

# PSC - SELECTIVE FISHERY EVALUATION COMMITTEE

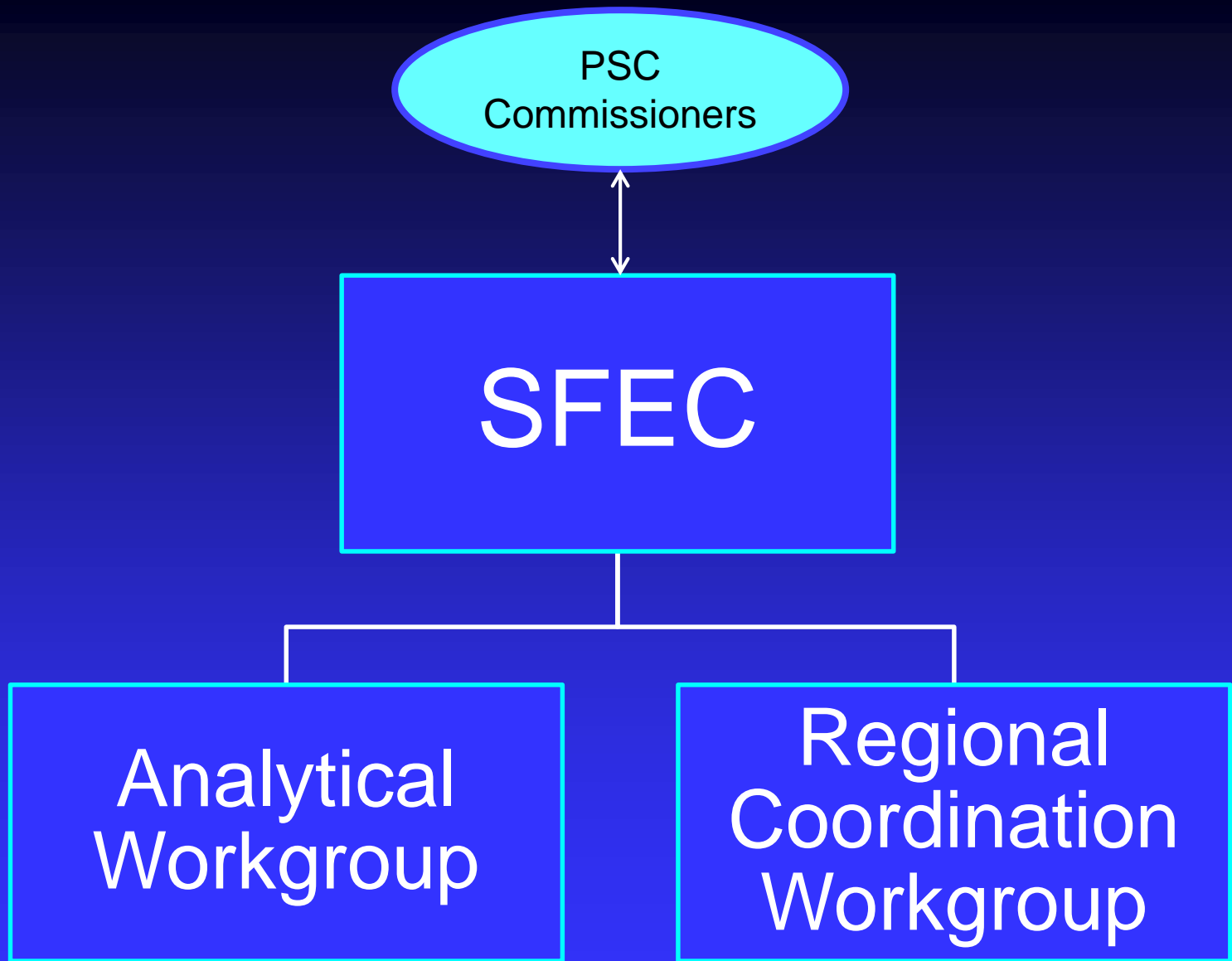
2015 UPDATE TO MARK COMMITTEE



*2015 Mark Committee Meeting*

# Primary Duties of SFEC

- Clearinghouse for coordination and reporting on MM and MSF programs
- Provide advice to the PSC
- Develop analytical tools
- Assess and monitor the cumulative impacts of MSFs on stocks of concern to the PSC



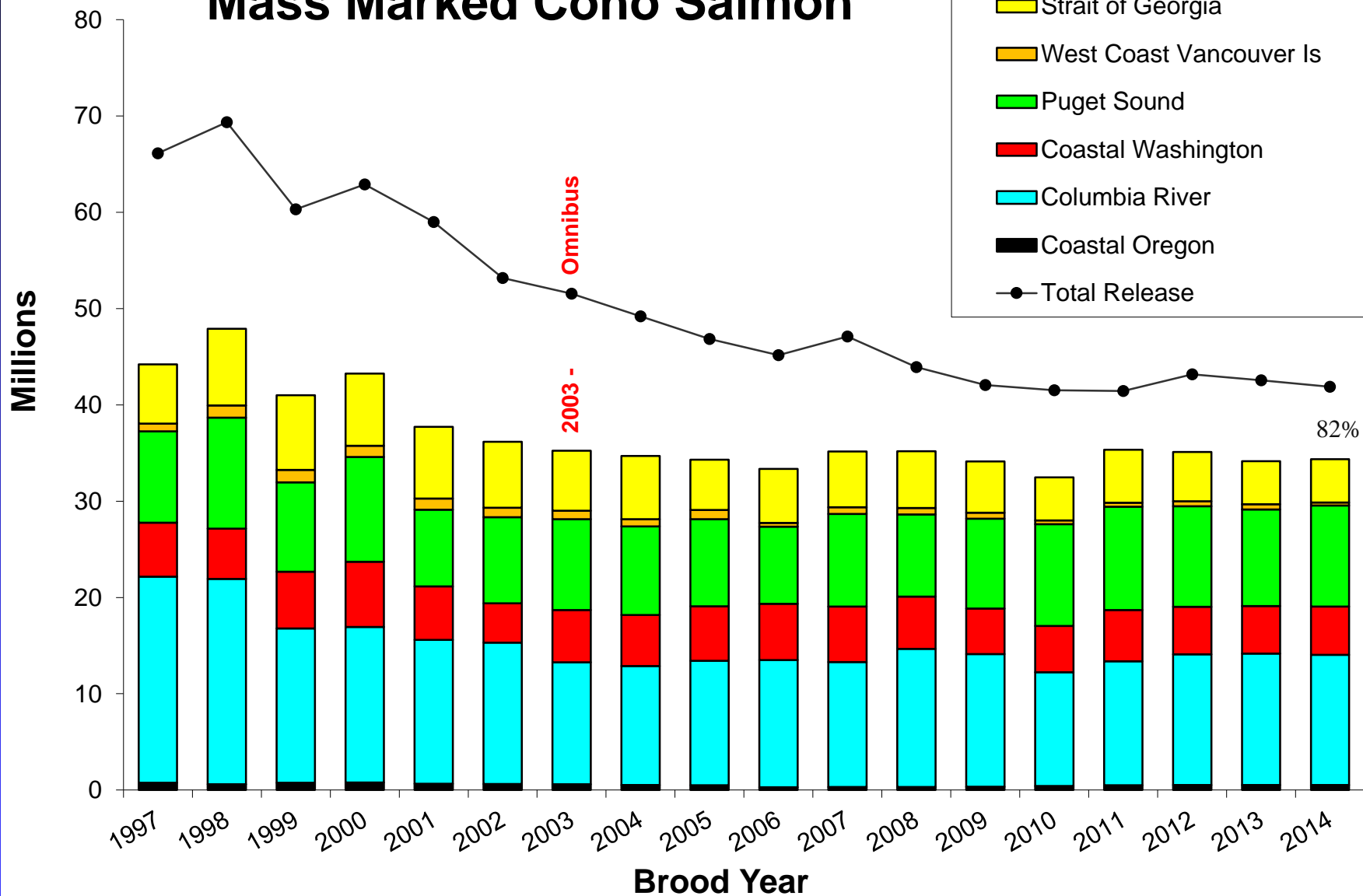
# Primary AWG Tasks

- Develop analytical tools
  - Evaluate potential impacts on the CWT program
  - Exploitation rates
  - Tagging rates
  - Sampling rates
- Annual Review of MSF Proposals
  - Provide advice to proponents regarding the design of MSFs and the conduct of sampling and monitoring programs

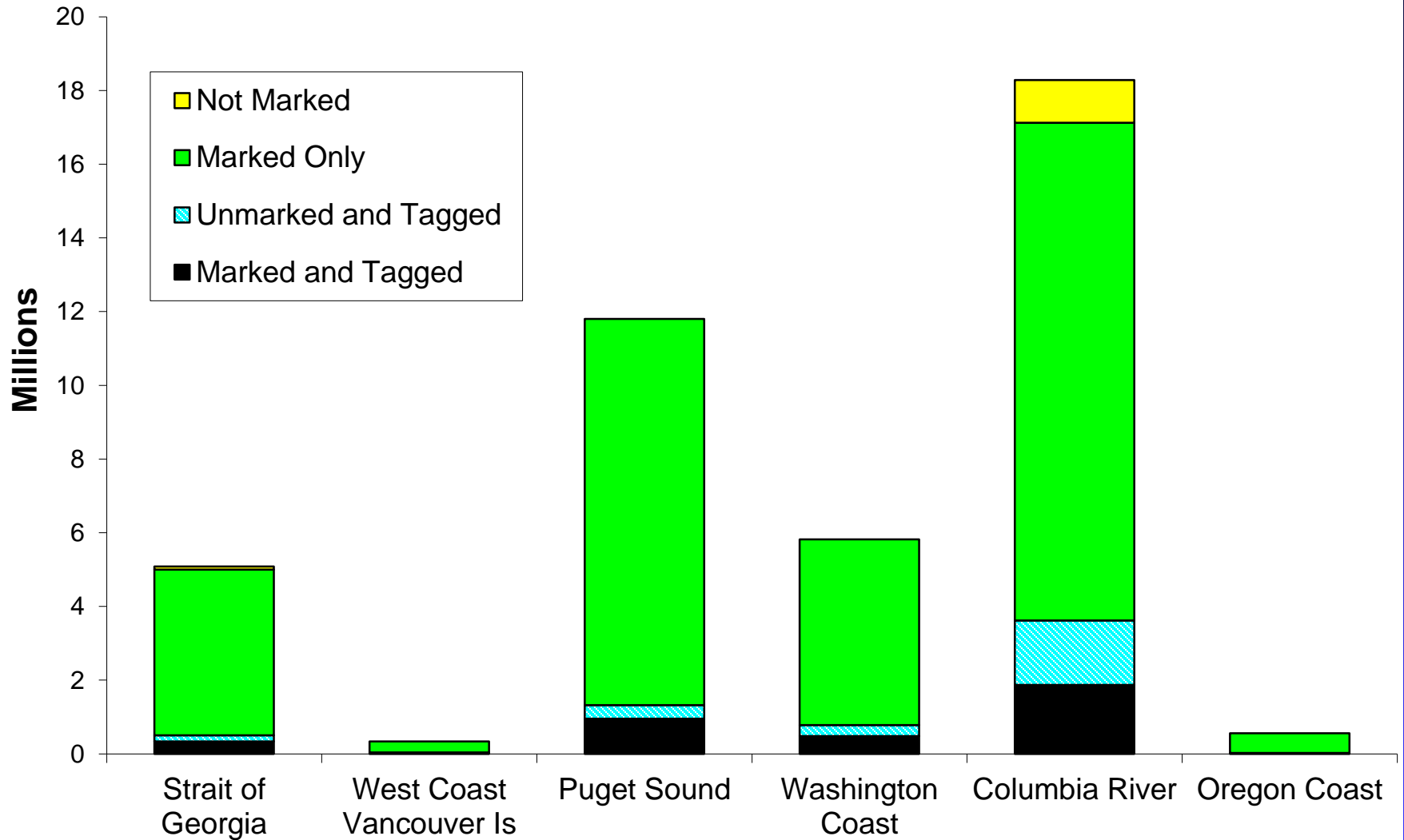
# Primary RCWG Tasks

- SFEC Annual Review of MM Proposals
  - Determine potential impacts on sampling and tagging programs, and suggest modifications
- Annual Coordination Report
  - Documentation of MM, DIT, MSF, and CWT Sampling Activities
- Coordinate and report on continuing research on ETD and MM technologies

