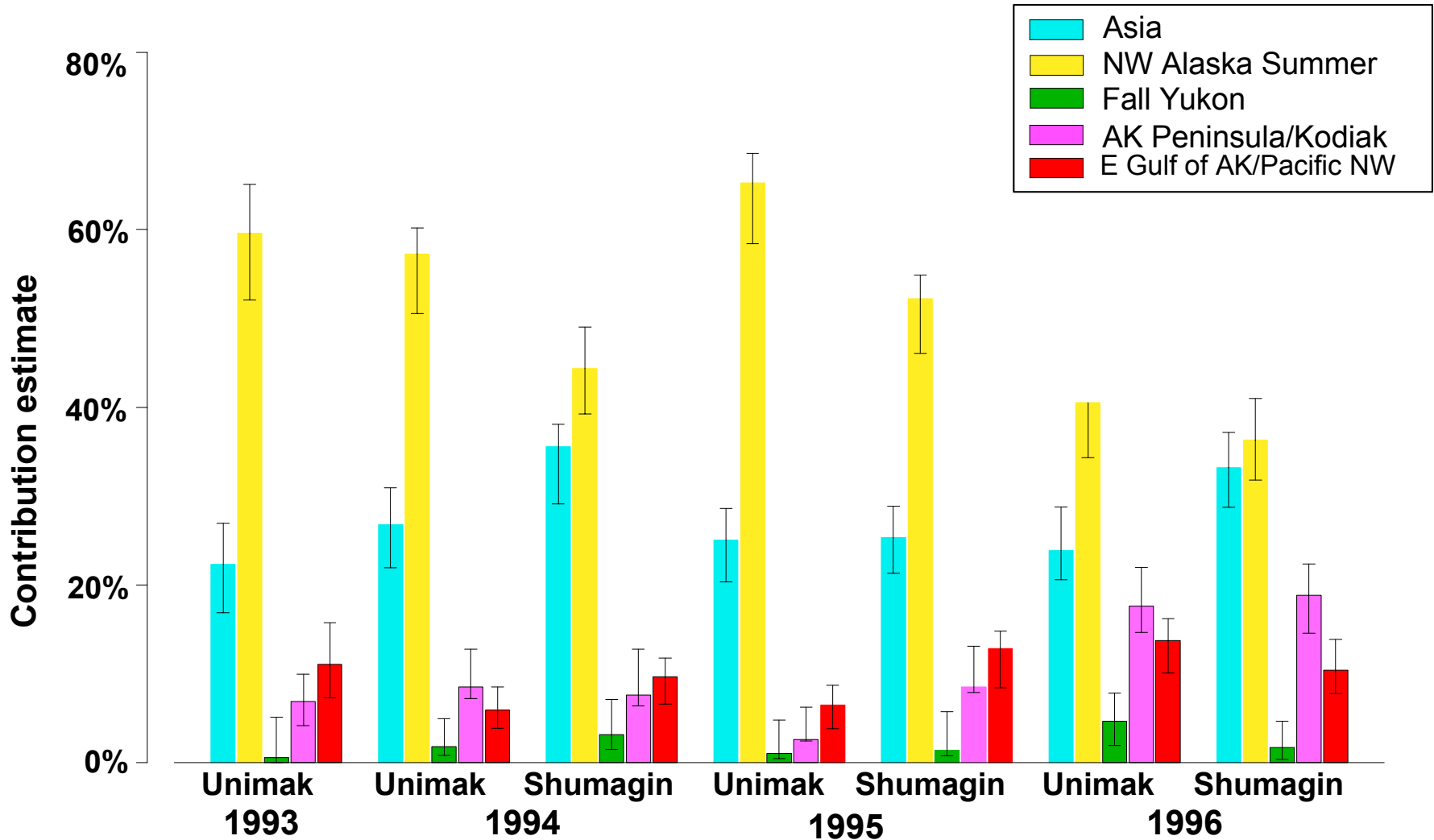


June Fishery

Shumagin Islands



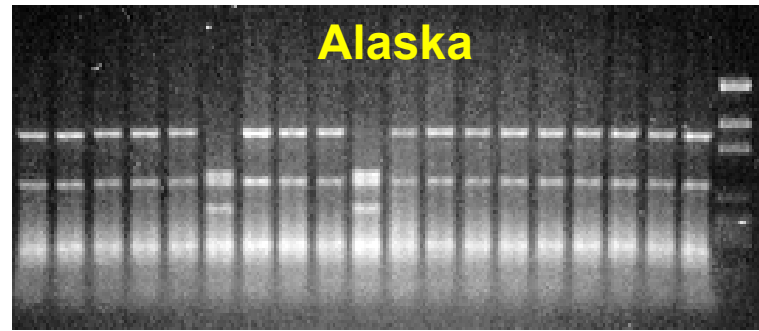
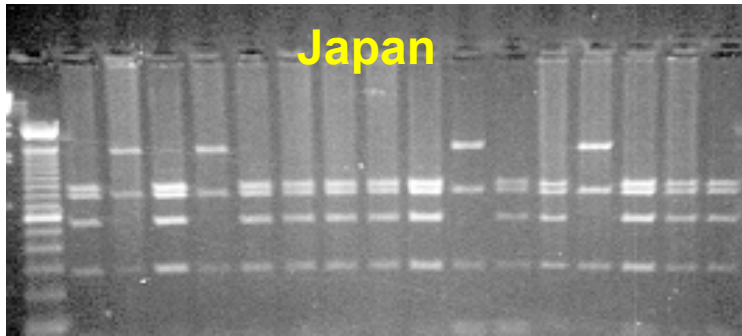
Annual Estimates for South Unimak and Shumagin Islands June Fisheries



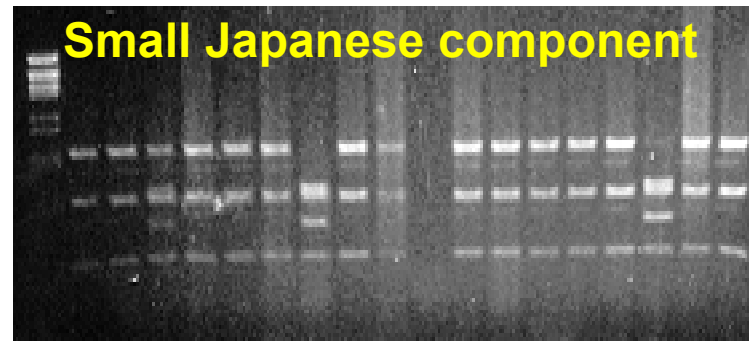
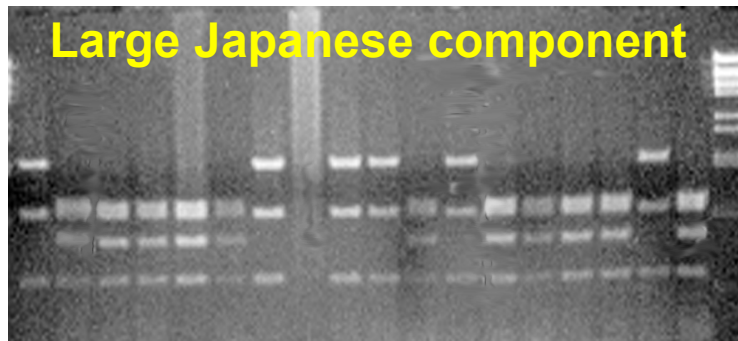
Single Nucleotide Polymorphism

