

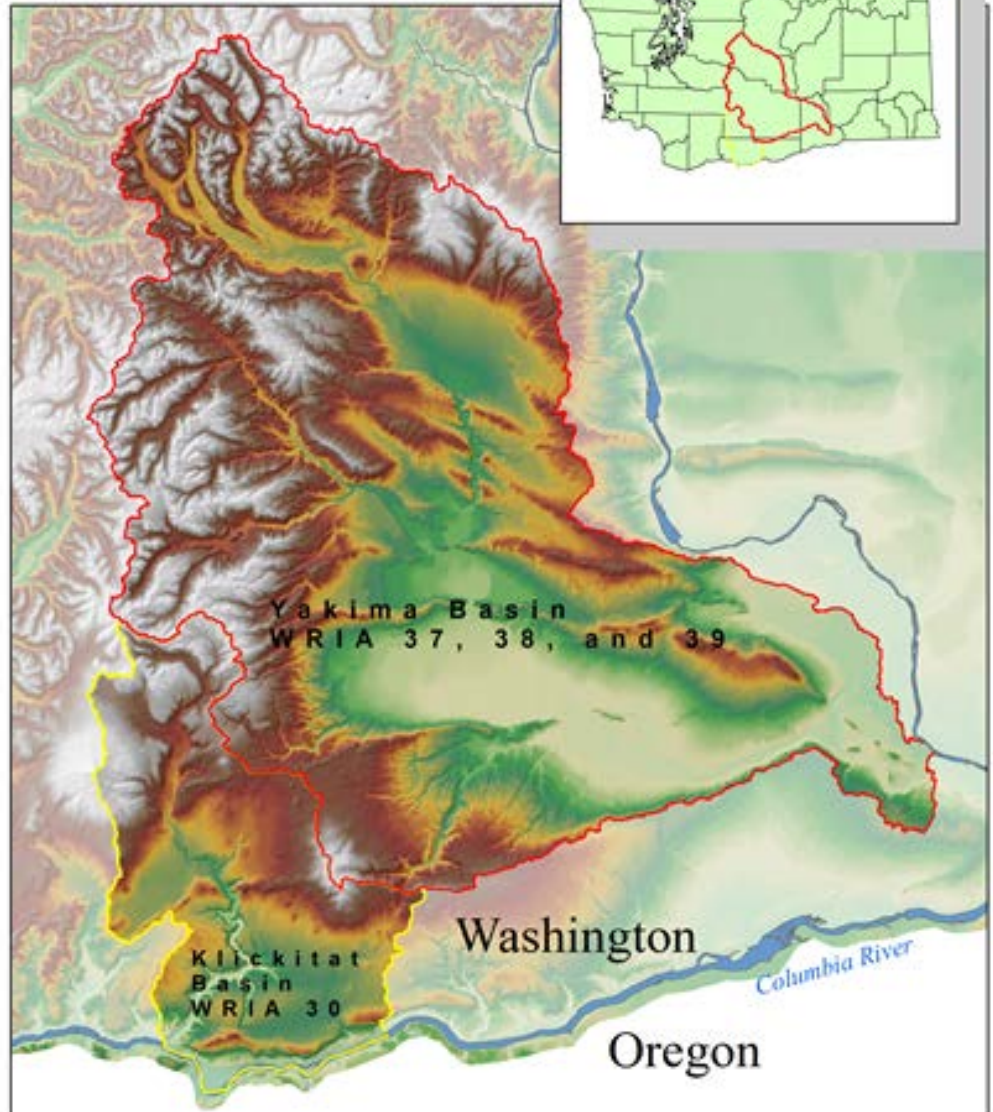


Yakima Klickitat Fisheries Project

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Juvenile Salmonid Predation

- Yakima River Basin
- Yakima River
- Irrigation Diversions
- American White Pelican
- Great Blue Heron



PIT Tags – Passive Integrated Transponder Tags

- Detailed info – Origin, Run, Rear....
- In river interrogation sites which track tagged fish

2009 YN began it's reintroduction of Summer Chinook



Released 176,00
30,000 PIT tag
1 PIT tag = 6 fish
June release date

Summer Chinook PIT tags detected for 2009:

Wapato Diversion - 422

Sunnyside Diversion - 444

Chandler Diversion – 365

Wapato Wildlife Rookery -120

Selah Rookery -13

AWPE colony at Badger Island – 201 (PSMFC data)