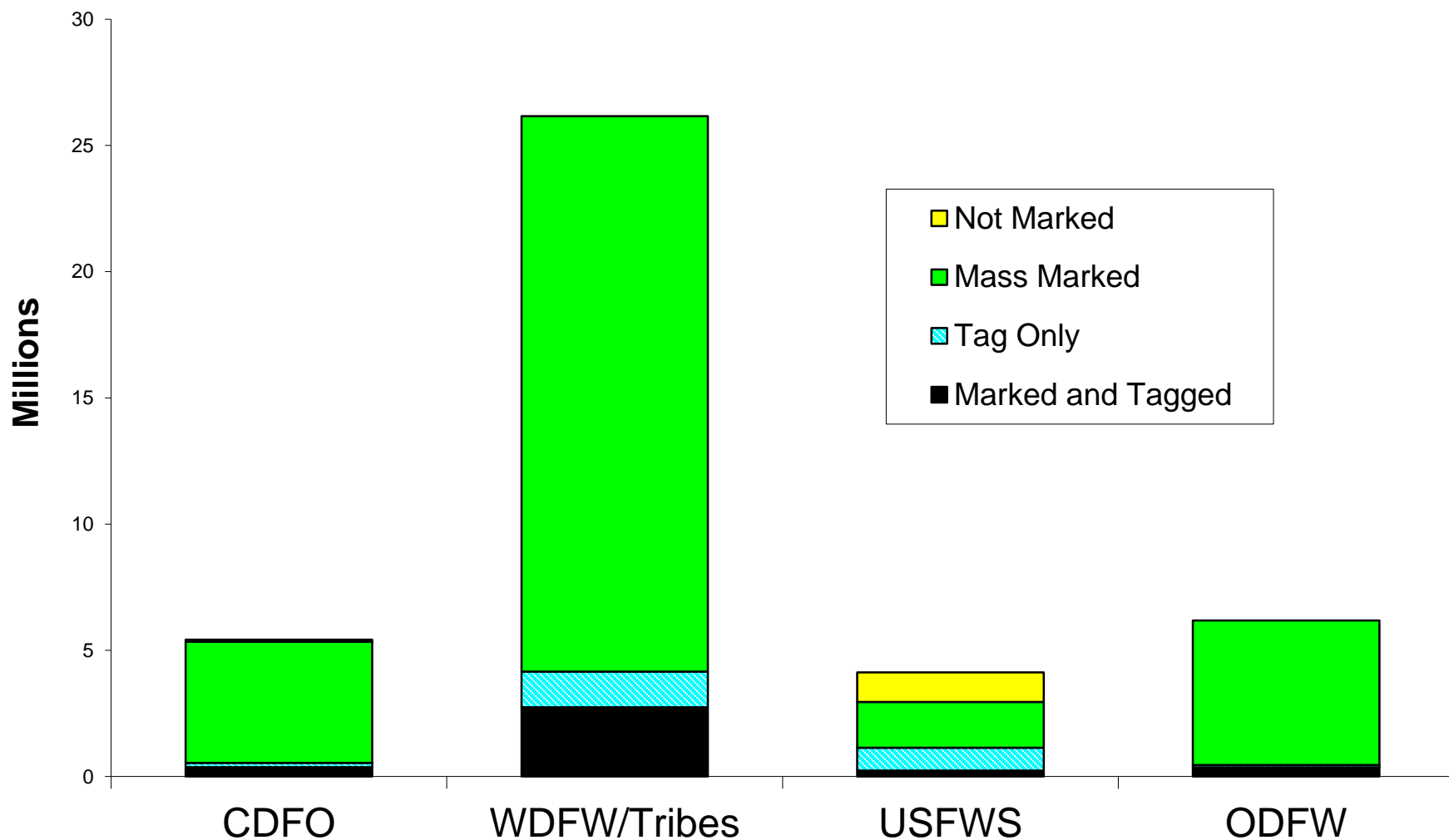
# Mass Marked Coho Salmon



# Coho Marking Plans – by Region

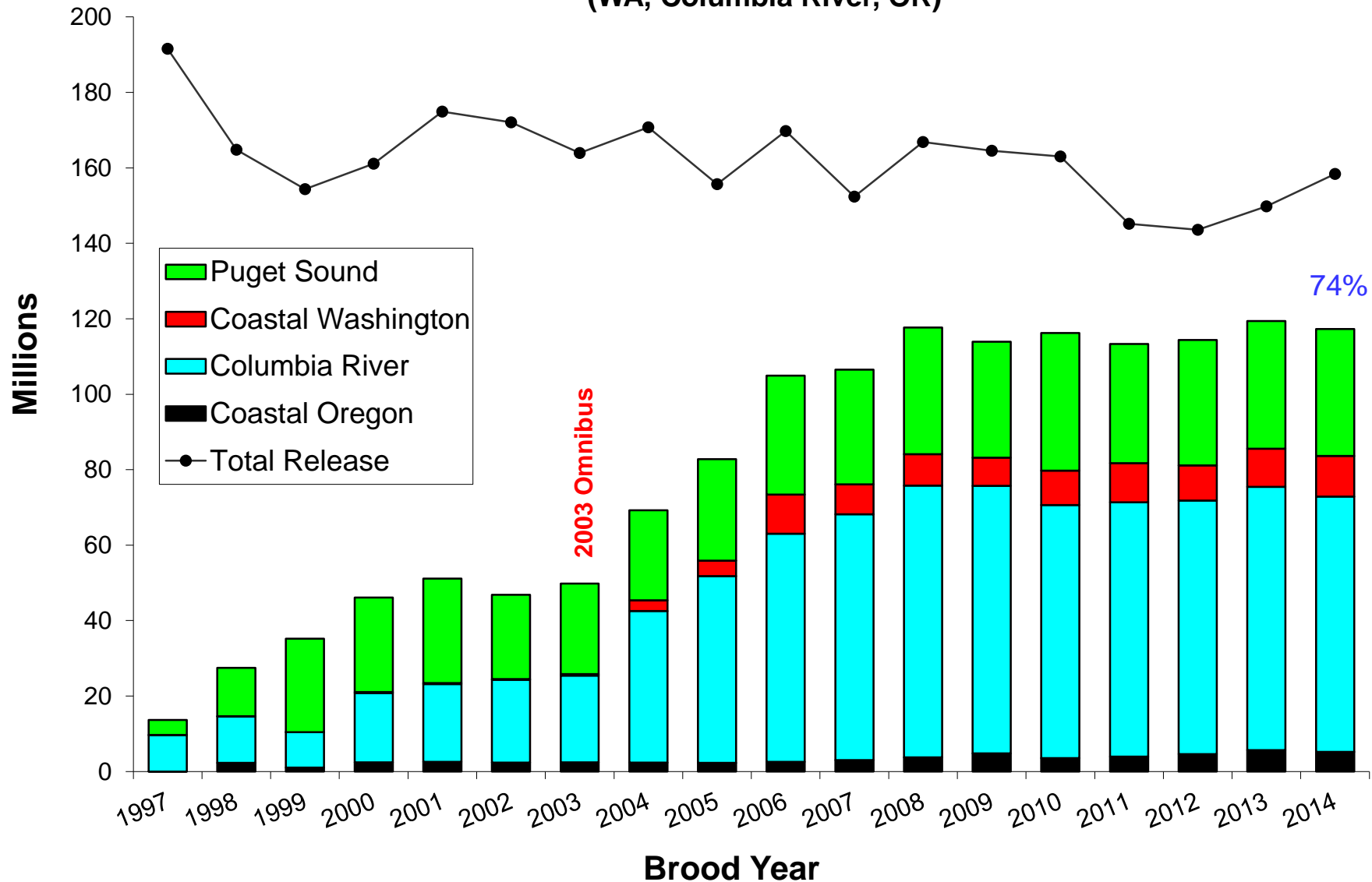


# Coho Marking Plans – by Agency

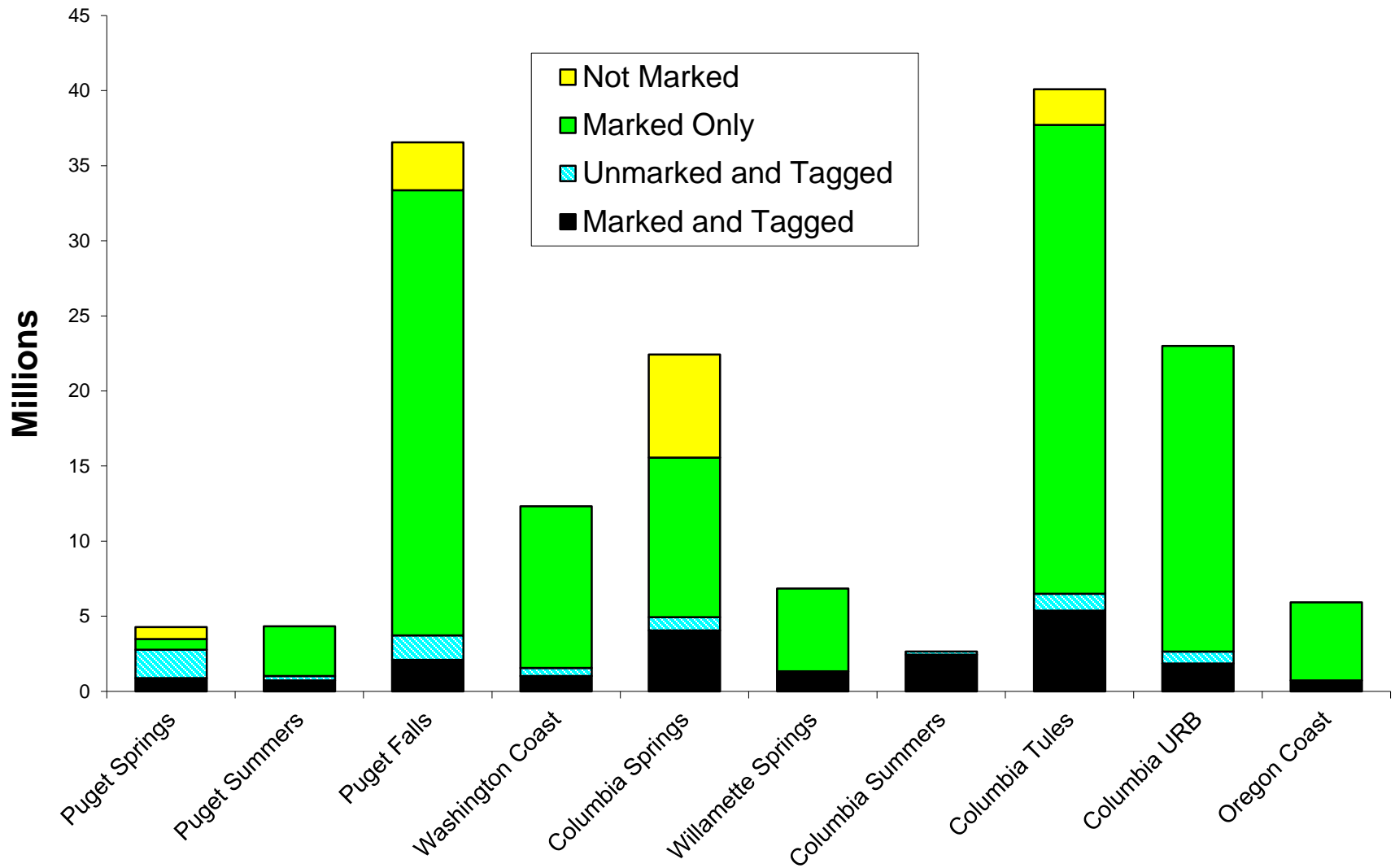


# Mass Marked Chinook Salmon

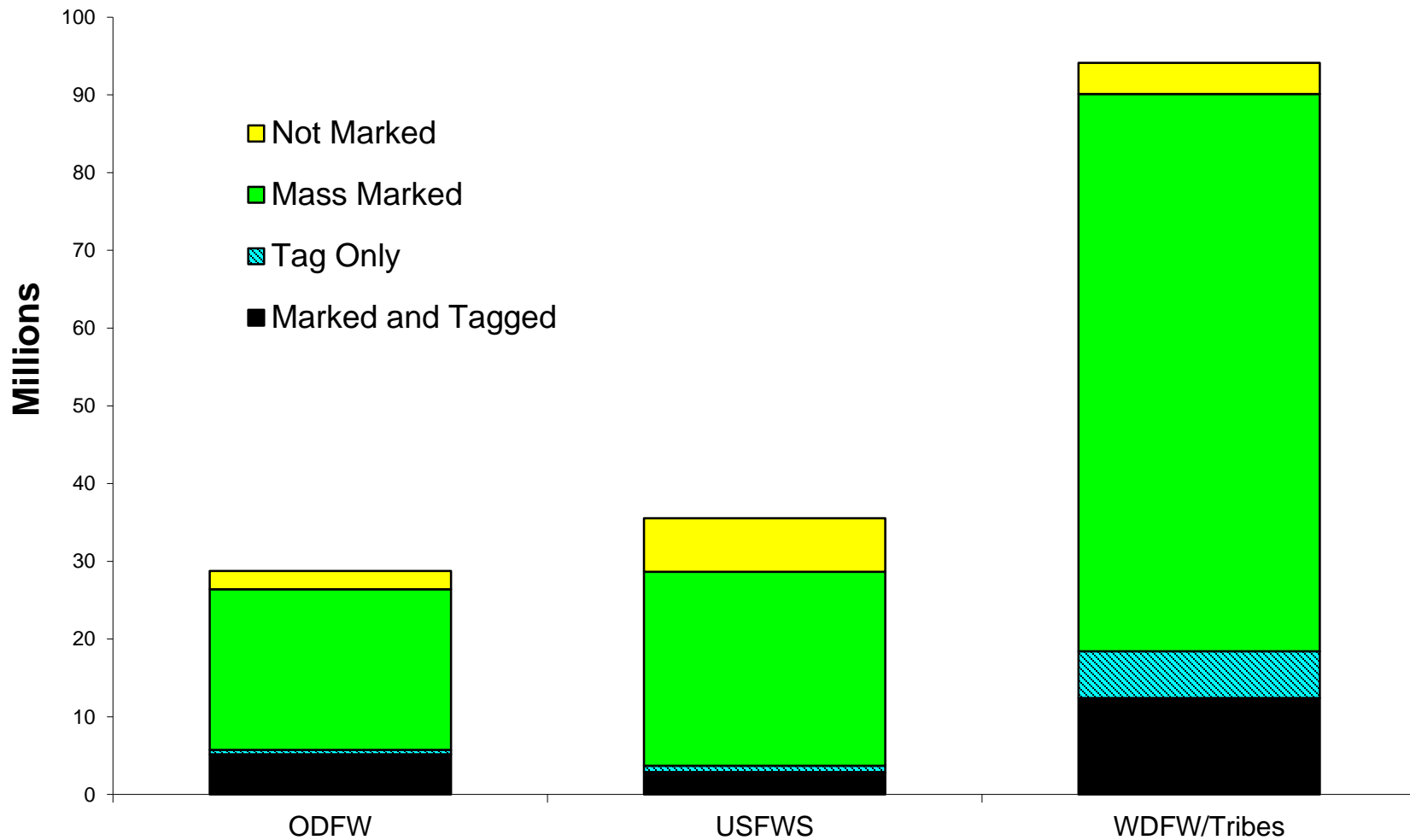
(WA, Columbia River, OR)



# Chinook Marking Plans – by Region and Run Type



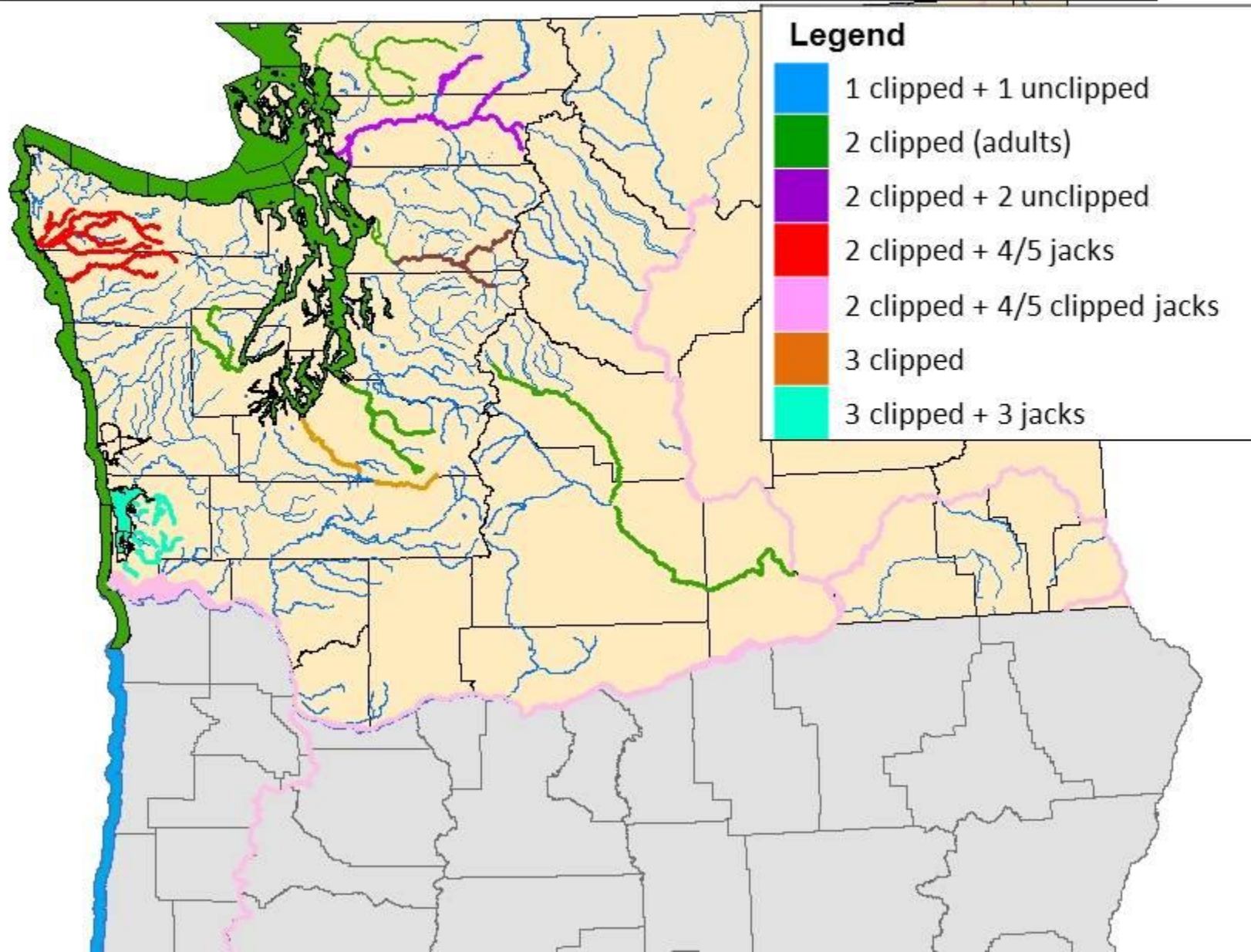