SNP markers distinguish Japanese stocks

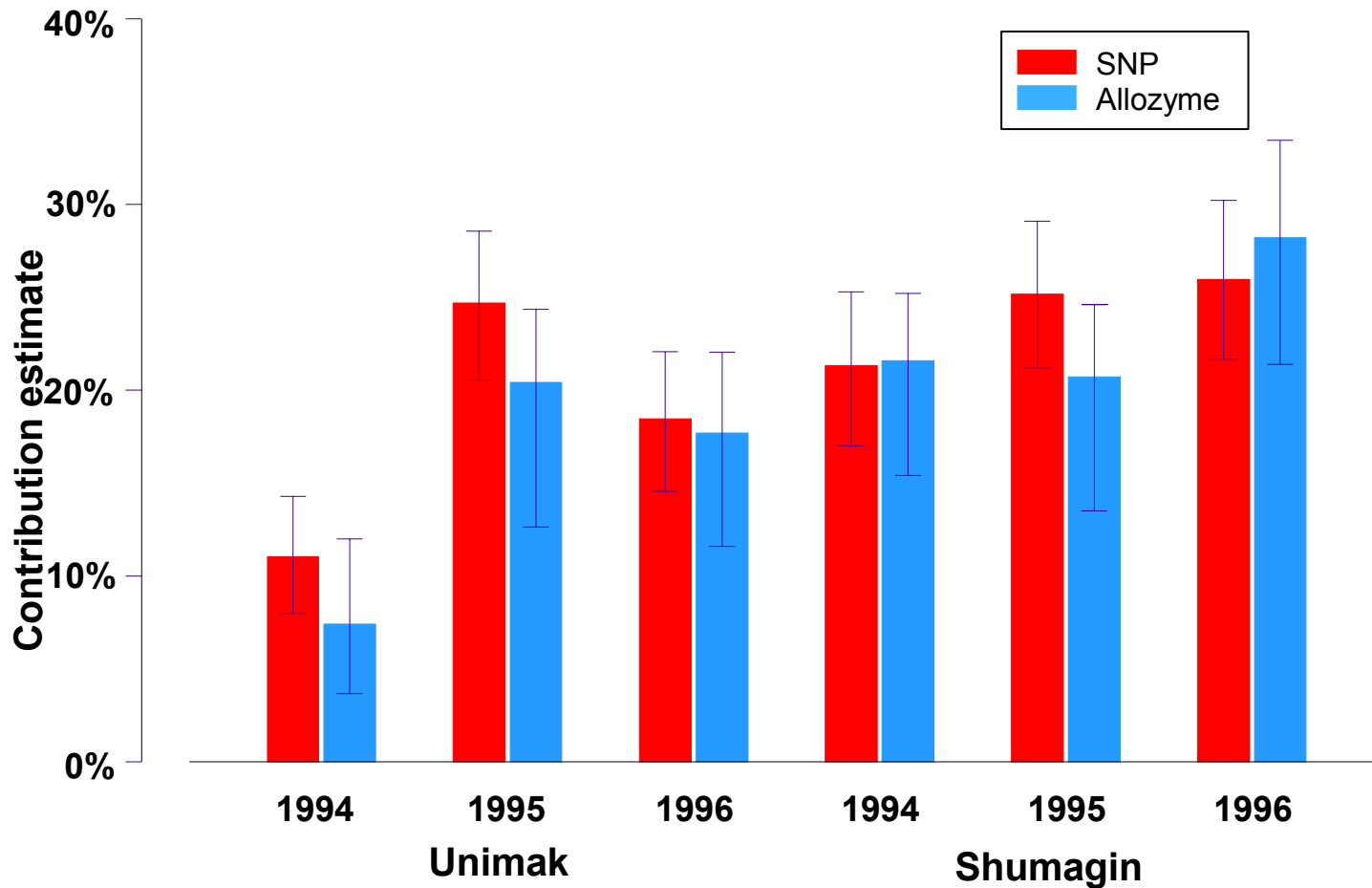
Baselines



