

Potential impacts of Atlantic salmon aquaculture on native salmon in Puget Sound

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NOAA Technical Memorandum NMFS- NMFSC-53

“Represents the *best available science* regarding the effects of net-pens on listed salmon and will stand as the *primary resource document* for NMFS Northwest Region ESA determinations.”

The Atlantic salmon



Potential impact of farmed and hatchery salmon on wild forage

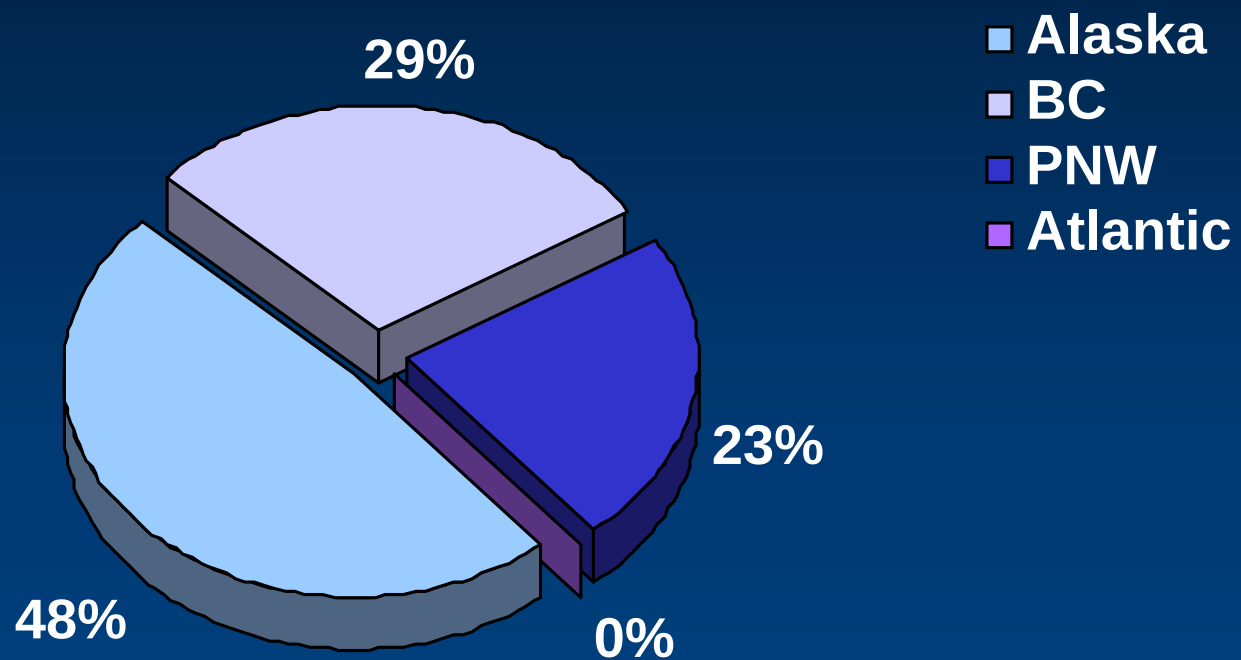
	Production (mt)	Conversion ratio	Forage (mt)
Escaped Atlantics			2.0
Farms	93,000	3:1	279,000
Hatcheries	136,400	5:1	682,000
		10:1	1,364,000

(2000 data)