~1600 Summer Chinook tags

~10,000 fish accounted for

8% Summer Chinook tags accounted for in Heron Rookeries and Diversions scanned in 2009

PIT Tag Detection: Irrigation Diversions

- Roza
- Chandler
- Wapato
- Sunnyside
- Wanawish Left
- Wanawish Right



Irrigation Diversion PIT tags

- Conducted in front of fish screens and behind screens
- Timing of scanning coincides with BOR annual maintenance
- Numerous tags behind trash screens
- Underwater cameras behind trash screens show fish predation
- Primarily fish predation (some Pelican)

Chandler Irrigation Diversion

- Juvenile fish bypass facility
- PIT tag interrogation site
- Yearly entrainment study
- Mortality study - Expanded to Sunnyside Diversion

Chandler Canal

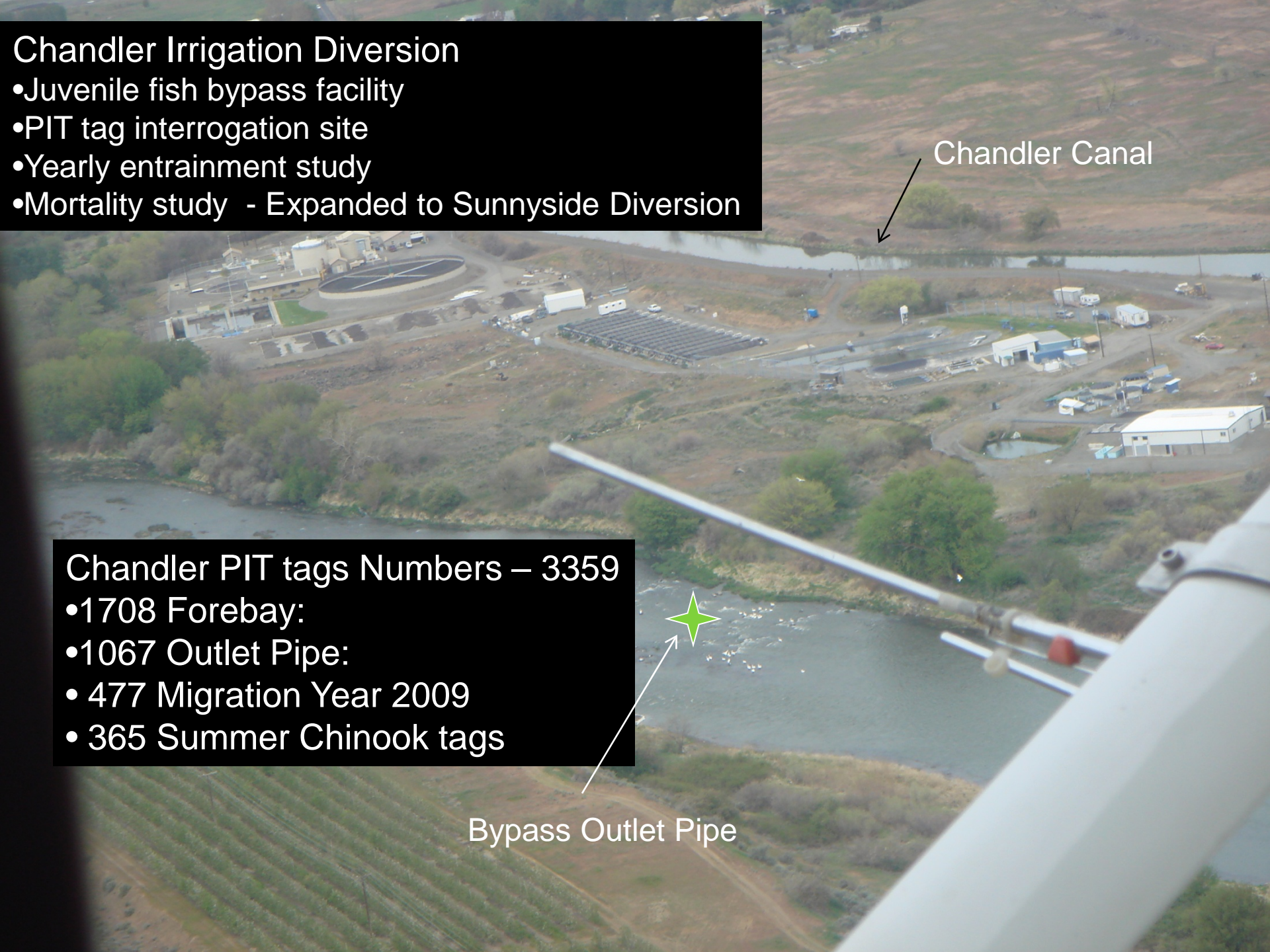


Chandler PIT tags Numbers – 3359

- 1708 Forebay:
- 1067 Outlet Pipe:
- 477 Migration Year 2009
- 365 Summer Chinook tags