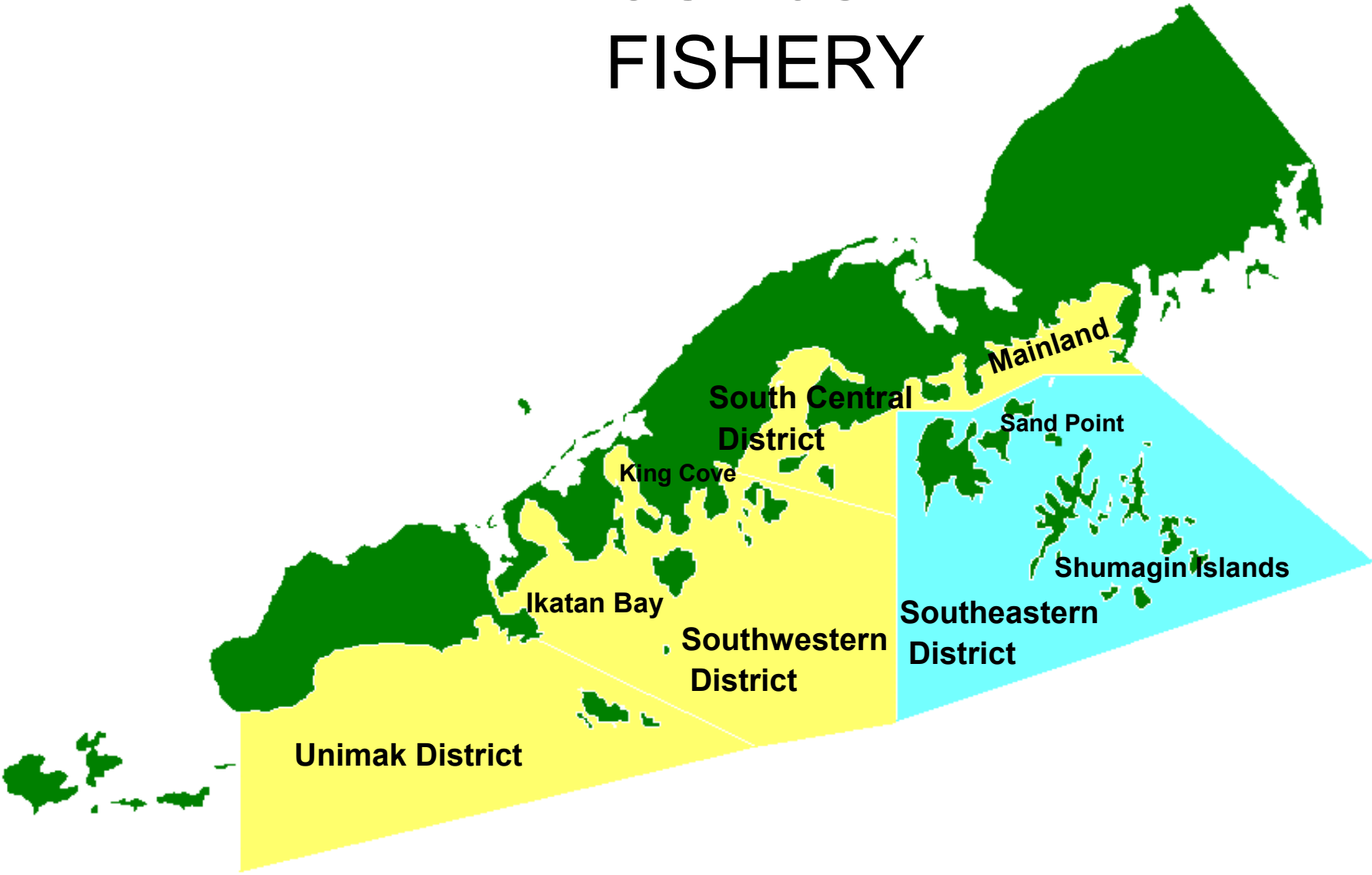
Mixed fishery samples



Estimates for Japanese contribution to Area M fisheries, June 21-25