Escaped Atlantic salmon equivalent



Salmon releases and escapes



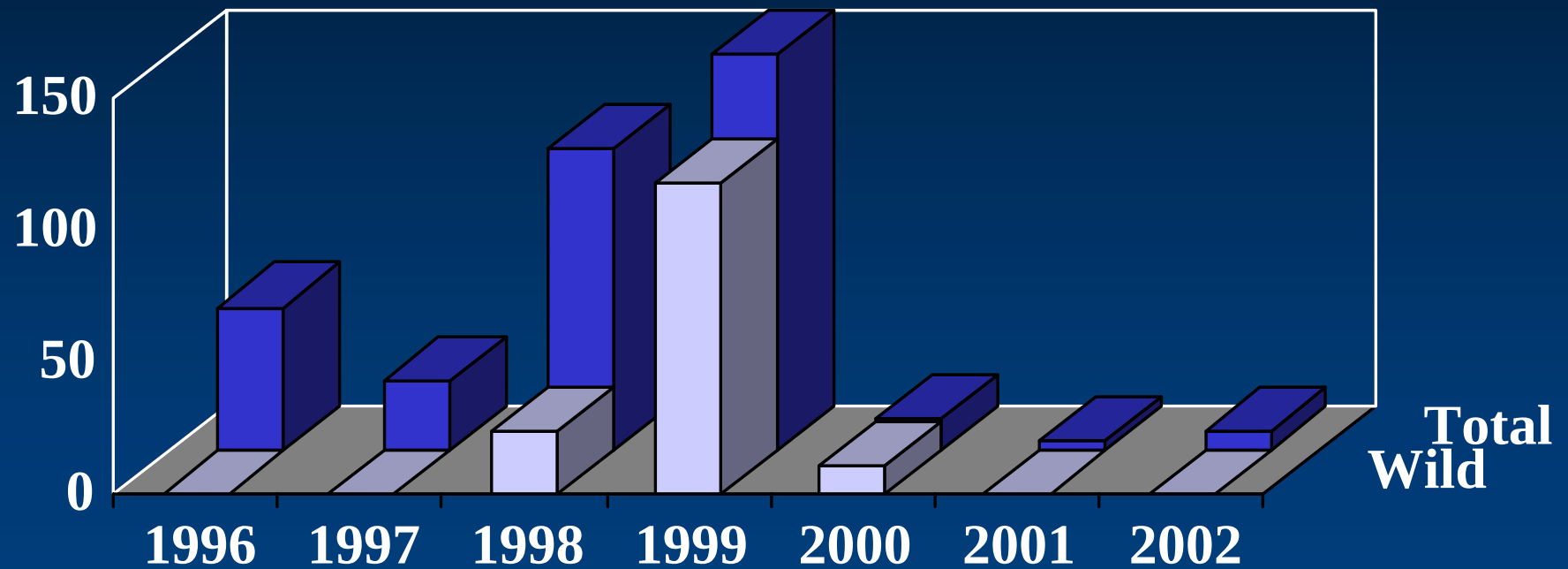
West coast hatchery salmon equivalent



Potential effects of El Niño on size (mm FL) of S. Oregon coho salmon



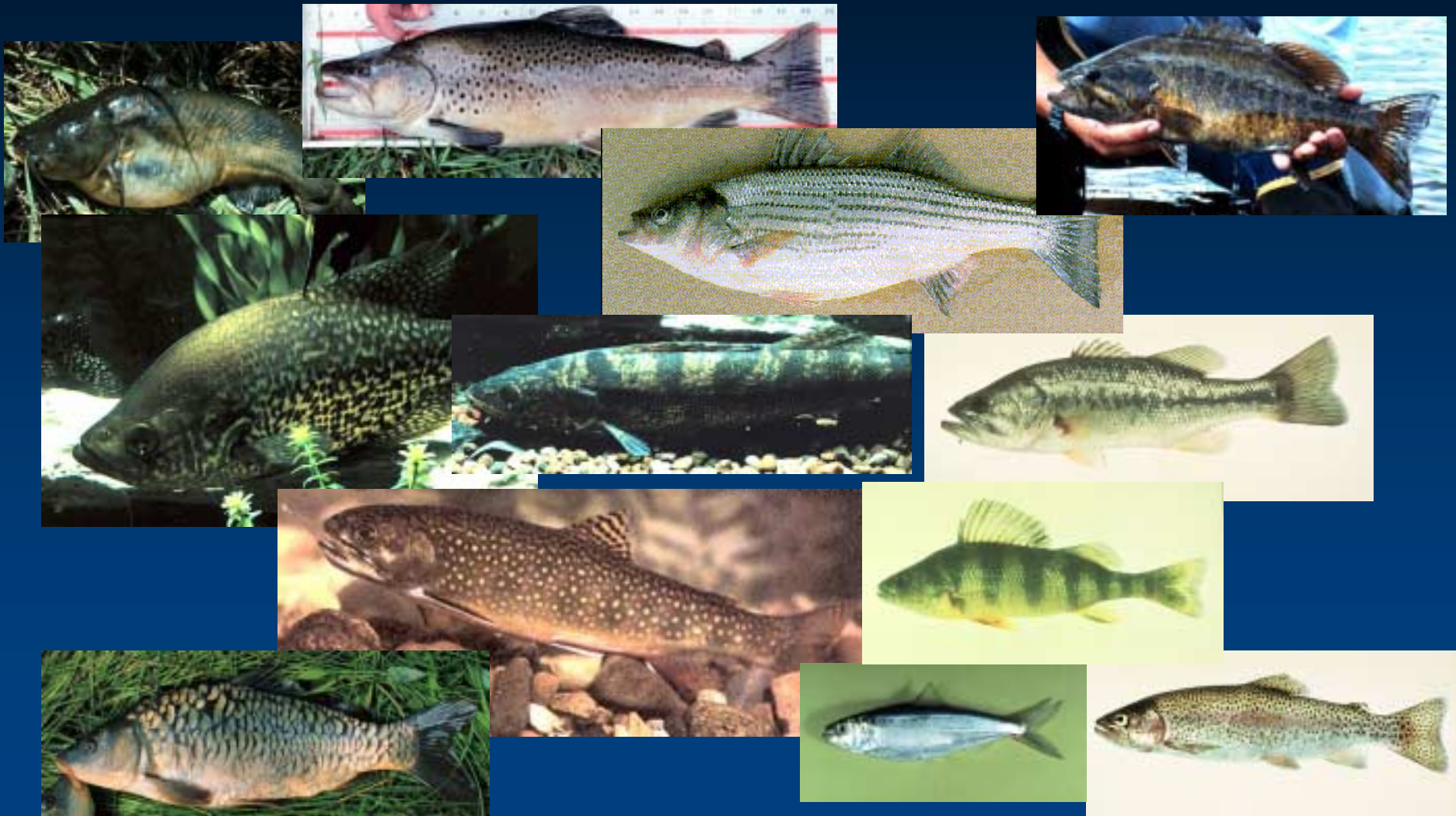
Atlantic salmon watch 1996 - 2002



Atlantic salmon watch 2001

<u>Species</u>	<u>Juveniles</u>	<u>Adults</u>
Atlantic salmon	0	2
Cutthroat trout	4,528	638
Steelhead trout	142,002	627
Rainbow trout	2,270	82
Chinook salmon	950	4,623
Coho salmon	160,666	14,335
Chum salmon	0	3,115
Pink salmon	0	18,892
Sockeye salmon	6	34,155

Non-native species established in Washington during the 19th century



Success of non-native stocks in the Deschutes River

- Chinook salmon

- 1953-2002: 225 million fish planted from 18 hatcheries
- Current “wild” runs depends on hatchery production

- Coho salmon

- 1980-2002: no hatchery fish planted
- Current wild run of 3,320 adults per year

- Steelhead

- 1950-2002: 1.25 million fish planted from 2 hatcheries