# Chinook Marking Plans - by Agency



# MM & MSF Issues

- Lack of:
  - Post-season MSF reports
  - Modeling capacity to evaluate impacts of large-scale MSFs on Chinook
  - Methods to assess mixed bags

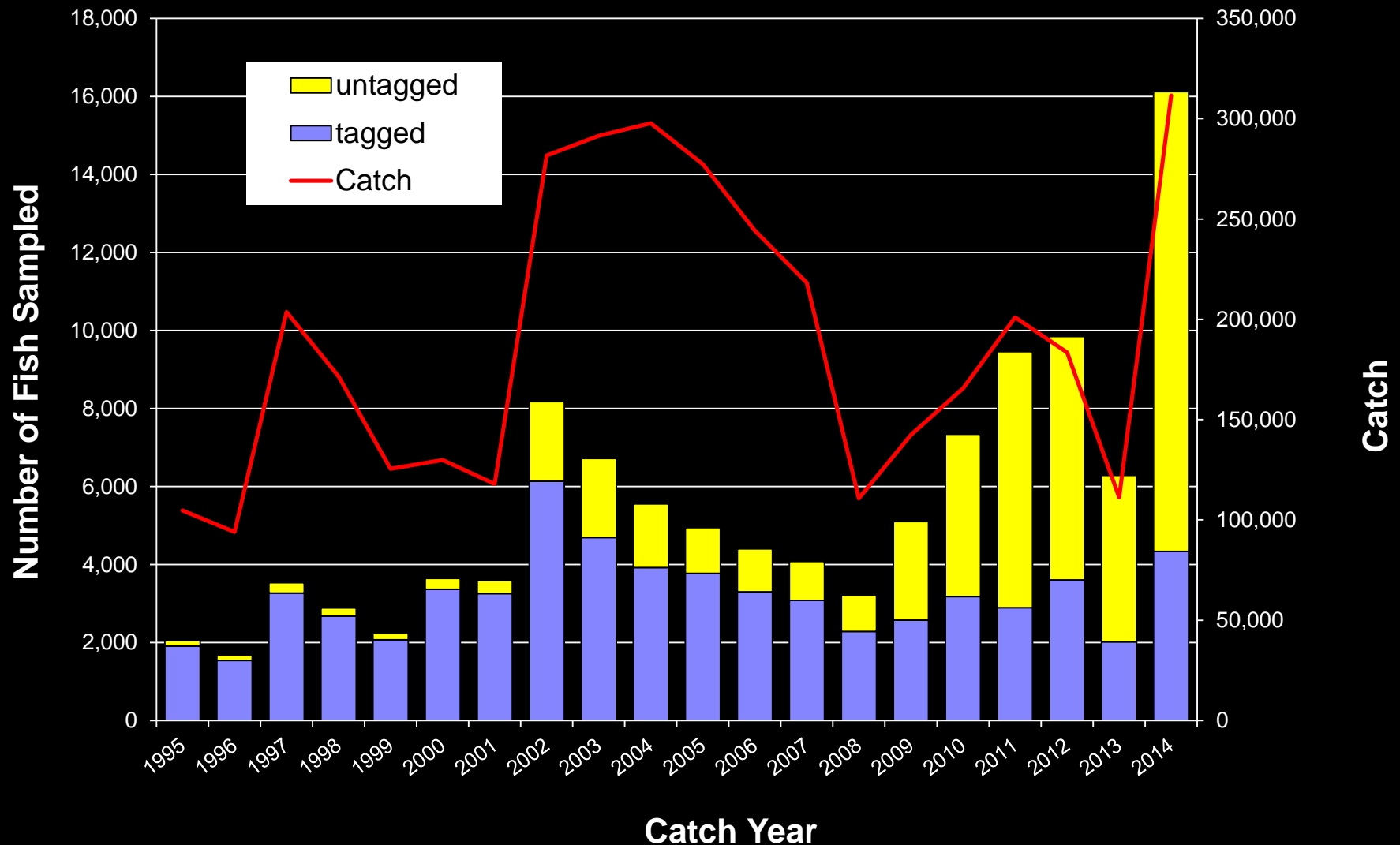
## Bag Limits Proposed for 2014 Chinook Recreational Mark-Selective Fisheries