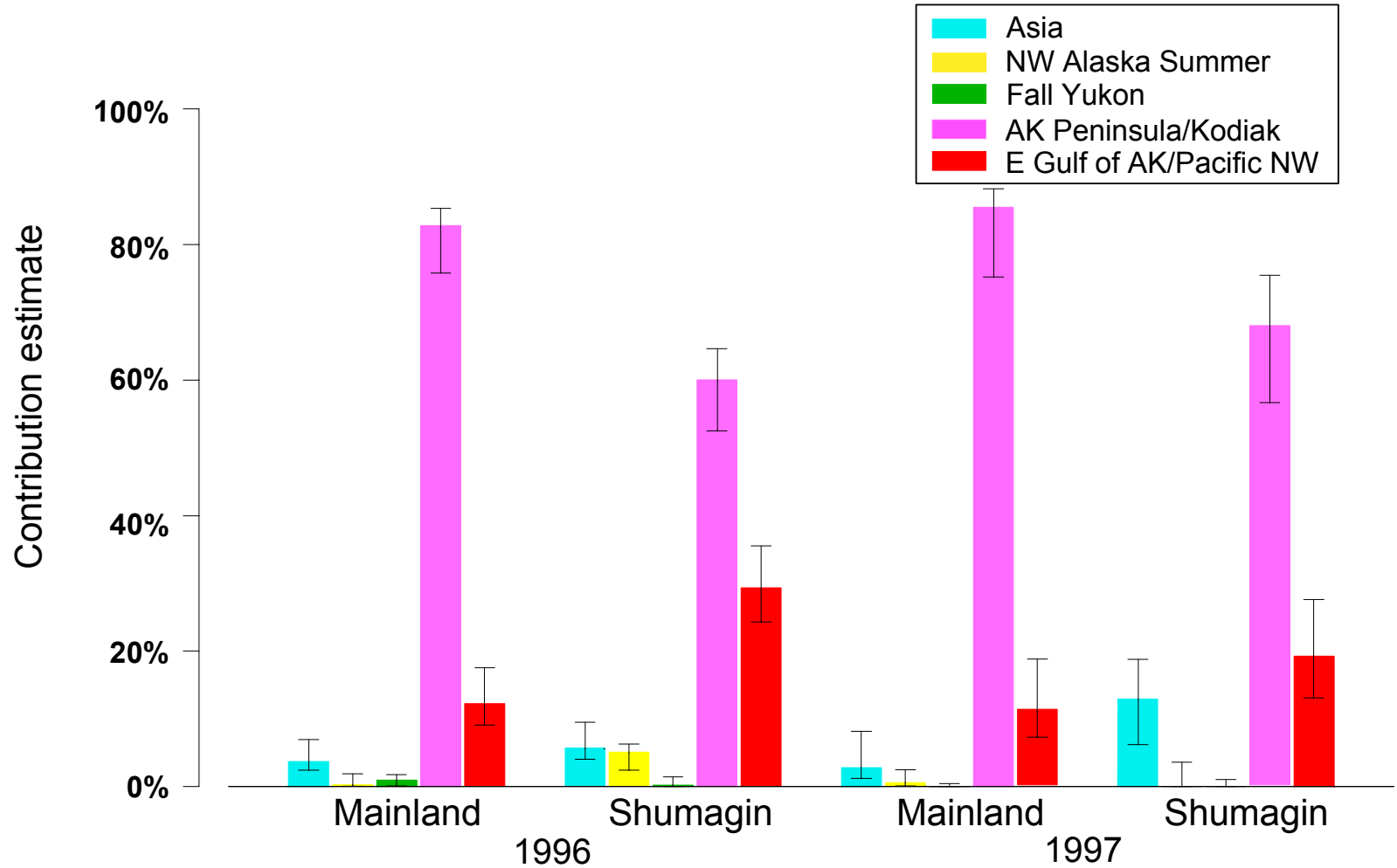


POST-JUNE FISHERY

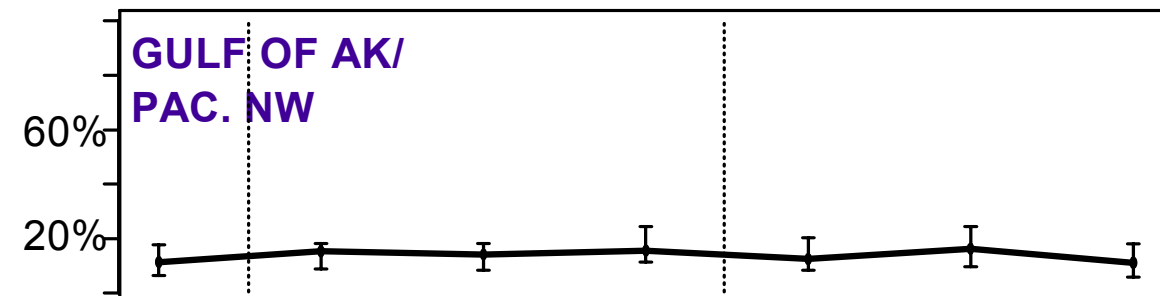
