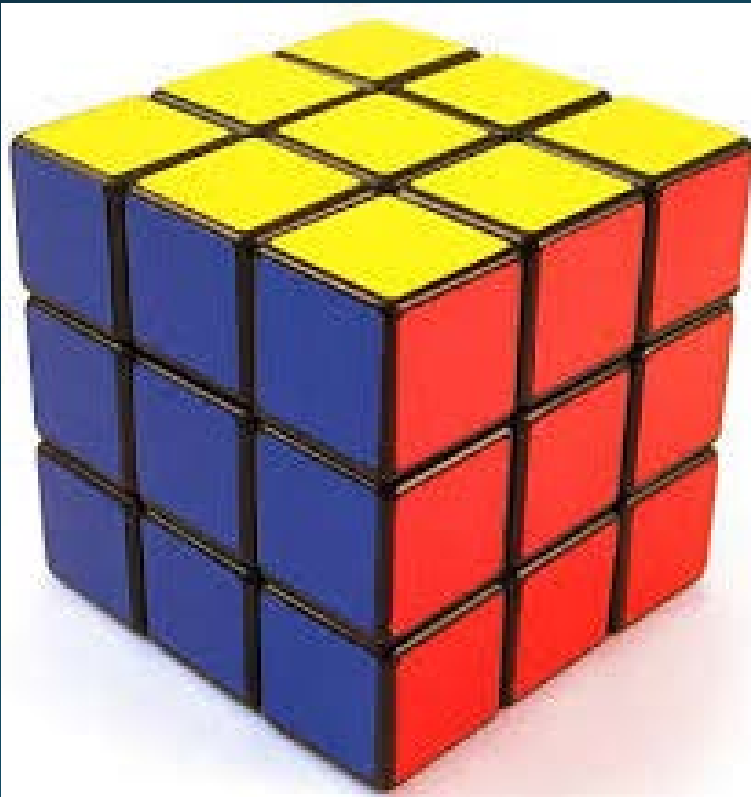


# LCN Coho Harvest Matrix



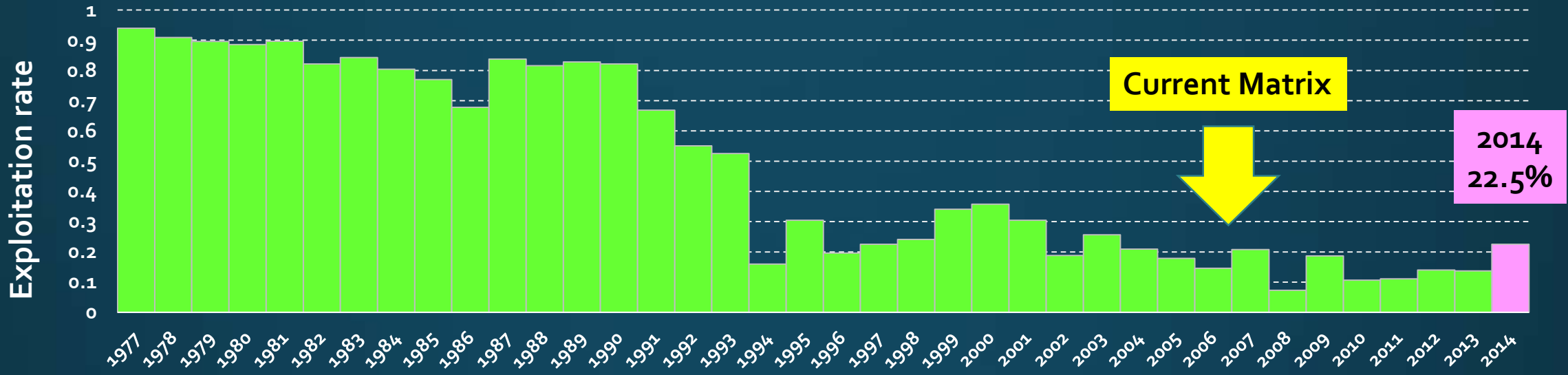
PFMC

September 12, 2014