## MM & MSF Issues (cont.)

- Lack of:
  - DIT programs for some indicator stocks impacted
  - Coastwide electronic tag detection
    - Loss of data on unmarked fish
    - Impacts sampling programs

# Alaska's Troll Fishery



*Figure from Ron Josephson*

# SFEC Summary

- Mass marking levels have leveled off
  - Coho: 34 million (unchanged)
  - Chinook: 117 million (-2 million)
- DIT programs continue to decrease in number
  - 16 Coho
  - 14 Chinook
- New DIT programs are still needed
- Continued increases in untagged fish sampled may reduce sample rates and will impose additional costs

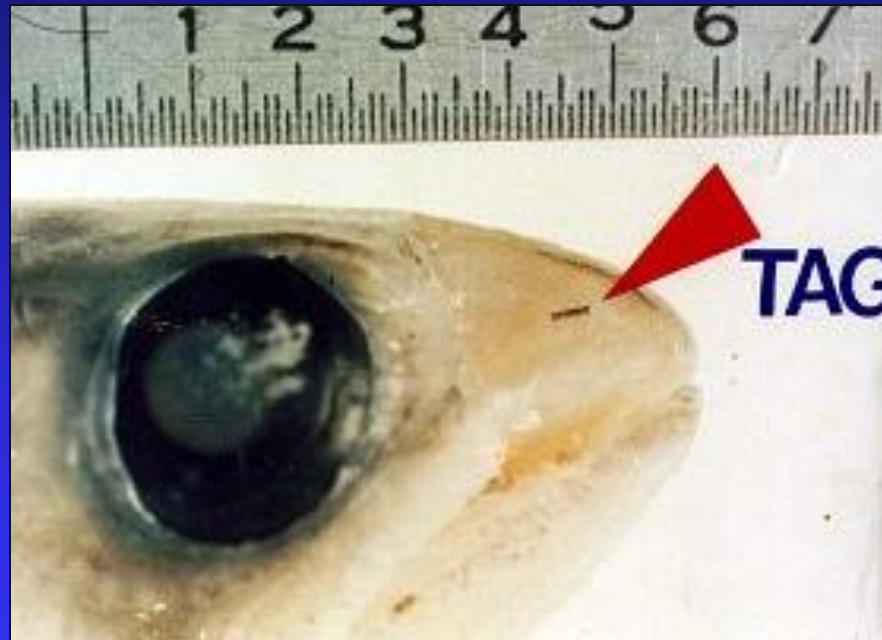
# SFEC Summary

- Analyses of MSFs are still needed
- Coho MSFs have reached their full potential along the coast
- Chinook MSFs have likely reached their full potential in Puget Sound, but have room to grow along the coast
- Analytical tools are needed
- Finishing Reports on:
  - Annual summary report of proposals
  - “Lessons Learned” report
  - Analyses of DITs



The End

# WHAT'S UP WITH DITs?



# Mark-Selective Fishery Goals

- Lessen impacts on weak wild stocks
- Remove hatchery strays from rivers where stray rates are too high
- Increase fishing season length under quotas

# Are MSFs Operating as Intended?

- Increased or consistent harvest opportunity
- Is there differential mortality between marked and unmarked fish?
- Unmarked mortalities are within established goals
- Regulations are clear
- Fishery management tools are sufficient
- ..... and many more

DITs



# Double Index Tags

- Devised by ASFEC (1997)
- Indicate wild stocks
- Provide an index of the relative difference in ER between marked and unmarked fish due to MSFs

# Earlier Coho DIT Assessment

- Report completed in 2003
- BYs 1995-97
- 33 Coho MSFs (1998-2000)
- 0-15% ER in MSFs
- MSFs were virtually undetectable
- No significant association between selective fishery intensity and return rate difference

(NWFRB 2003)

# Current Coho DIT Assessment

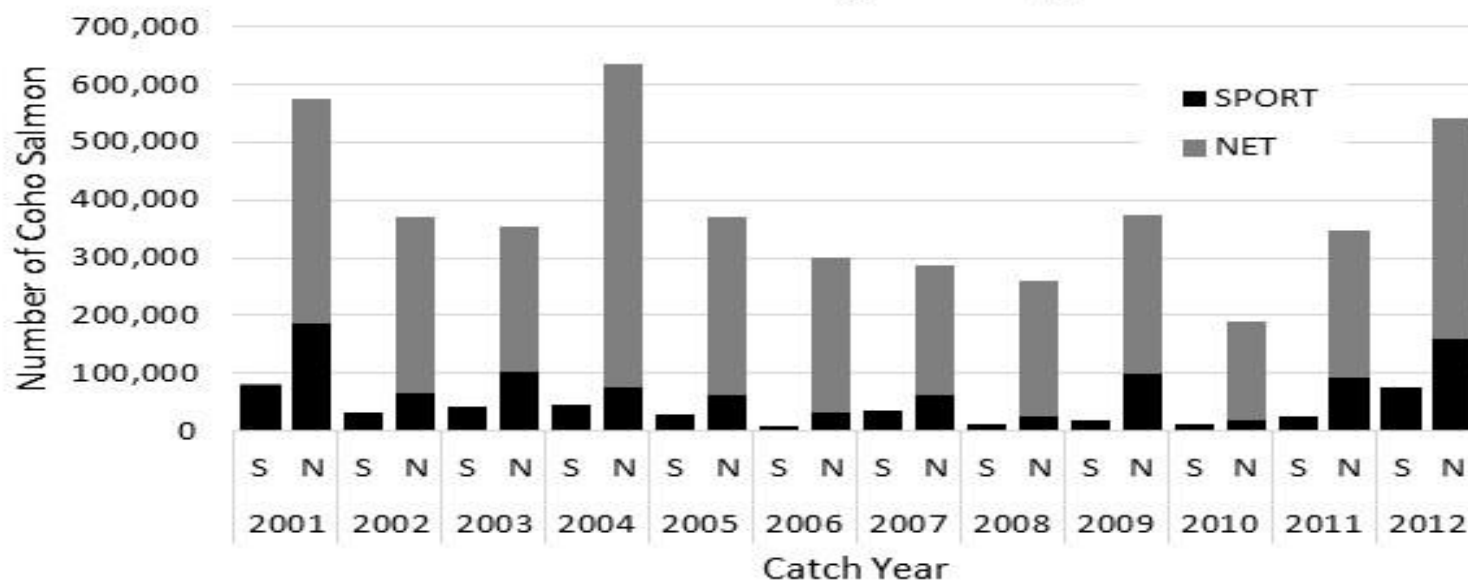
- BYs 1998-2009
- DITs
  - 8 – Puget Sound
  - 6 – WA Coast
  - 1 – Columbia River

(M. Alexandersdottir & R. Koshow, in prep.)



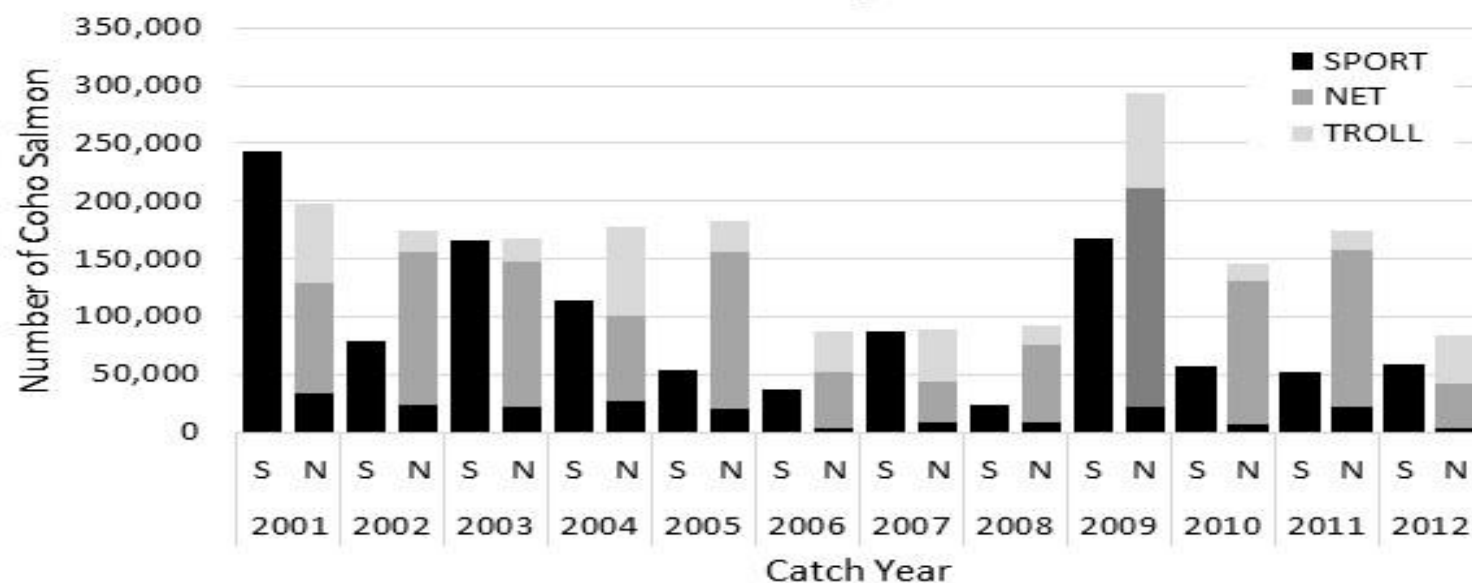
Sum of number...

## Washington Puget Sound



Sum of number...

## Washington Coast



# Assessing Mark-Selective Fishery Mortalities

- Difference in DIT return rates
- 3 year-olds
- Z-statistic

$$z = \frac{\hat{p}_u - \hat{p}_m}{\sqrt{\text{Var}(\hat{p}_u) + \text{Var}(\hat{p}_m)}}$$

SF=11%  
(3-27%)

Region	Hatchery	Return Year	SF	Pu(%)	Pm(%)	Z-statistic	P-value
Hood Canal	George Adams	2001	0.10	4.35%	4.25%	0.70	0.49
	George Adams	2002	0.06	5.51%	5.02%	3.45	0.00
	George Adams	2003	0.13	3.72%	3.52%	1.35	0.18
	George Adams	2004	0.15	4.43%	3.96%	2.43	0.02
	George Adams	2005	0.10	4.45%	4.39%	0.38	0.71
	George Adams	2006	0.10	0.58%	0.74%	-2.42	0.02
	Quilcene NFH	2001	0.13	3.11%	2.82%	1.33	0.18
	Quilcene NFH	2002	0.05	4.12%	3.76%	1.18	0.24
	Quilcene NFH	2003	0.23	2.99%	2.45%	3.80	0.00
	Quilcene NFH	2004	0.18	3.21%	2.83%	2.42	0.02
	Quilcene NFH	2005	0.13	2.34%	2.23%	0.88	0.38
	Quilcene NFH	2006	0.15	0.30%	0.41%	-2.02	0.04
N. Puget Sound	Kendall Creek	2001	0.10	2.38%	2.50%	-0.88	0.38
	Kendall Creek	2002	0.09	1.67%	1.74%	-0.69	0.49
	Kendall Creek	2003	0.08	0.97%	0.91%	0.95	0.34
	Kendall Creek	2004	0.12	0.46%	0.41%	0.89	0.37
	Kendall Creek	2005	0.15	0.24%	0.18%	2.05	0.04
	Kendall Creek	2006	0.04	0.17%	0.18%	-0.22	0.83
	Marblemount	2001	0.14	4.50%	4.12%	2.61	0.01
	Marblemount	2002	0.08	5.25%	4.94%	2.14	0.03
	Marblemount	2003	0.27	1.50%	1.40%	1.23	0.22
	Marblemount	2004	0.20	3.66%	3.30%	2.62	0.01
	Marblemount	2005	0.07	3.73%	3.58%	1.11	0.27
	Marblemount	2006	0.11	0.45%	0.46%	-0.28	0.78
	Wallace River	2001	0.11	7.45%	7.65%	-1.11	0.27
	Wallace River	2002	0.09	5.78%	5.47%	1.98	0.05
	Wallace River	2003	0.12	6.67%	6.14%	2.97	0.00
	Wallace River	2004	0.16	6.30%	5.91%	2.08	0.04
	Wallace River	2005	0.10	6.07%	5.82%	1.64	0.10
	Wallace River	2006	0.07	3.09%	3.09%	-0.01	0.99