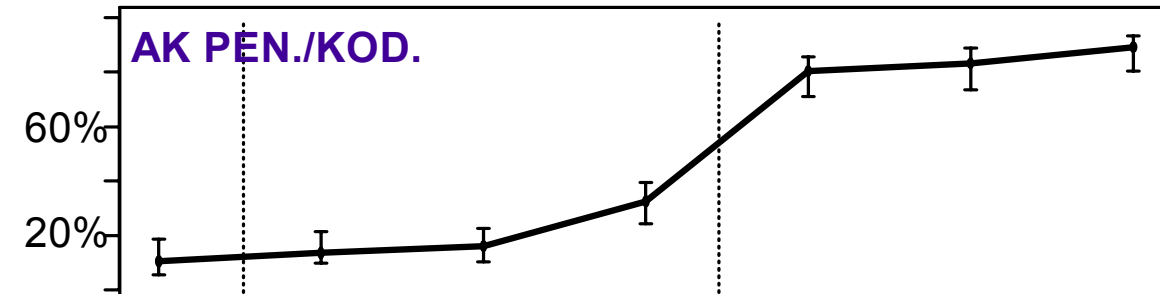
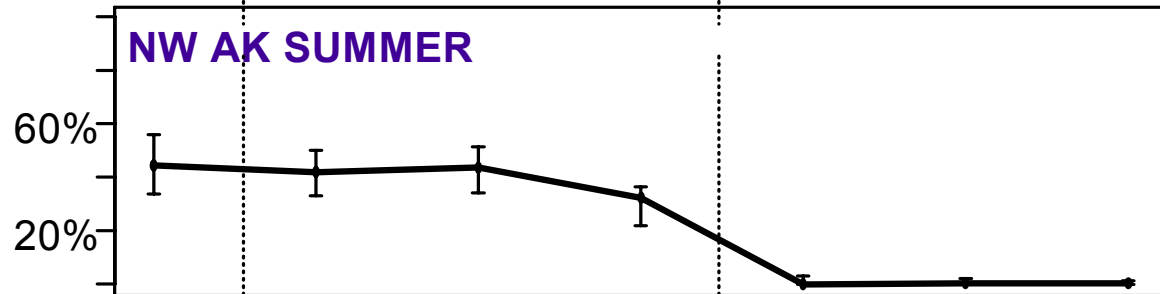
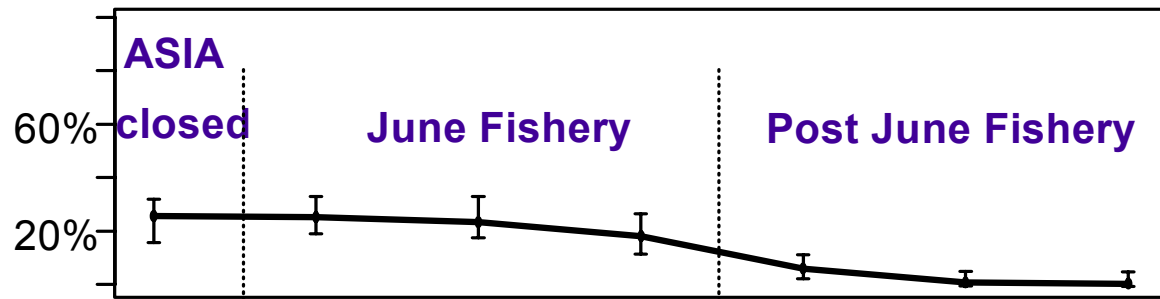