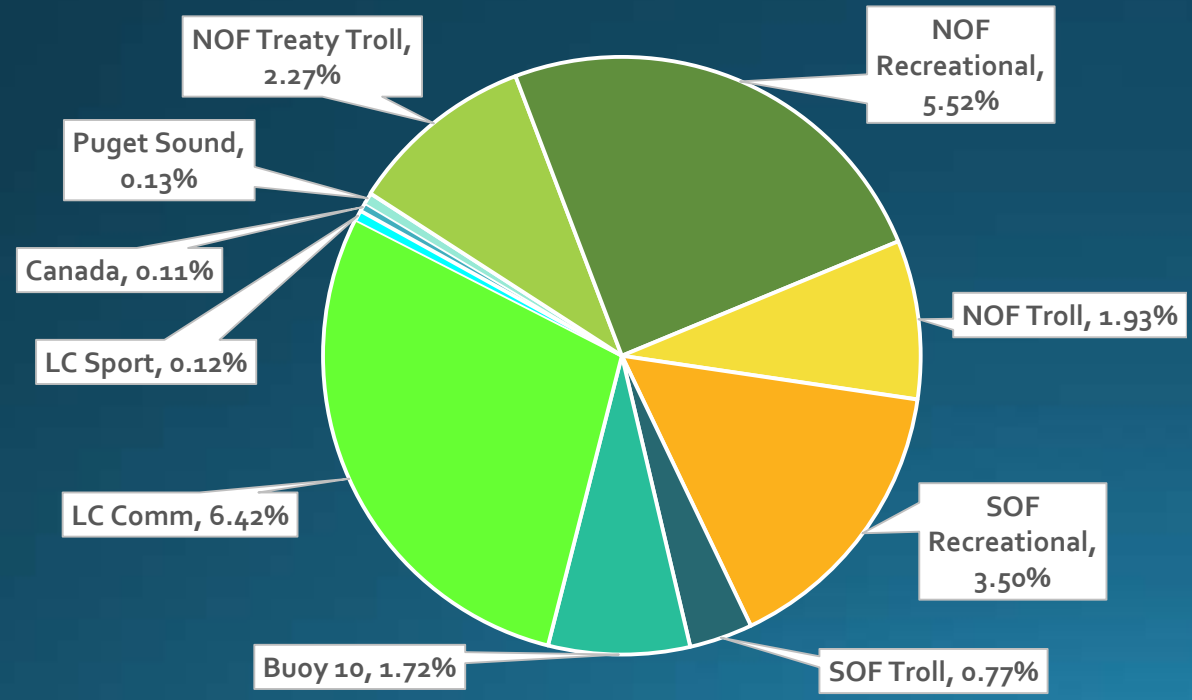
# Today's Topics

- **Background**
- **Analysis of Matrix Structure**
- **Possible New Matrix Structure**