- Current “wild” run has characteristics of supplemented artificial population

Disease incidence at west coast salmon hatcheries

Disease	Incidence	Disease	Incidence
IHN	20.2	VHS	0.2
BKD	50.3	Furunculosis	17.8
ERM	15.0	CWD	36.8
CS	18.8	Ich.	20.8

(PNWFHPC 1993. Includes salmon hatcheries in AK, CA, ID, MT, OR WA, USFWS, NWIFC)

Escaped Atlantic salmon in Chile

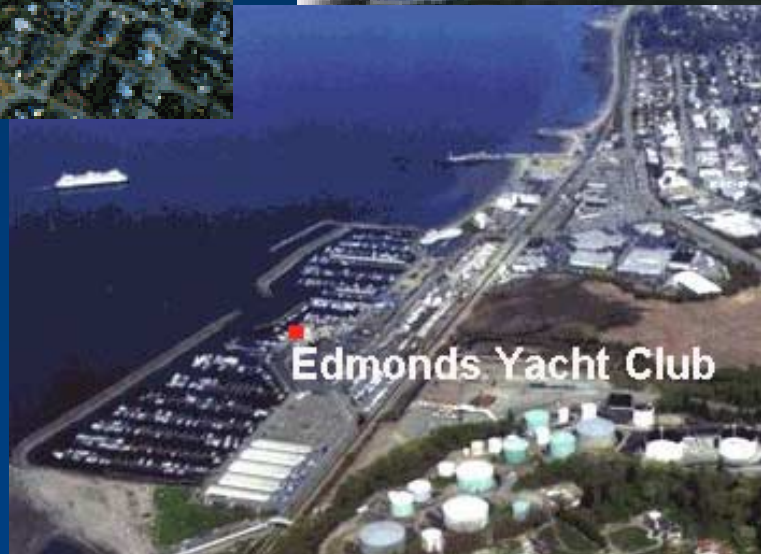
(Soto et al. 2001)

- Greatest fidelity to farm sites
- Easily caught
- Do poorly feeding on their own
- Low growth rate after escape
- Growth due to eating feed pellets
- Less likely to reproduce than escaped coho or rainbow trout.

B.C. fish farm



Puget Sound Marinas



Springer versus the Atlantic salmon



Fish farm in Washington



Risk conclusions for Atlantic salmon farming in Puget Sound

- Low risk that Atlantic salmon will increase disease in wild salmon
- Low risk that Atlantic salmon will compete with wild salmon for food
- Low risk that Atlantic salmon will colonize habitats
- Little risk that Atlantic salmon will prey on wild salmon