Post-June Fishery

Mainland and Shumagin Islands



Mainland Area, 1996



6/12-13

6/15-20

6/21-25

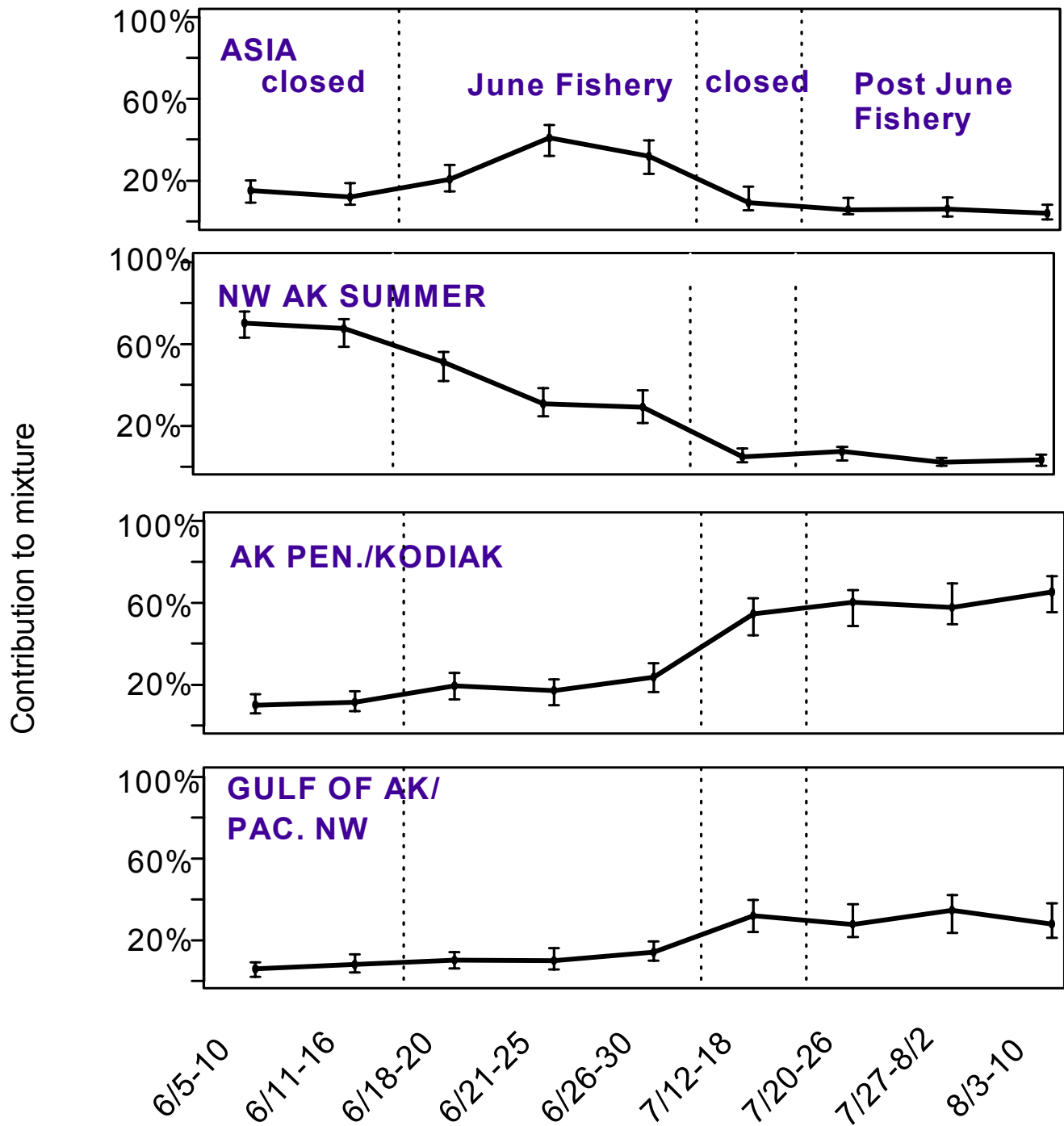
6/26-30

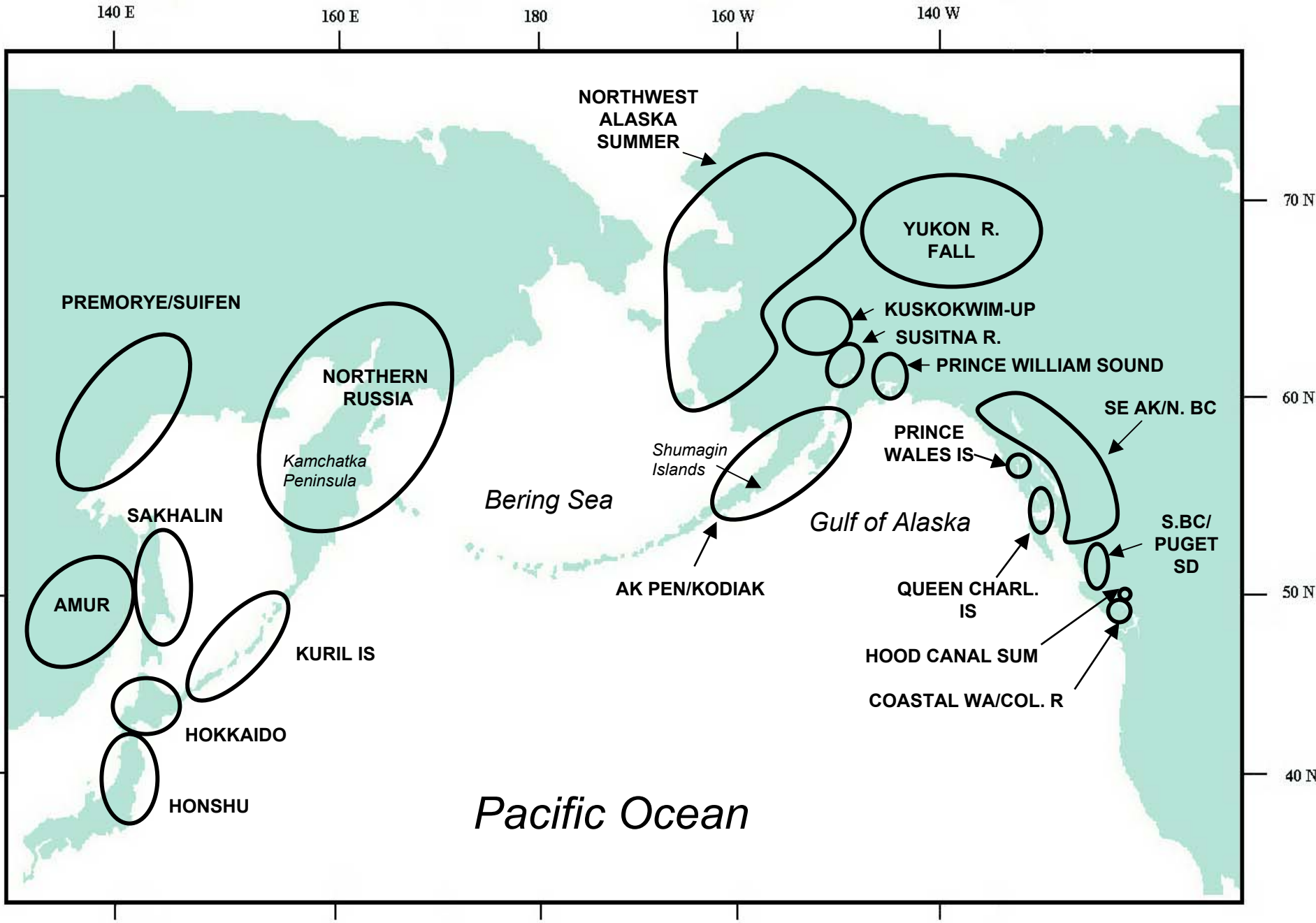
7/20-26