# Fishing rates



PFMC 2014 LCN Exploitation Rates



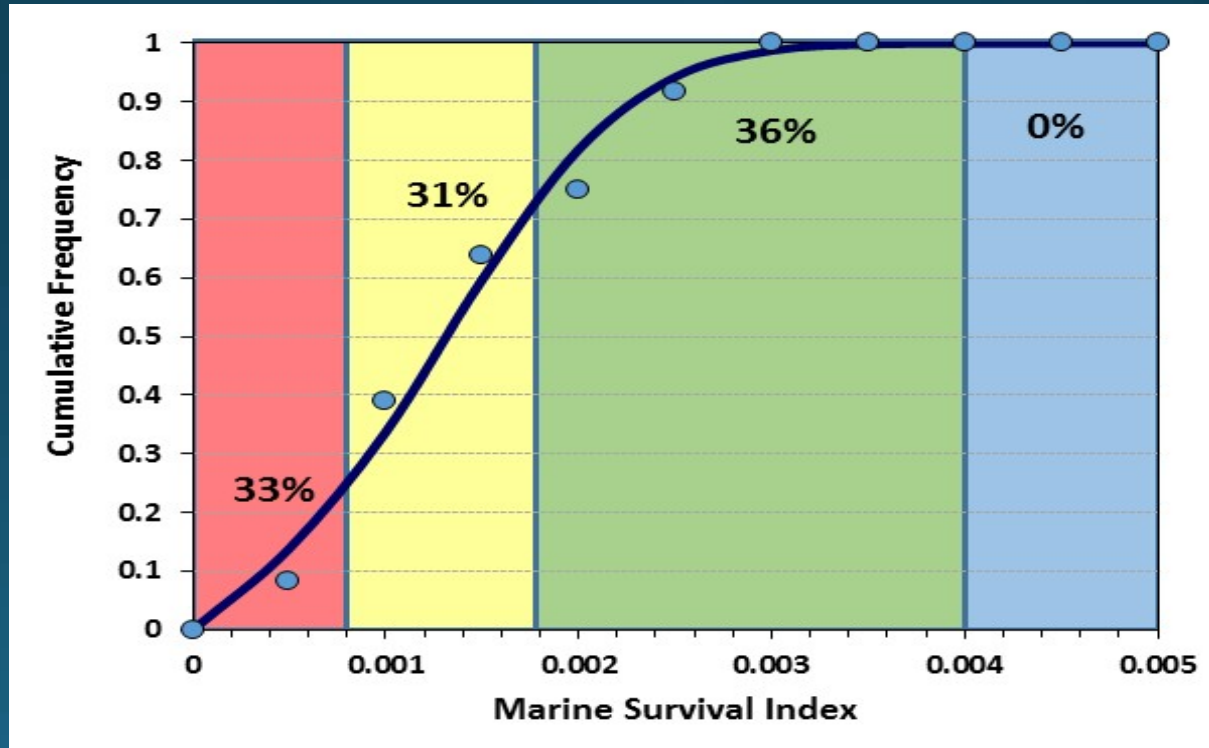
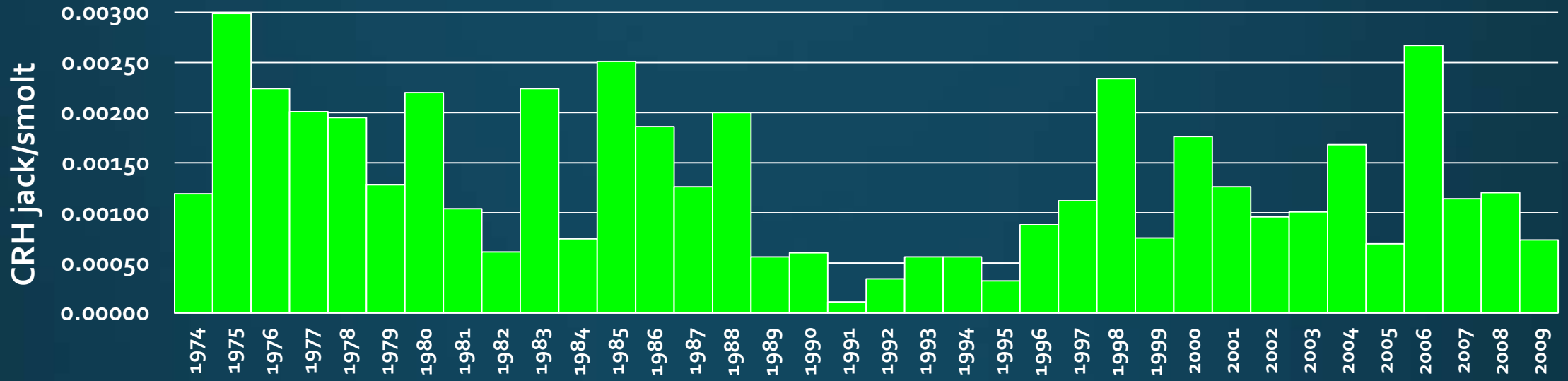
2005 – 2014 Objectives