Bypass Outlet Pipe



Wapato Irrigation Diversion

- 1607 Total number PIT tags
- 587 Migration Year 2009
- 422 Summer Chinook

Sunnyside Irrigation Diversion Forebay

- 1962 Total number of PIT tags
- 575 Migration Year 2009
- 387 Summer Chinook

Sunnyside Irrigation Diversion Aft Forebay

- 312 Total number of PIT tags
- 78 Migration Year 2009
- 57 Summer Chinook

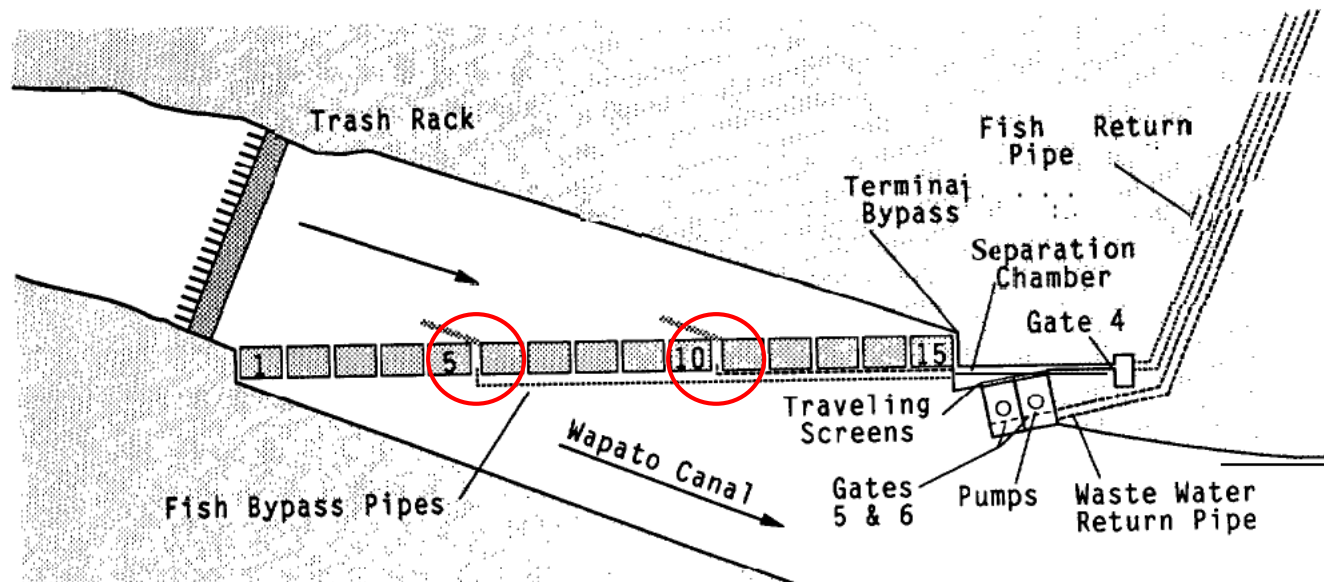


Assuming uniform fish distribution above Sunnyside Dam, about 75% of the fish in the Yakima River may be diverted through the Sunnyside Canal Fish Screening Facility. - *A FISHERIES EVALUATION OF THE SUNNYSIDE CANAL FISH SCREENING FACILITY, SPRING 1985*

- Irrigation Diversions pull ~ 1,000 CFS
- Low flow in the river causes more fish to be entrained in diversions
- Summer Chinook released mid June subject to higher entrainment with lower river flow

Fish Diversions uses rolling screens with a sweeping velocity to direct fish to three bypass pipes

In the Wapato Screening Facility two of the fish bypass pipes were discovered to be clogged and one operating less than 15%.