Region	Hatchery	Return Year	SF	Pu(%)	Pm(%)	Z-statistic	P-value
Coastal	Bingham Creek	2001	0.05	3.05%	2.92%	1.26	0.21
	Bingham Creek	2002	0.05	3.54%	3.32%	2.19	0.03
	Bingham Creek	2003	0.11	3.32%	2.59%	7.34	0.00
	Bingham Creek	2004	0.05	0.92%	0.85%	1.19	0.24
	Bingham Creek	2005	0.07	1.25%	1.31%	-0.81	0.42
	Bingham Creek	2006	0.05	1.92%	1.71%	0.45	0.65
	Forks Creek	2001	0.12	2.94%	2.39%	6.51	0.00
	Forks Creek	2002	0.16	2.32%	2.10%	2.78	0.01
	Forks Creek	2003	0.27	3.61%	2.94%	7.16	0.00
	Forks Creek	2004	0.13	1.41%	1.37%	0.60	0.55
	Forks Creek	2005	0.11	4.85%	4.31%	3.89	0.00
	Forks Creek	2006	0.11	0.54%	0.60%	-1.53	0.13
	Makah NFH	2001	0.08	1.94%	2.02%	-0.29	0.77
	Makah NFH	2002	0.11	1.85%	2.15%	-1.05	0.29
	Makah NFH	2003	0.21	1.22%	1.17%	0.26	0.80
	Makah NFH	2004	0.19	1.21%	1.16%	0.41	0.68
	Makah NFH	2005	0.23	2.28%	2.25%	0.15	0.88
	Makah NFH	2006	0.12	0.46%	0.36%	1.48	0.14
	Quinalt NFH	2001	0.15	3.33%	2.74%	3.00	0.00
	Quinalt NFH	2002	0.11	1.35%	1.63%	-1.63	0.10
	Quinalt NFH	2003	0.15	1.75%	1.53%	2.19	0.03
	Quinalt NFH	2004	0.10	1.34%	1.41%	-0.78	0.44
	Quinalt NFH	2005	0.09	1.57%	1.54%	0.31	0.75
	Quinalt NFH	2006	0.17	0.59%	0.62%	-0.57	0.57
SF=13% (5-27%)	Salmon River	2001	0.15	1.17%	1.18%	-0.07	0.95
	Salmon River	2002	0.12	0.18%	0.27%	-1.43	0.15
	Salmon River	2004	0.14	0.45%	0.49%	-0.22	0.83
	Solduc	2001	0.13	2.76%	2.65%	1.21	0.23
	Solduc	2002	0.09	3.59%	3.77%	-1.79	0.07
	Solduc	2004	0.13	2.61%	2.68%	-0.80	0.42
	Solduc	2005	0.18	4.09%	3.89%	1.88	0.06
	Solduc	2006	0.22	0.75%	0.65%	2.14	0.03

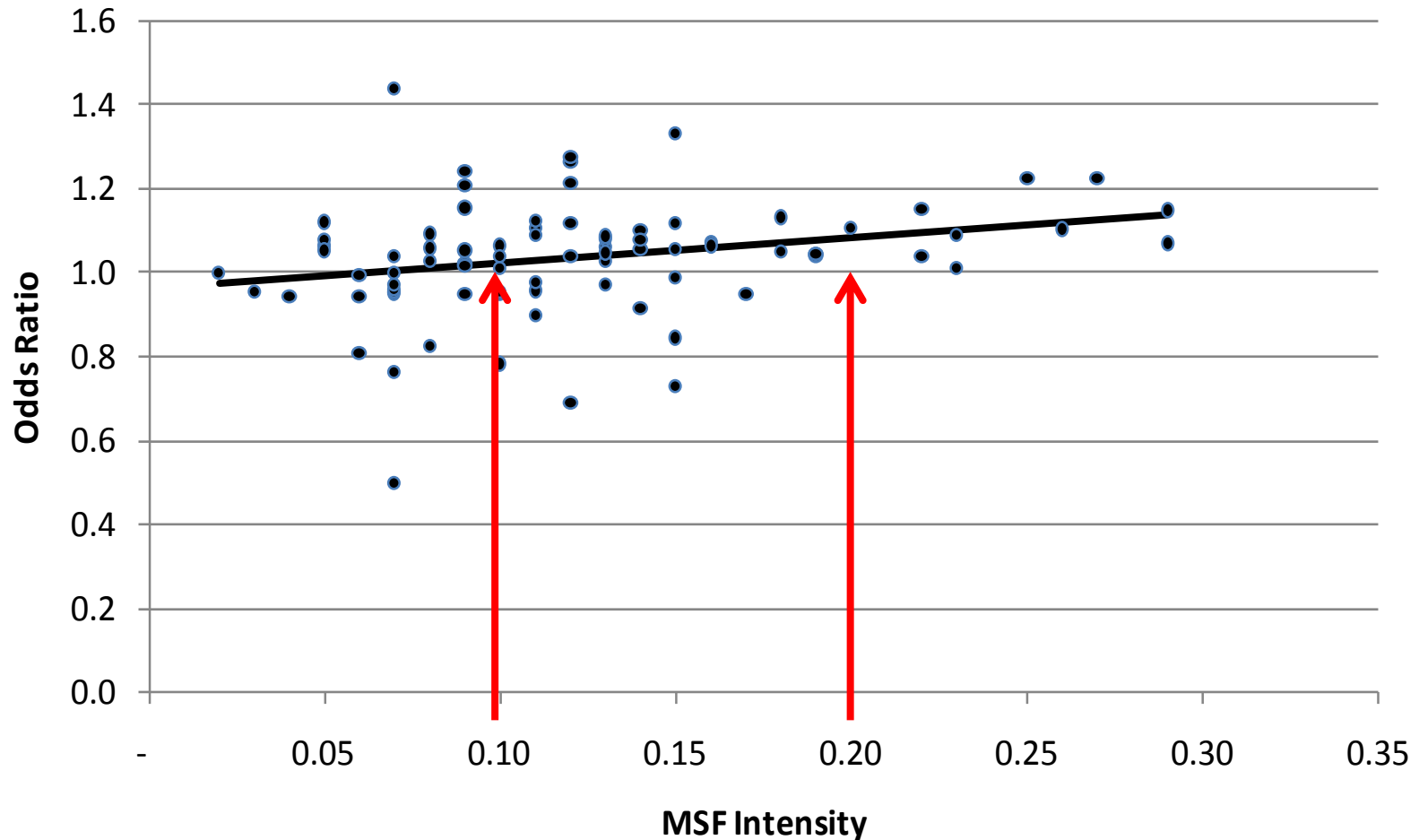
# Current Coho DIT Assessment

- 22 of 82 DIT groups assessed returned at significantly different rates
- Much easier to detect a MSF impact when DIT groups are rolled up by region
- When data were scrubbed for implausibly low escapement, significant association between selective fishery intensity and return rate difference was found

(M. Alexandersdottir & R. Koshow, in prep.)

- $< 10\%$  = no impact detected
- $10 - 20\%$  = impact detected
- $> 20\%$  = large impact detected

### Unmarked to marked ratio vs MSF intensity



# Lessons Learned – Coho DITs

- Improved hatchery practices
  - ↑ effort to treat groups equal
  - ↑ effort to sample all escapement
- Implausibly low escapements
  - Error in reporting
  - Not sampled
  - Fish are released off-station (stray)

(M. Alexandersdottir & R. Koshow, in prep.)

# Lessons Learned – Coho DITs

- Reporting of Releases
  - DIT identification missing
  - Related group ID missing
- Recovery data
  - MSF designation field
  - Tag detection method field

→ Resulted in extensive error checking

(M. Alexandersdottir & R. Koshow, in prep.)

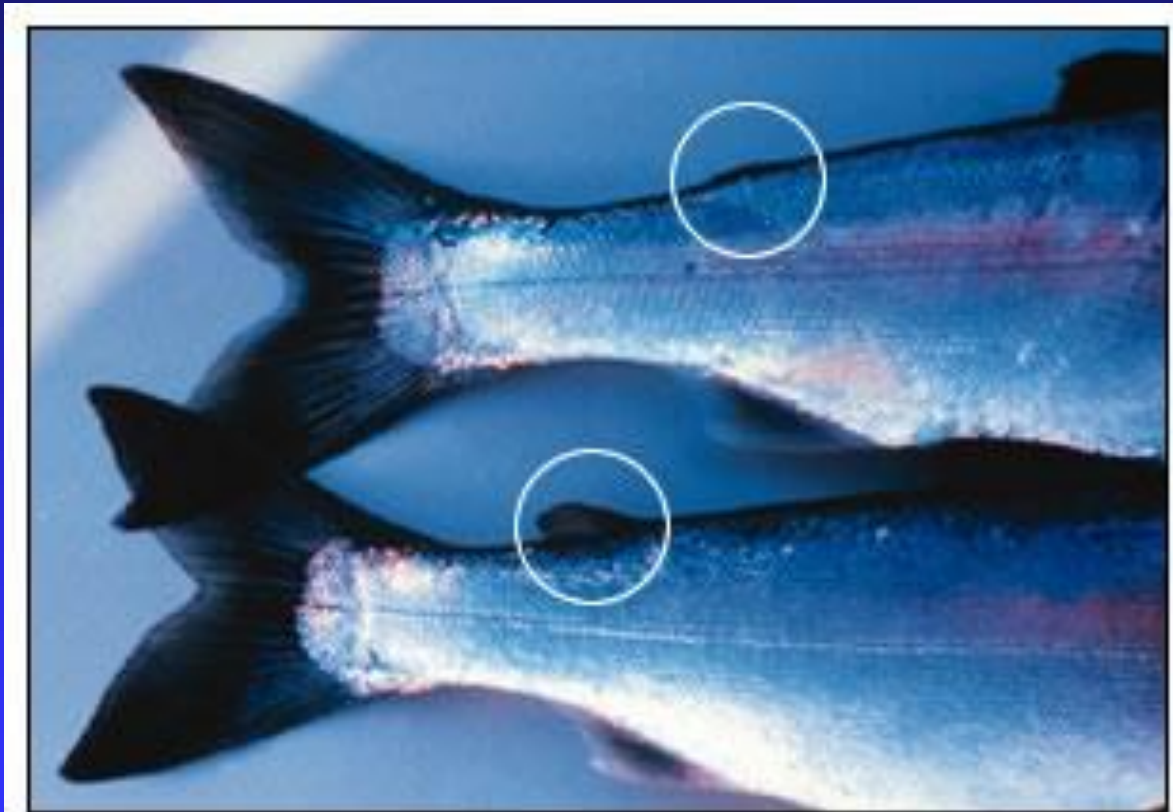
# Coho DITs – Recommendations

- Managers take into consideration added uncertainty
- Consider assumptions of the analytical methods when planning fisheries
- Sample all fisheries and escapement
- Review tagging levels
- Improve training for samplers and hatchery staff
- Review indicator stocks
- Establish a revision deadline for RMIS

(M. Alexandersdottir & R. Koshow, in prep.)