Rate	Frequency
8%	10%
15%	60%
20%	22%
22.5%	10%

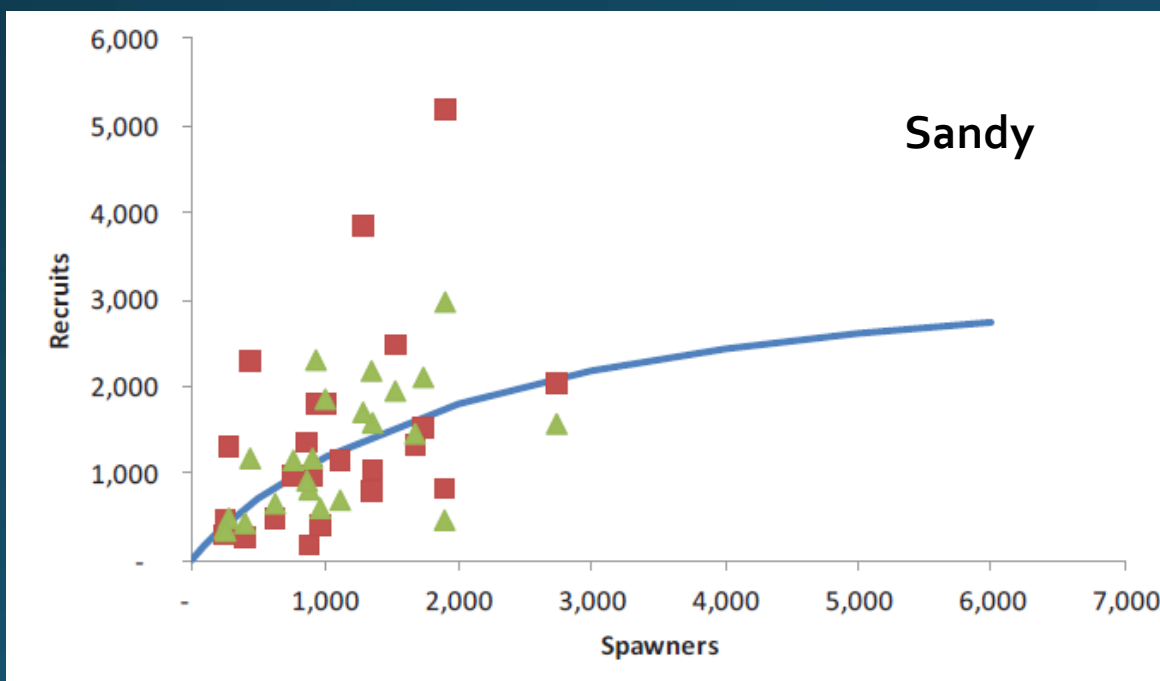
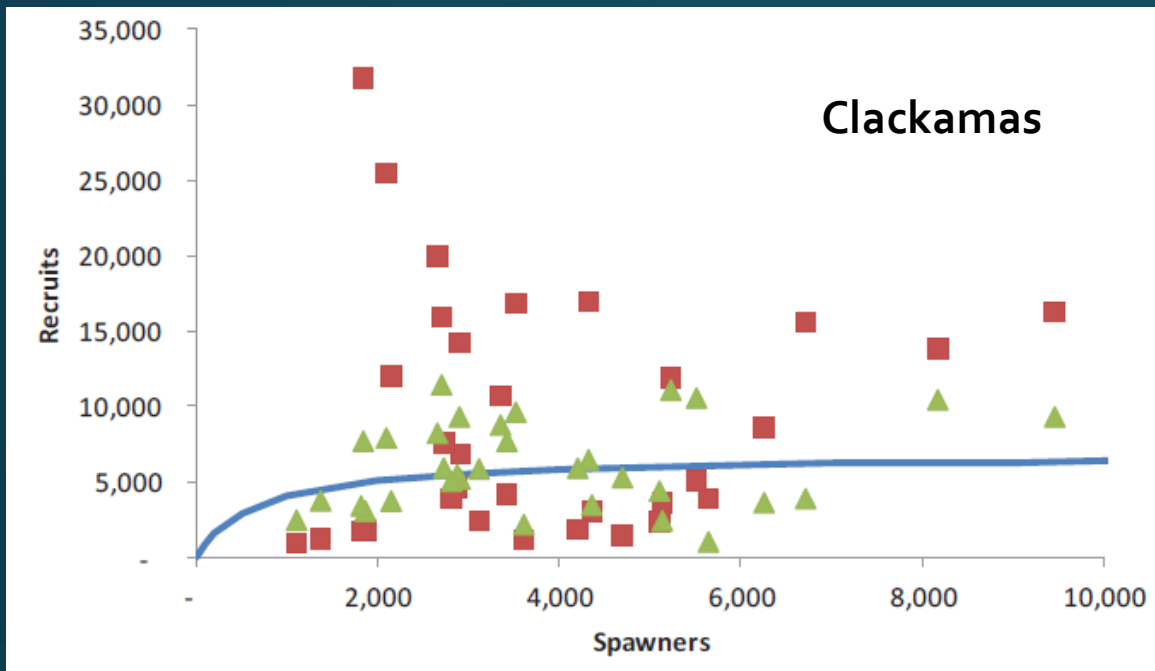
# LCN Harvest Control Rule

Parental Escapement (% of full seeding)		Marine Survival Index (based on return of jacks per hatchery smolt)			
		Critical (<.08%)	Low (<.15%	Medium (<.40%)	High (>.40%)
High	>0.75	<8%	<15%	<30%	<45%
Medium	0.75 to 0.50	<8%	<15%	<20%	<38%
Low	0.50 to 0.20	<8%	<15%	<15%	<25%
Very Low	0.20 to 0.10	<8%	<11%	<11%	<11%
Critical	<0.10	0-8%	0-8%	0-8%	0-8%