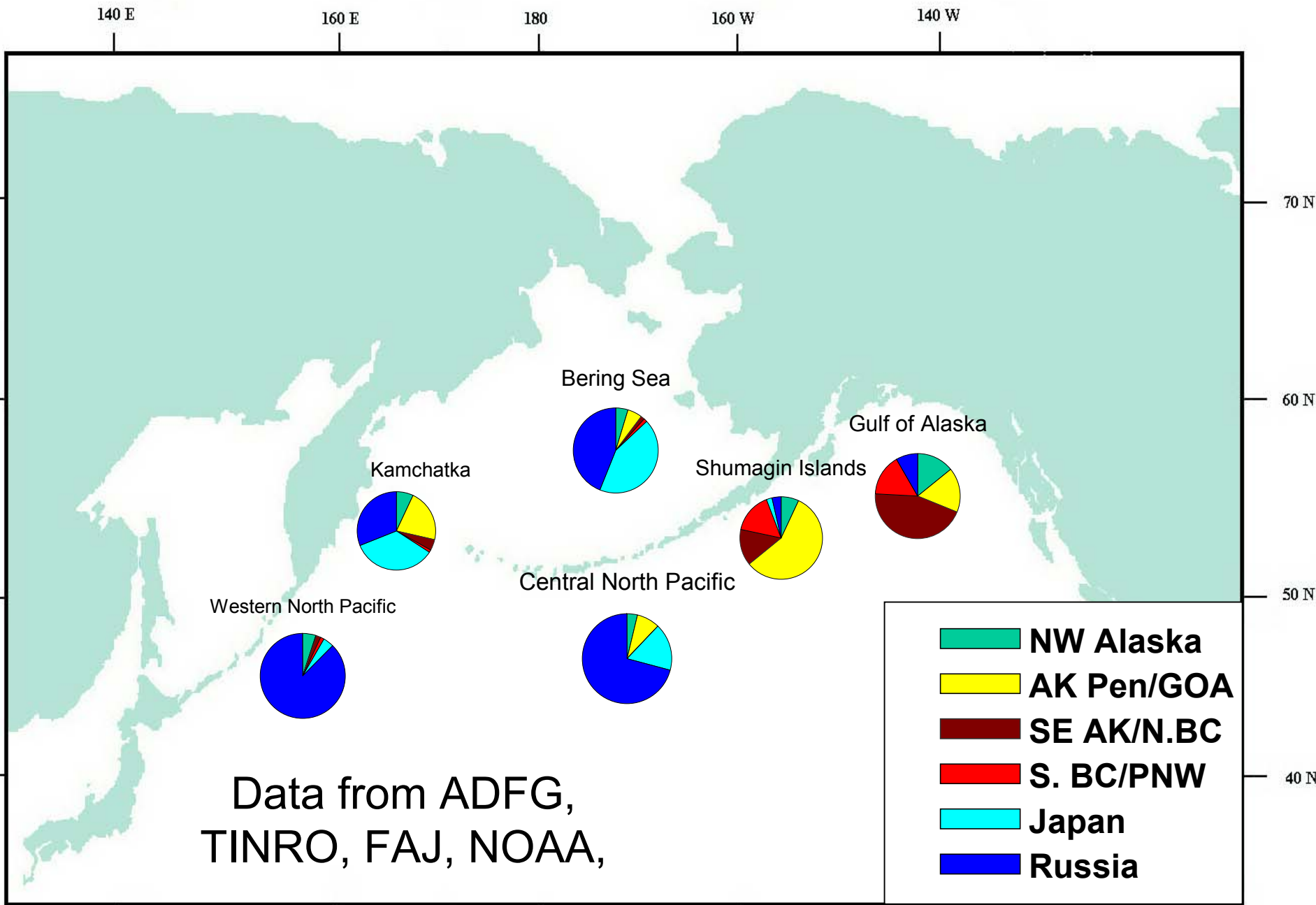
7/27-8/2

8/3-10

Shumagin Islands, 1996







•Seeb, L. W., P. A. Crane, C. M. Kondzela, R. L. Wilmot, S. Urawa, N. V. Varnavskaya and J. E. Seeb. 2004. Migration of Pacific Rim chum salmon on the high seas: insights from genetic data. *Environmental Biology of Fishes*. In Press.

Acknowledgements

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