“The fish became passive as a result of fatigue, and eventually became impinged” — *A Fisheries Evaluation of the Richland and Wapato Canal Fish Screening Facilities , Spring 1987*

FIGURE 4. Flow Control Structure and Fish Bypass System in the Wapato Canal Fish Screening Facility

“there has undoubtedly been a net improvement in juvenile fish survival (relative to fish screening facilities) as a direct result of this evaluation program.”-

A Summary of 22 Years of Fish Screen Evaluations in the Yakima River Basin
Summary Report
1985 – 2007

Letter written to the Bureau of Reclamation from the Yakama Nation for failure in fish bypass operations:

- BOR has not been maintaining the fish passage facilities at Wapato Dam
- The Bureau of Reclamation (BOR) has had the responsibility and funding to maintain and operate these fish passage facilities.
- An examination of the facilities showed the juvenile by-pass facilities maintained by Reclamation at Wapato Dam was blocked due to lack of maintenance by Reclamation.
- Yakama Nation may wish to seek restitution and/or other compensation for our losses

American White Pelican Hazing

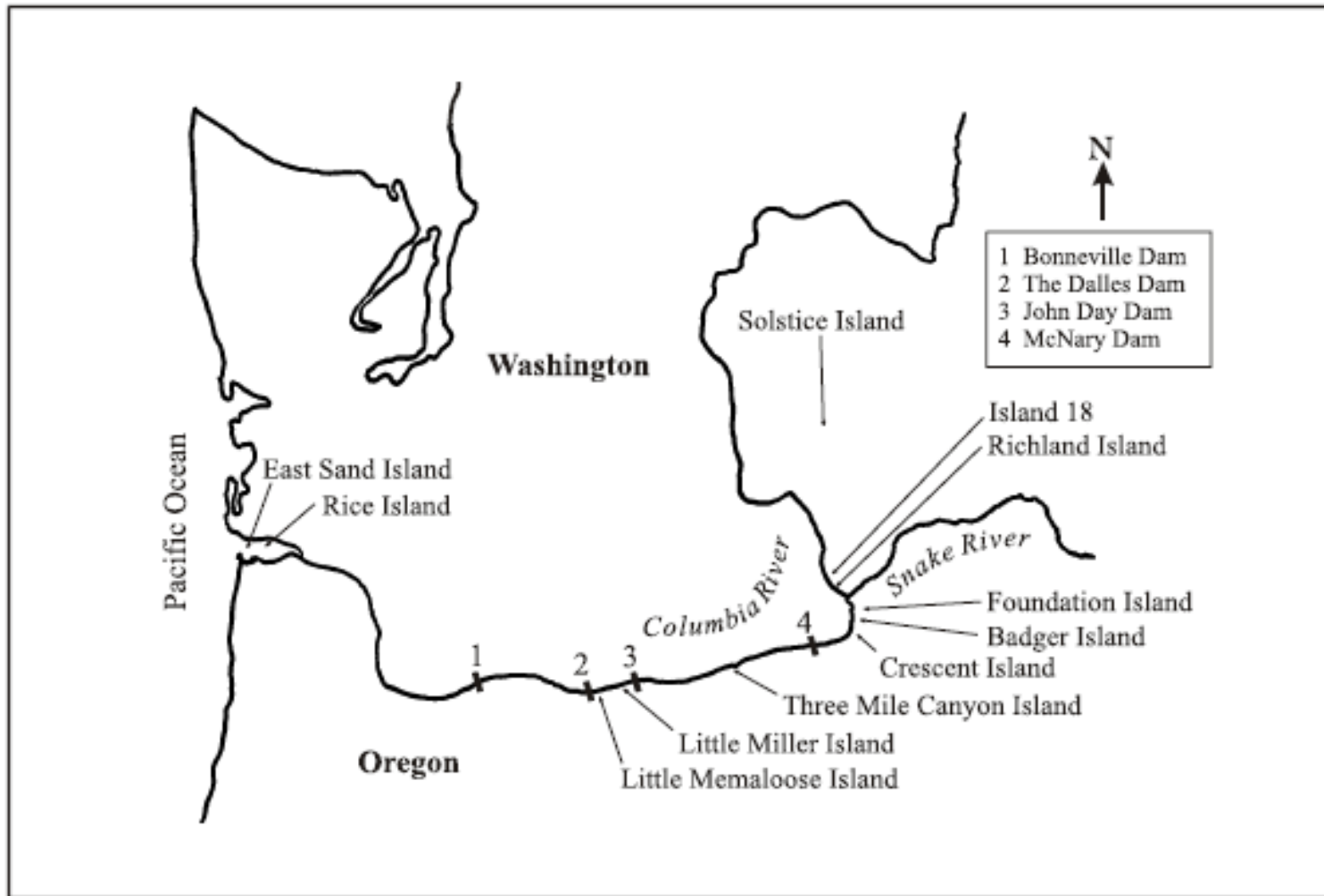




Why Haze Pelicans?