# Marine Survival Index



# Seeding Levels



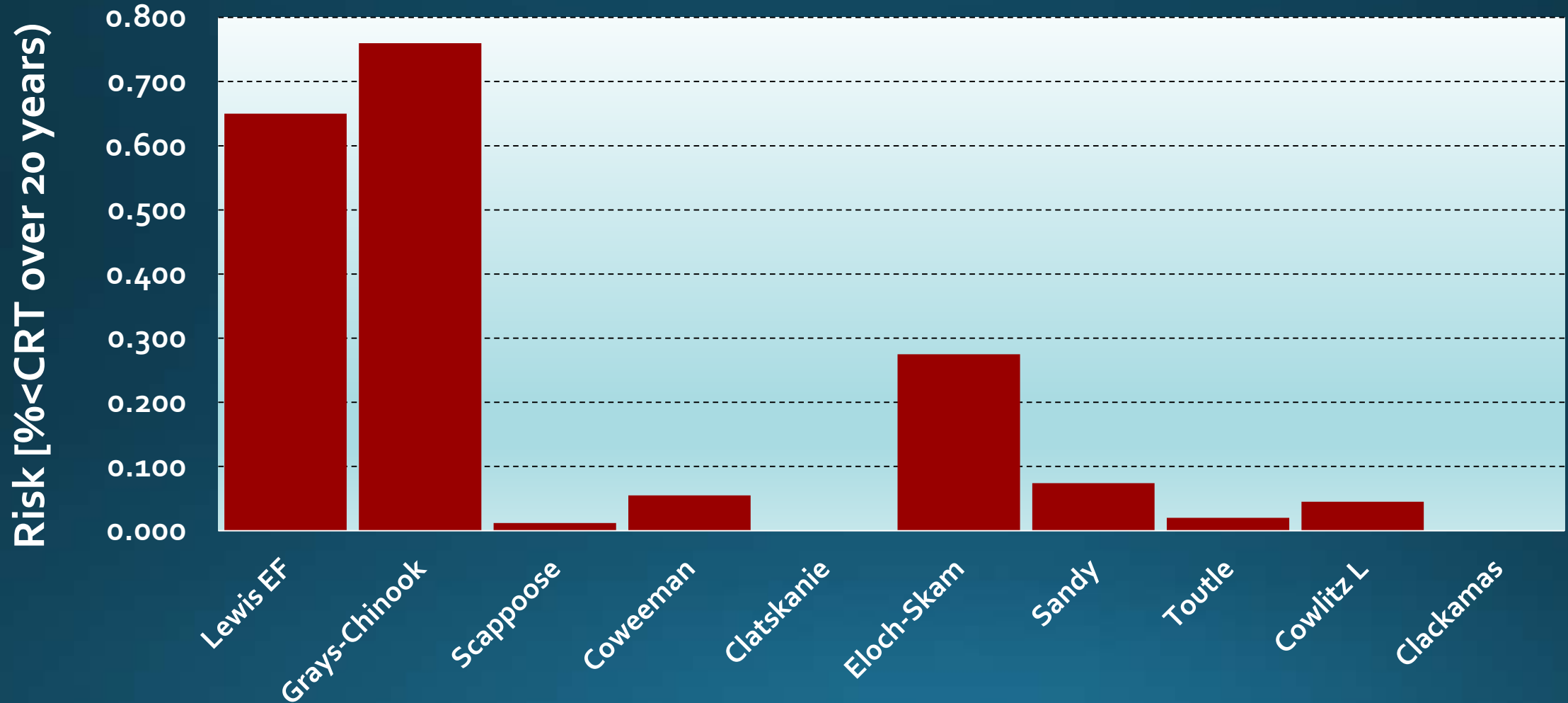
*v. Recruits*

	$r^2$
Spawners	20%
MSI	71%

	$r^2$
Spawners	10%
MSI	27%

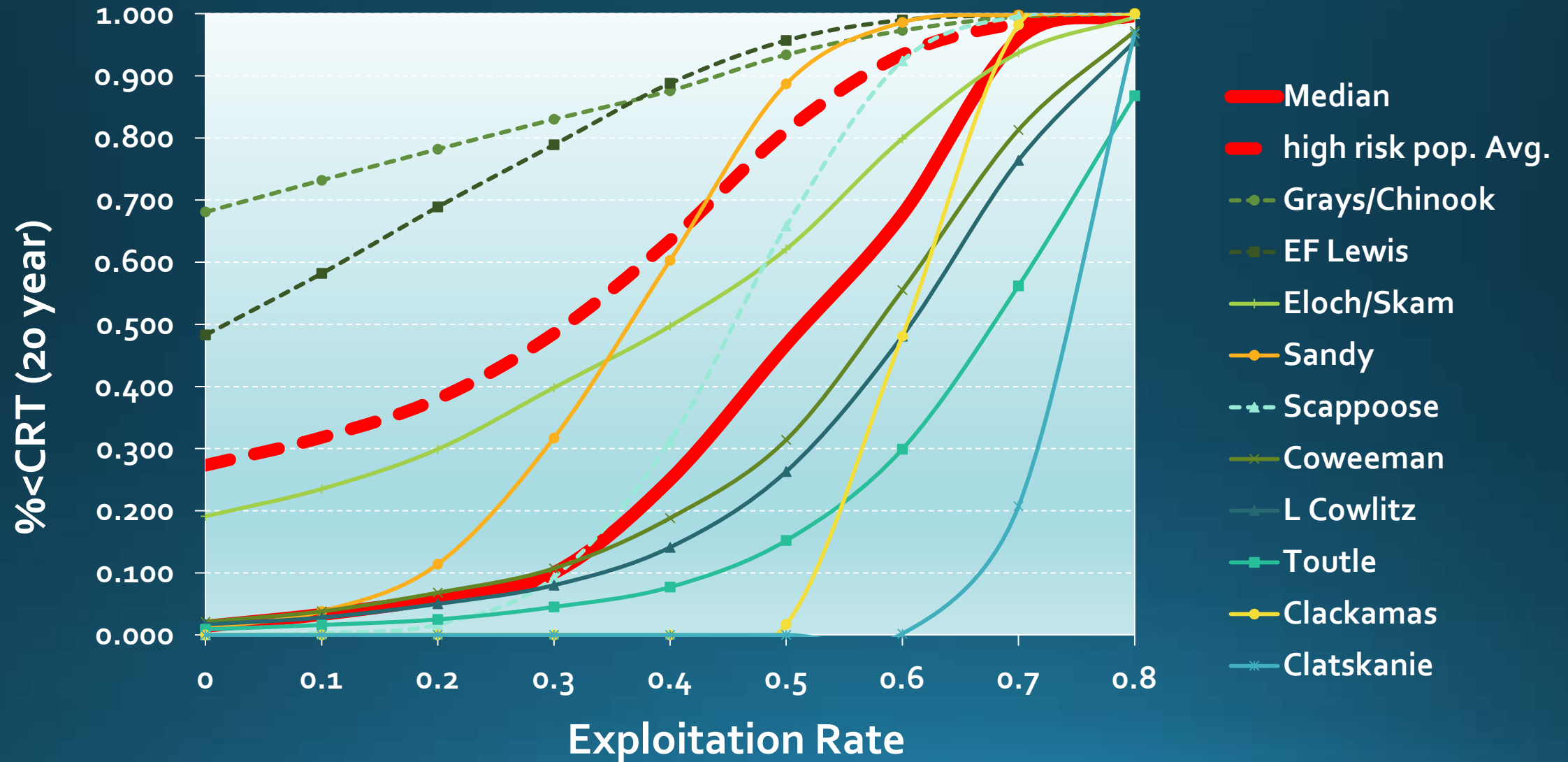
(1993-2009 data)

## 2. Some populations have more risk than others



*@ 16% exploitation rate*

### 3. Risk not highly sensitive to fishing at low rates





# 4. Different structures can produce equivalent risks

Parental Escapement (% of full seeding)		Marine Survival Index (based on return of jacks per hatchery smolt)			
		Critical (<.08%)	Low (<.15%)	Medium (<.40%)	High (>.40%)
High	>0.75	<8%	<15%	<30%	<45%
Medium	0.75 to 0.50	<8%	<15%	<20%	<38%
Low	0.50 to 0.20	<8%	<15%	<15%	<25%
Very Low	0.20 to 0.10	<8%	<11%	<11%	<11%
Critical	<0.10	0-8%	0-8%	0-8%	0-8%