# Chinook MSF Analyses

- Catch Years 2003 – 2011

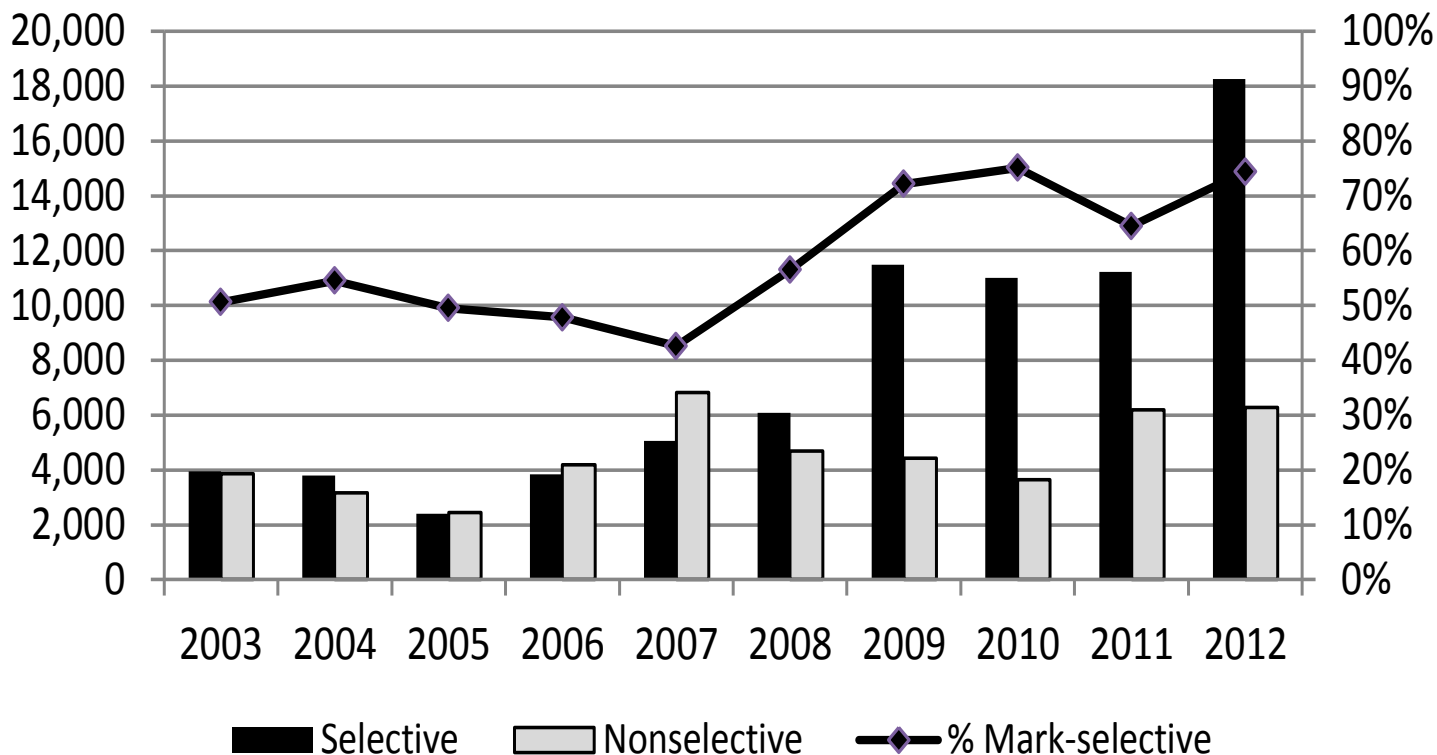


*Removed adipose fin (hatchery salmon) and intact adipose fin (wild salmon).*

WDFW

# Chinook MSFs – North PS

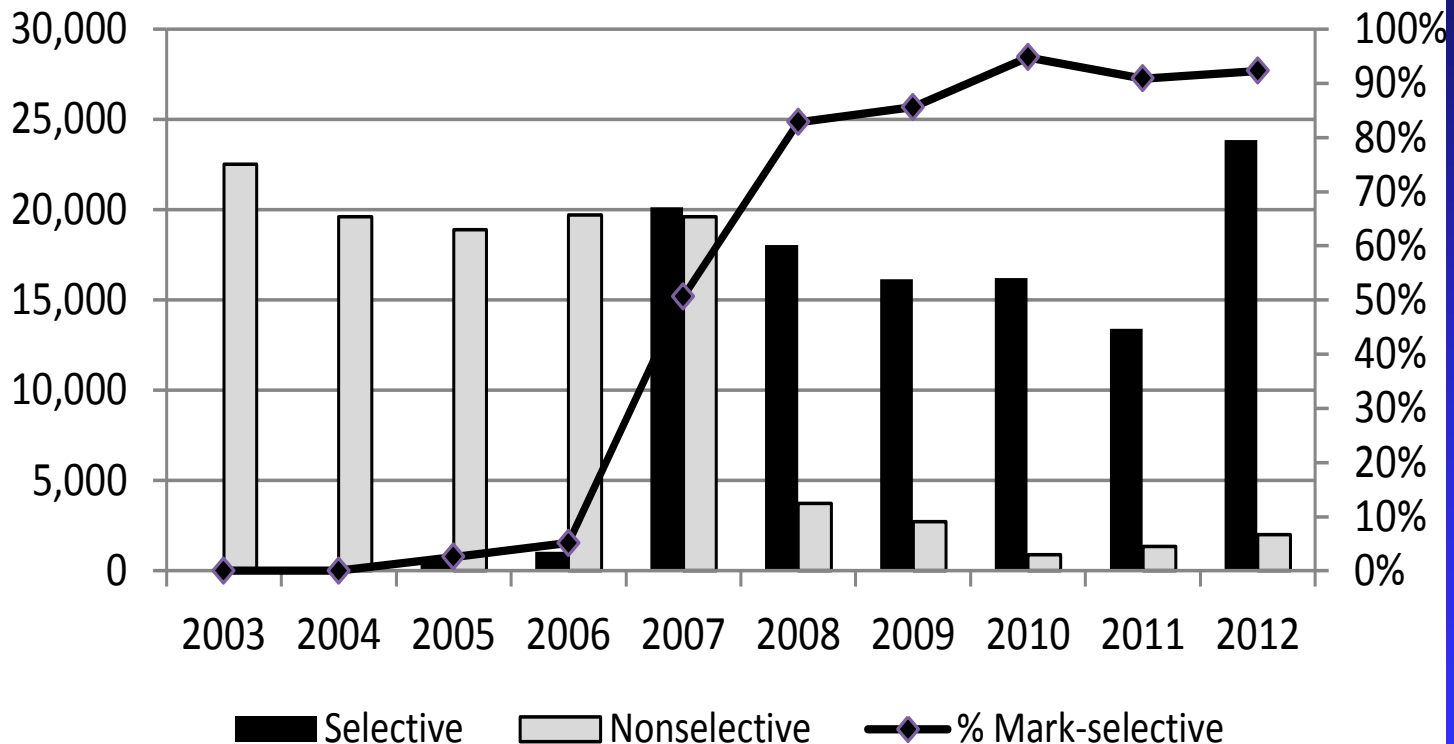
## Puget Sound Chinook Salmon Sport Catch in Marine North Areas



(CTC draft report)

# Chinook MSFs – Puget Sound

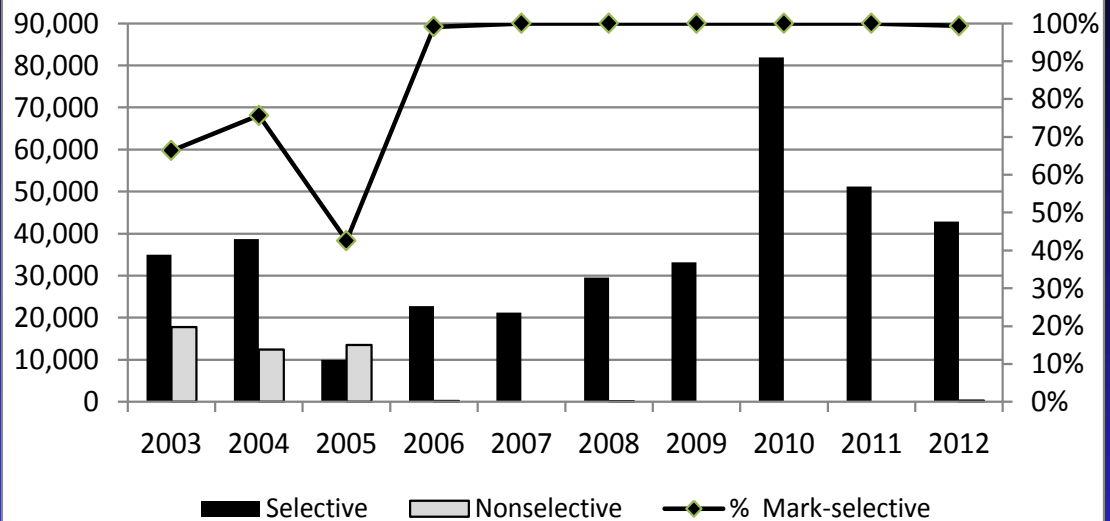
**Puget Sound Chinook Salmon Sport Catch  
in Marine Other Areas**



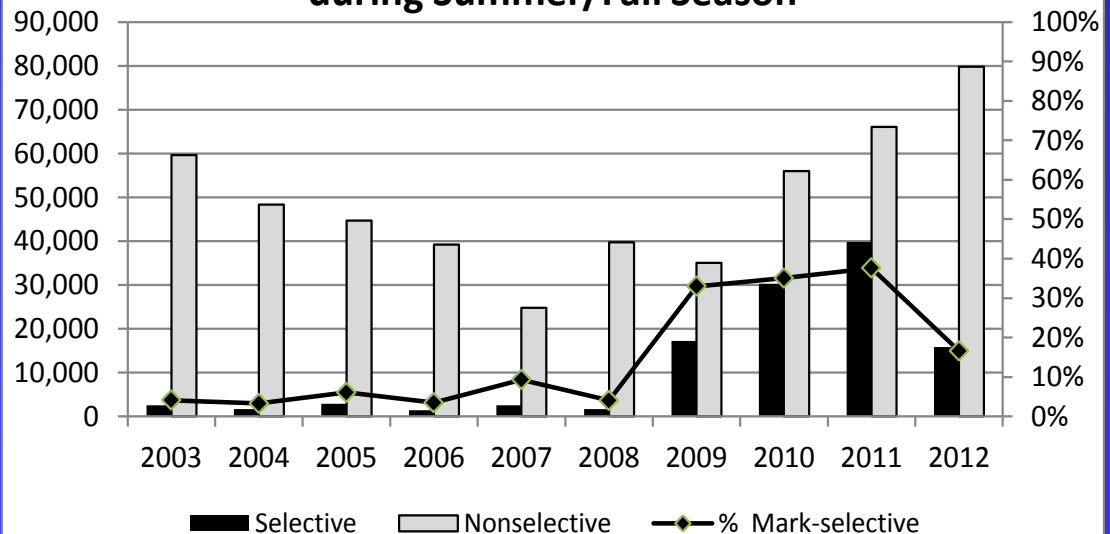
(CTC draft report)