- Visually seen taking smolts
- PIT tag data – Predation by AWPE
 - Badger Island AWPE Colony in McNary Pool
 - Chandler outlet pipe
- Large Numbers of AWPE occurring during smolt out-migration: 150-200 Horn Rapids
- Low CFS at Prosser brings similar numbers of Pelicans to the Chandler juvenile bypass outlet pipe

8279 PIT tags found on Badger Island - 2760 YN fish



Badger Island

~ 30 Miles from Horn Rapids (Wanawish Dam)

~ 40 Miles from Prosser (Chandler Juvenile Screening Facility)

Round trip foraging distance AWPE documented up to 611 kilometers.

Cormorants, Darters and Pelicans of the World. Paul Johnsgard 1993

American White Pelican Badger Island PIT tag surveys: Yakama Nation Fish

	2009	2008	2007	2006	2005	2004	
Spring Chinook	167	298	70	91	104	53	
Summer Chinook	201	0	0	0	0	0	
Fall Chinook	53	620	163	219	89	77	
Coho	81	186	96	58	93	27	
Steelhead	1	4	3	1	4	1	
PIT tag Total:	503	1108	332	369	290	158	2760

2008 Fall Chinook PIT tags Deposited on Badger Island totaled 620:

- 349 - Released above Prosser Dam
- 52 – Chandler Canal - Juvenile Facility Calibration
- 73 – Detected by the Chandler PIT tag interrogator (*Interrogated late June early July*)
- 219 - Released from the Prosser Fish Hatchery

201 – Summer Chinook Tags

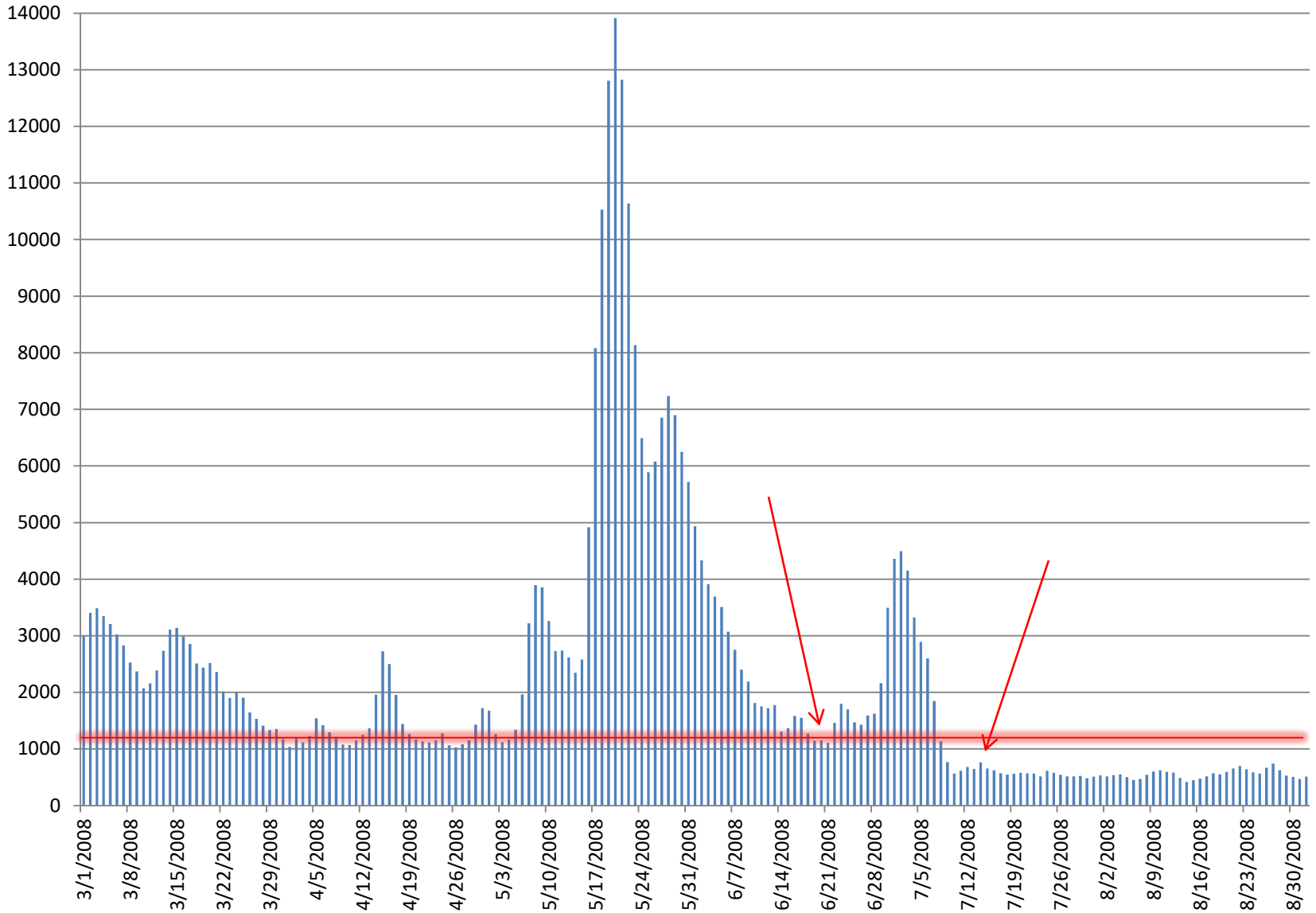
American White Pelican Chandler Outlet Pipe PIT tag surveys