=

**15-16%**

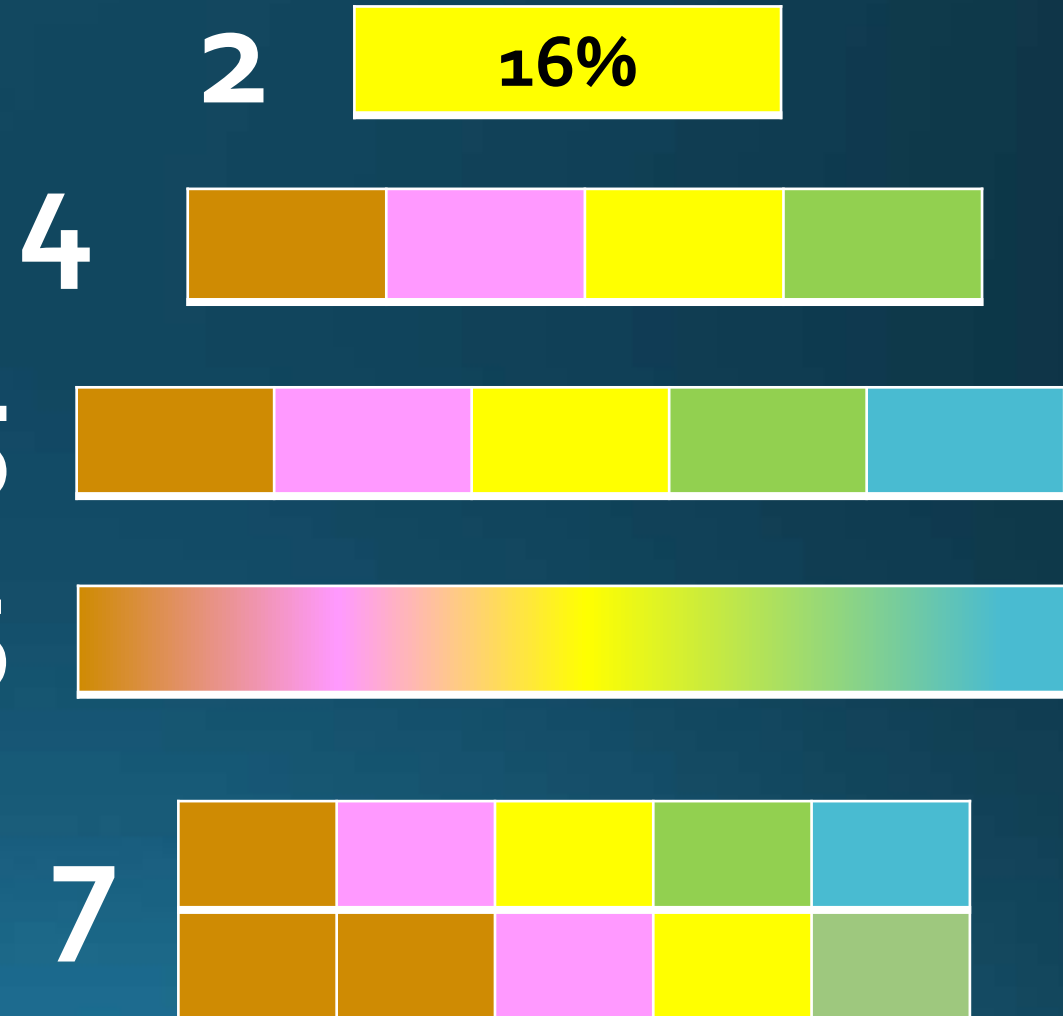
# Fishery Effects

Exploitation Rate	Fishery
8-10%	No coho retention
10-20%	Mark-selective
20-25%	Coho target
30%	Maximum usable

# Matrix alternatives

1 & 3

Parental Escapement (% of full seeding)		Marine Survival Index (based on return of jacks per hatchery smolt)			
		Critical (<.08%)	Low (<.15%)	Medium (<.40%)	High (>.40%)
High	>0.75	<8%	<15%	<30%	<45%
Medium	0.75 to 0.50	<8%	<15%	<20%	<38%
Low	0.50 to 0.20	<8%	<15%	<15%	<25%
Very Low	0.20 to 0.10	<8%	<11%	<11%	<11%
Critical	<0.10	0-8%	0-8%	0-8%	0-8%