# Chinook MSFs – Columbia River

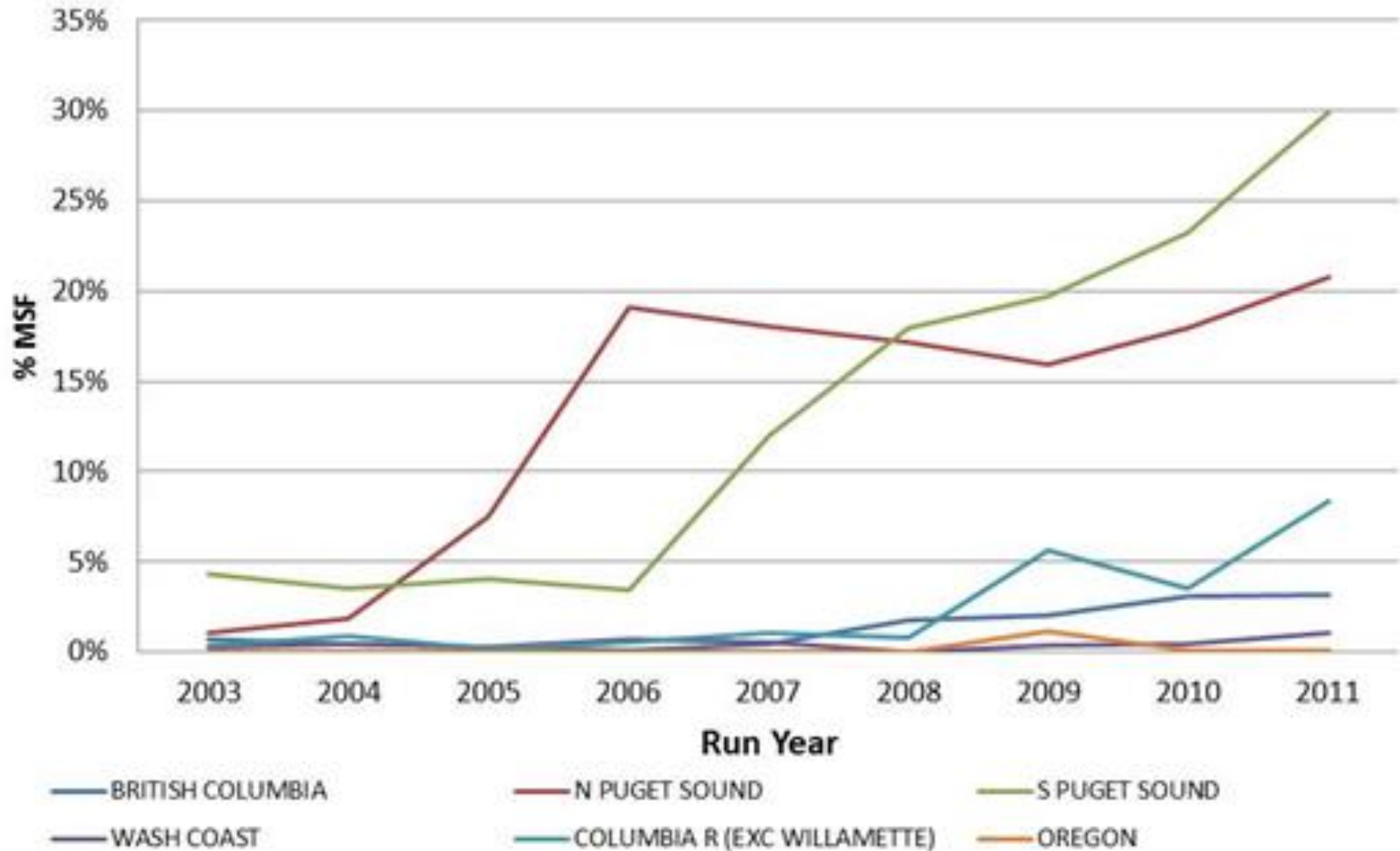
**Columbia River Chinook Salmon Sport Catch  
during Spring Season**



**Columbia River Chinook Salmon Sport Catch  
during Summer/Fall Season**



# % of CWT Recoveries in MSFs



# DIT Coverage

- 42 CTC indicator programs
- BC – 1 of 14 CTC stocks (5 impacted)
- Puget Sound – 8 of 13
- WA Coast – 0 of 3
- Columbia River – 2 of 10
- OR Coast – 0 of 2
- 11 DIT programs assessed to-date

# DITs –Columbia R and BC

Stock		Brood Year	Oldest age in brood	Z-test	p(0.05)
COLUMBIA RIVER	LRH	2006	5	-0.70	0.48
		2007	4	4.86	0
		2009	2	4.28	0
	SPR	2004	5	0.82	0.41
		2005	5	-1.15	0.25
		2006	5	-0.62	0.53
		2007	4	-4.47	0
		2008	3	-2.30	0.02
BRITISH COLUMBIA	CHI	1998	5	-7.44	0
		1999	5	2.29	0.02
		2000	5	0.08	0.94
		2001	5	-1.13	0.26
		2002	5	-2.45	0.01
		2003	5	-1.14	0.25
		2004	5	-1.67	0.09
		2005	5	2.55	0.01
		2006	4	1.58	0.11
		2007	3	-0.15	0.88
		2008	2	0.33	0.74

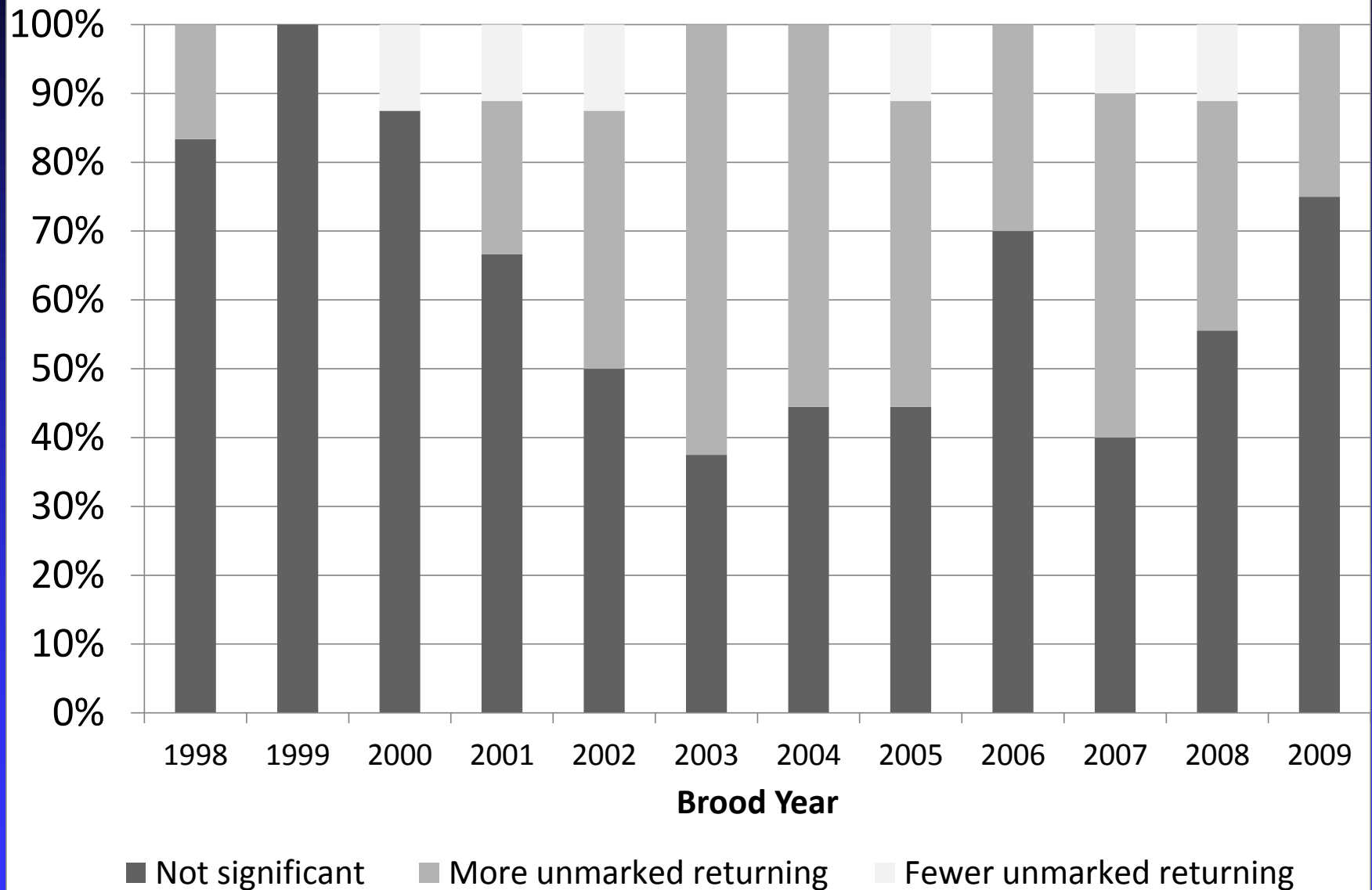
# DITs – North Puget Sound

Stock		Brood Year	Oldest age in brood	Z-test	p(0.05)
N PUGET SOUND	NSF	1998	5	0.77	0.44
		1999	5	-1.96	0.05
		2000	5	0.38	0.71
		2001	5	-2.68	0.01
		2002	5	-0.47	0.64
		2003	5	0.37	0.71
		2004	5	1.73	0.08
		2005	5	0.81	0.42
		2006	5	1.81	0.07
		2007	4	1.92	0.05
		2008	3	1.37	0.17
		2009	2	-0.25	0.8
	SAM	1998	5	-1.72	0.09
		1999	5	0.39	0.7
		2000	5	-2.51	0.01
		2001	5	2.70	0.01
		2002	5	0.02	0.98
		2003	5	0.20	0.84
		2004	5	-0.94	0.35
		2005	5	1.65	0.1
		2006	5	1.37	0.17
		2007	4	1.27	0.21
		2008	3	0.42	0.68
		2009	2	2.47	0.01
	SKS	1998	5	-0.08	0.94
		1999	5	0.55	0.59
		2000	5	0.25	0.8
		2001	5	1.66	0.1
		2002	5	3.92	0
		2003	5	3.86	0
		2004	5	7.71	0
		2005	5	2.30	0.02
		2006	5	2.02	0.04
		2007	4	2.62	0.01
	SKY	2008	3	4.41	0
		2000	5	0.78	0.43
		2001	5	-0.17	0.86
		2002	5	2.83	0
		2003	5	1.99	0.05
		2004	5	3.51	0
		2005	5	1.54	0.12
		2006	5	0.21	0.83
		2007	4	1.29	0.2
		2008	3	0.85	0.39
		2009	2	-1.35	0.18
		2008	3	0.85	0.39
		2009	2	-1.35	0.18