# Example Alternatives

Model	No.	Structure	Exploitation Rates (%) <sup>a</sup>	Frequencies (%)	Seeding categories	Effective ER <sup>b</sup>	Risk 5 high <sup>c</sup>
actual	--	Current (Sandy/Clack)	8/15/20/22.5	10/60/20/10	--	16.0%	--
3	a	Current (all pops)	8/11/15/20/25/30/38+	24/0/48/20/0/8/1	0/0.10/0.20/0.50/0.75	15.7%	0.346
4	b	1 x 4	10/15/20/25	10/25/60/5	--	18.0%	0.364
5	b	1 x 5	<u>10/15/20/25/30</u>	<u>10/35/45/5/5</u>	--	18.0%	0.364
6	b	Continuous	10/10-15/15-20/20-25/25-30	<u>5/10/58/27/0</u>	--	18.0%	0.363
6	c	Continuous	10/10-15/15-20/20-25/25-30	<u>5/10/50/30/5</u>	--	18.6%	0.368
7	5b1	2 x 5	10/15/20/25/30	= 10/35/45/5/5	--	18.0%	0.364
			10/10/15/20/25	0/100 =	<u>0/.3</u>		
8	a	1 x 3 (new) <sup>d</sup>	10/19/22.5	15/60/25	--	18.5%	0.365
9	a	2 x 5 (new) <sup>d</sup>	10/15/20/22/30	= 7/17/52/21/3	--	18.0%	0.369
		(weak strata)	10/10/15/20/22	12/88 =	<u>0/.4</u>		

<sup>a</sup> Exploitation rates include only ocean and Columbia River mainstem fisheries – tributary fishery impacts are in addition.

<sup>b</sup> Effective exploitation rate is the weighted average in all years.

<sup>c</sup> 5-high risk is the average for the 5 highest risk and most sensitive model populations.

<sup>d</sup> Identified in 09/03/14 SAS/TWG meeting.

						Effective	Risk	
Model	No.	Structure	Rates (%)	Frequencies (%)	Seeding categories	ER	median	5 high
actual	--	--	8/15/20/22.5	10/60/20/10	--	16.0%	--	--
1	a	Current (Sandy/Clack)	8/11/15/20/25/30/38+	24/0/54/17/0/5/1	0/0.10/0.20/0.50/0.75	15.1%	0.044	0.342
2	a	Fixed	0	100	--	0%	0.014	0.273
2	b	Fixed	8	100	--	8%	0.028	0.307
2	c	Fixed	12	100	--	12%	0.037	0.329
2	d	Fixed	16	100	--	16%	0.050	0.354
2	e	Fixed	18	100	--	18%	0.053	0.366
2	f	Fixed	19	100	--	19%	0.056	0.372
2	g	Fixed	20	100	--	20%	0.059	0.380
3	a	Current (all pops)	8/11/15/20/25/30/38+	24/0/48/20/0/8/1	0/0.10/0.20/0.50/0.75	15.7%	0.045	0.346
4	a	1 x 4	8/15/20/25	10/70/11/9	--	15.7%	0.046	0.350
4	b	1 x 4	10/15/20/25	10/25/60/5	--	18.0%	0.054	0.364
4	c	1 x 4	8/15/20/25	10/25/60/5	--	17.8%	0.054	0.363
5	a	1 x 5	8/15/20/25/30	10/65/15/5/5	--	15.7%	0.046	0.349
5	b	1 x 5	10/15/20/25/30	10/35/45/5/5	--	18.0%	0.053	0.364
5	c	1 x 5	10/15/20/25/30	10/20/55/10/5	--	19.0%	0.056	0.369
5	d	1 x 5	10/15/20/25/30	10/10/55/20/5	--	20.0%	0.059	0.377
6	a	Continuous	10/10-15/15-20/20-25/25-30	5/15/53/22/5	--	18.0%	0.054	0.363
6	b	Continuous	10/10-15/15-20/20-25/25-30	5/10/58/27/0	--	18.0%	0.054	0.363
6	c	Continuous	10/10-15/15-20/20-25/25-30	5/10/50/30/5	--	18.6%	0.055	0.368
7	5b1	2 x 5	10/15/20/25/30	= 10/35/45/5/5	--	18.0%	0.053	0.364
			10/10/15/20/25	0/100 =	0/3			
7	5b2	2 x 5	10/15/20/25/30	= 14/36/40/5/4	--	17.5%	0.051	0.361
			10/10/15/20/25	12/88 =	0/5			
7	5b3	2 x 5	10/15/20/25/30	= 12/39/30/5/3	--	16.3%	0.047	0.350
			10/10/15/20/25	38/62 =	0/6			