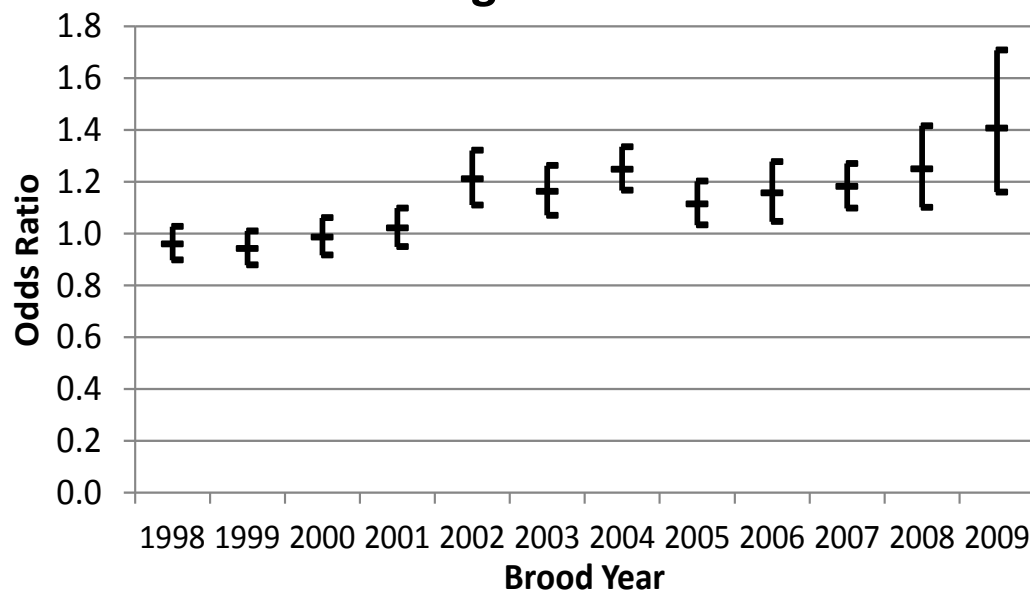
# DITs – South Puget Sound

Stock		Brood Year	Oldest age in brood	Z-test	p(0.05)
S PUGET SOUND	GAD	1998	5	0.54	0.59
		1999	5	1.04	0.3
		2000	5	0.75	0.45
		2001	5	0.50	0.62
		2002	5	1.33	0.18
		2003	5	2.79	0.01
		2004	5	1.16	0.25
		2005	5	3.54	0
		2006	5	1.26	0.21
		2007	4	6.04	0
		2008	3	2.60	0.01
		2009	2	1.68	0.09
	GRN	1997	5	-0.37	0.71
		1998	5	0.60	0.55
		1999	5	0.10	0.92
		2000	5	0.82	0.41
		2001	5	2.08	0.04
		2002	5	-2.26	0.02
		2003	5	1.54	0.12
		2004	5	2.14	0.03
		2005	5	2.70	0.01
		2006	5	2.19	0.03
		2007	4	3.53	0
		2008	3	-0.82	0.41
		2009	2	-0.34	0.74
	GRO	1999	5	1.69	0.09
		2000	5	0.99	0.32
		2001	5	1.41	0.16
		2002	5	1.10	0.27
		2003	5	3.65	0
		2004	5	3.06	0
		2005	5	-3.74	0
		2006	5	0.34	0.74
		2007	4	-0.47	0.64
		2008	3	0.64	0.52
		2009	2	1.67	0.1
	NIS	1998	5	6.00	0
		1999	5	1.01	0.31
		2000	5	-0.69	0.49
		2001	5	1.71	0.09
		2002	5	6.50	0
		2003	5	3.30	0
		2004	5	3.71	0
		2005	5	3.61	0
		2006	5	2.93	0
		2007	4	3.88	0
		2008	3	2.49	0.01
		2009	2	0.62	0.53

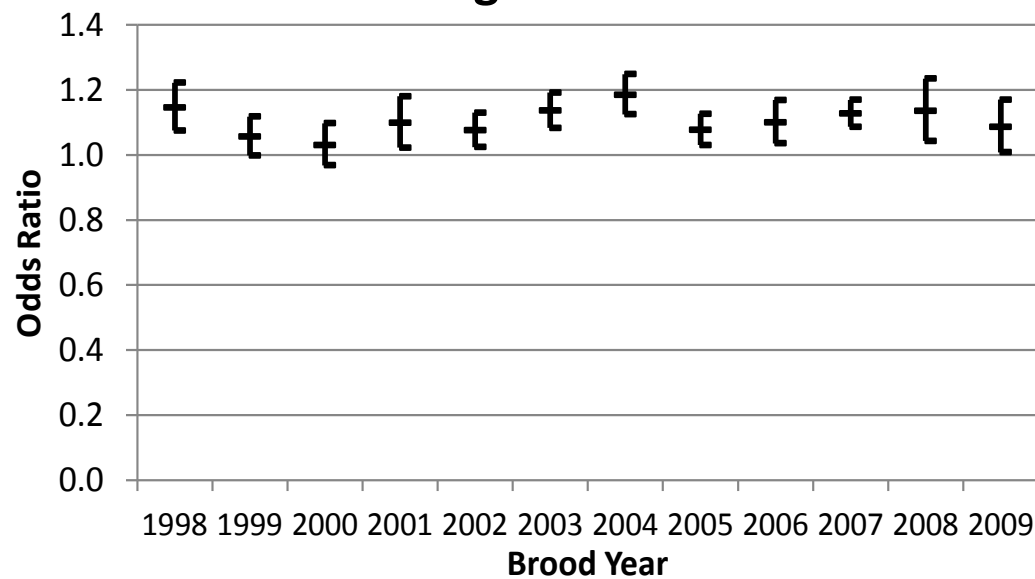
# DITs - 42 of 115 DITs Significant



### North Puget Sound DIT



### South Puget Sound DIT



# Lessons Learned - Chinook MSFs

- MSFs have increased in intensity in PS
  - We see a significant difference in return rates
- MSFs are in their infancy in the Columbia R. and along the coast
  - We don't have the DITs to test the hypothesis of selective impacts

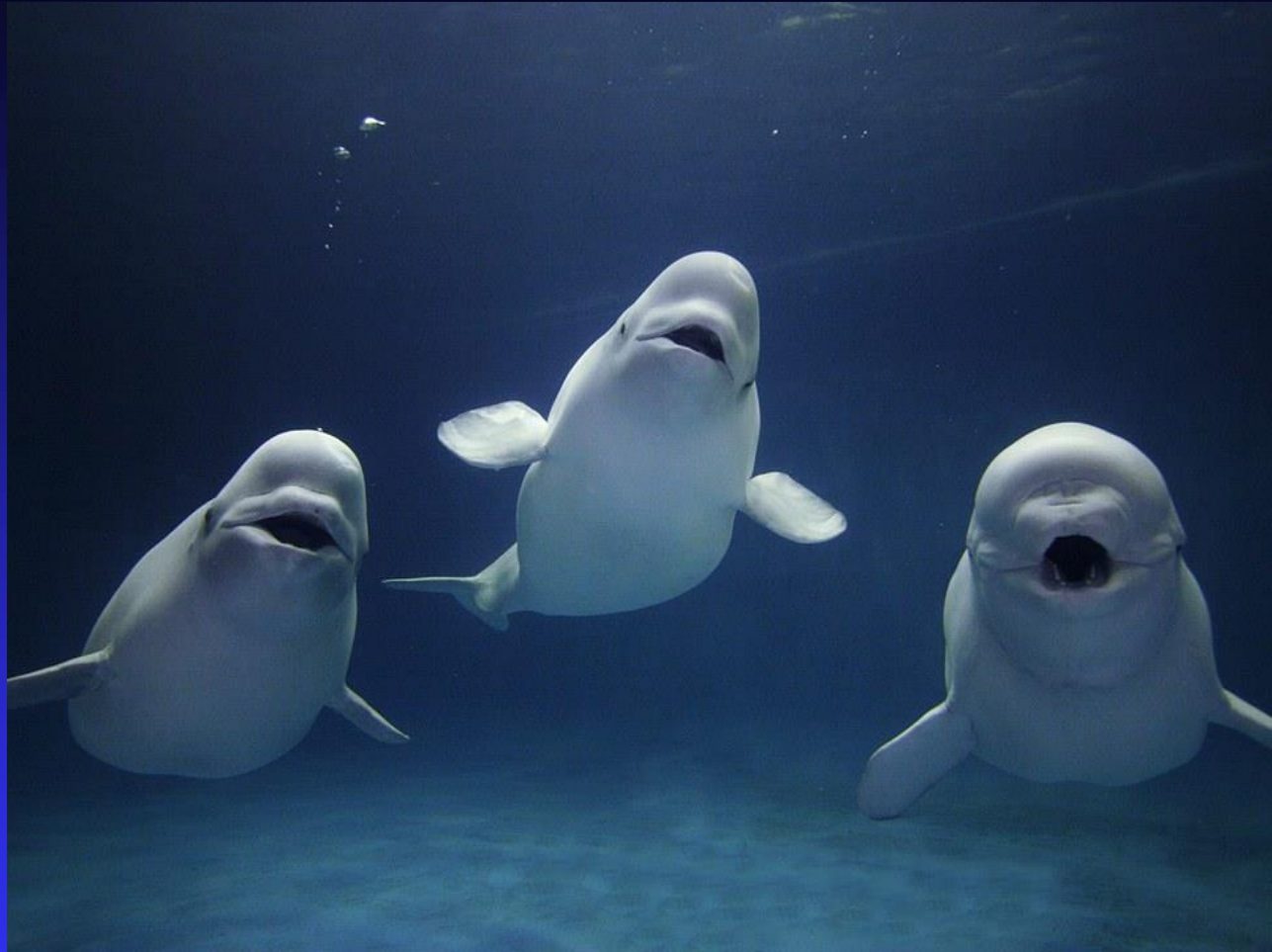
# ODFW Chinook and Coho DIT Releases

## Broodyears 1995-2013

ODFW DIT Releases		BROODYEAR																		
Species	Stock Source	95	96	97	98	99	00	01	02	03	04	05	06	07	08	09	10	11	12	13
Spring Chinook	CLACKAMAS R EARLY			2	3	2	2	2	2	2										
	COLE RIVERS HATCHERY				4	2	3	2	2	2	2	2								
	GRANDE RONDE R UPR												2				2		4	
	LOSTINE R ENDEMIC													2						
	MCKENZIE HATCHERY			3	3	3	2	2	2	2	2	3	2							
	MID WILLAMETTE R										2	3								
Fall Chinook (T)	BIG CR HATCHERY												2	2		2	2	4	2	2
Chinook Total				5	10	7	7	6	6	6	6	8	6	4		2	4	4	6	2
Coho	COLE RIVERS HATCHERY	2	2	2	2	2	2	2	2	2	2	2								
	FALL CR (ALSEA R)	2	2																	
	FISHHAWK LK (NEHALEM		4			4														
	NEHALEM R NF & TRIBS	4		4	4		4													
	SANDY HATCHERY (SANDY R	5	2	4	5	4	4	4	2	2	2	2	2	2	2					
	SILETZ R (SILETZ HT)			2	2	2	2													
	TANNER CR (BNVILLE)	7	9	5	5	5	2	2								2		4		
	UMPQUA R (ROCK CR HT)	4	4	3	2	2														
Coho Total		24	23	20	20	19	14	8	4	4	4	4	2	2	2	2		4		

# Sandy Stock Coho DIT Recoveries

RELEASE DATA					FISHERIES			ESCAPEMENT	OVERALL
Brood Year	Release Site	Tagcode	Ad+ CWT	CWT Only	Non-Sel	Sel	FISHERY TOTAL	HATCHERY	TOTAL
2000	SANDY R	093354	26,889	108	105	347	453	186	638
		093355	-	27,883	100	11	111	279	390
2000 Total					206	358	564	465	1,029
2001	SANDY R	093463	27,936	51	78	293	371	460	831
		093637	-	27,999	6	8	14	469	483
2001 Total					84	301	385	929	1,314
2002	SANDY R	093734	27,597	49	21	37	58	313	371
		093918	-	26,363	16	10	26	492	518
2002 Total					38	47	84	805	889
2003	SANDY R	094116	26,909		29	51	80	243	323
		094117	-	26,312	13	9	22	428	450
2003 Total					42	60	102	671	773
2004	SANDY R	094308	25,794		47	273	321	281	602
		094309	-	25,348	9	2	11	503	514
2004 Total					57	275	332	784	1,116
2005	SANDY R	094503	26,813		12	76	87	158	245
		094420	-	27,212	15	3	18	290	308
2005 Total					27	78	105	447	552
2006	SANDY R	094637	27,075	50	83	433	515	734	1,250
		094638	99	27,427	67	6	73	920	993
2006 Total					149	439	588	1654	2,242
2007	SANDY R	090162	27,830		5	70	75	299	374
		090163	-	27,687	15	6	21	505	527
2007 Total					20	76	96	805	901
2008	SANDY R	090261	28,169		47	74	121	314	435
		090260	-	27,901	34	7	41	580	621
2008 Total					81	81	162	894	1,056



*Questions?*