	2009	2008	2007	2006	2005	2004	2003	2002	2001	2000	
Summer	40										
Spring	23	56	37	13	14	6	7	3	2	5	
Fall	2	106	121	18	26	38	7		3	4	
Coho	4	23	28	6	6	1		2	2	1	
Steelhead	3	1			5			1			
Total	72	186	186	37	51	45	14	6	7	10	614

Fall Chinook and Summer Chinook Yakima River Releases Above Wapato Diversion

Release Yr	AccSite	Stock	Release d	N fish	# RV	# LV	# PIT	CWT	AD	Unmarked
2005	STI	YAK	4/18/05	38,890			4198			
2006	STI	YAK	5/10/06	118,835			19,901			
2007	BILLYS	YAK	5/10/07	5,002			5002			
	STI	YAK	5/10/07	75,000			9,970			
2008	STI	YAK	5/15/08	72,296			10,007		59,176	3,113
	BILLYS	YAK	5/11/08	11,308			5,008		6,103	197
	SKOV	YAK	5/16/08	5,417			5,002			415
2009	MARI	MARI	4/17/09	24,245						24,245
	STI	WELL	6/12/09	180,911	Summer Chinook		30,045	150,866		

Daily CFS near Prosser March to September 2008





Great Blue Heron Rookeries



Study methods

- Identify all Rookeries in the Yakima Basin
- Population surveys during nesting
- Detection efficiencies by seeding PIT Tags
- PIT Tag reading post fledge and after flooding
- PIT Tag removal (Tag collision causes interference)
- Aerial flights and river surveys monitor population



Yakima Basin

- 17 Great Blue Heron Rookeries
- 15 active Rookeries
- 395 Nests ~ 700 GBHE
- Double Crested Cormorants in Sunnyside Wildlife Area

Great Blue Heron with babies



Selah Rookery

- Focus of Study
- 30 + nests previously, currently 26 nests
- I -82
- 12.25 acres

Yakima Basin Great Blue Heron Rookeries

Selah Rookery



97

82

13 km



Selah Great Blue Heron Rookery: PIT Tag Numbers

	2009	2008	2007	2006	2005	2004	2003	2002	2001	2000	1999	Yrs combined
Fall Chinook		81	5	128	6							220
Spring Chinook	128	173	41	161	206	114	34	58	24	31		970
Summer Chinook	13											13
Steelhead	1	2										3
Coho	69	131	53	76	210	46	15	16	17	21		654
Unknown Chinook												0
Total	211	306	94	237	416	160	49	74	41	52	0	1640

1 Orphan tag in group

Roza Dam



Roza Dam creates a river reach of low flow providing predation opportunities for wading birds

- Irrigation
- Power
- 1400 CFS taken out of river
- Reach Distance - 18.3 Km

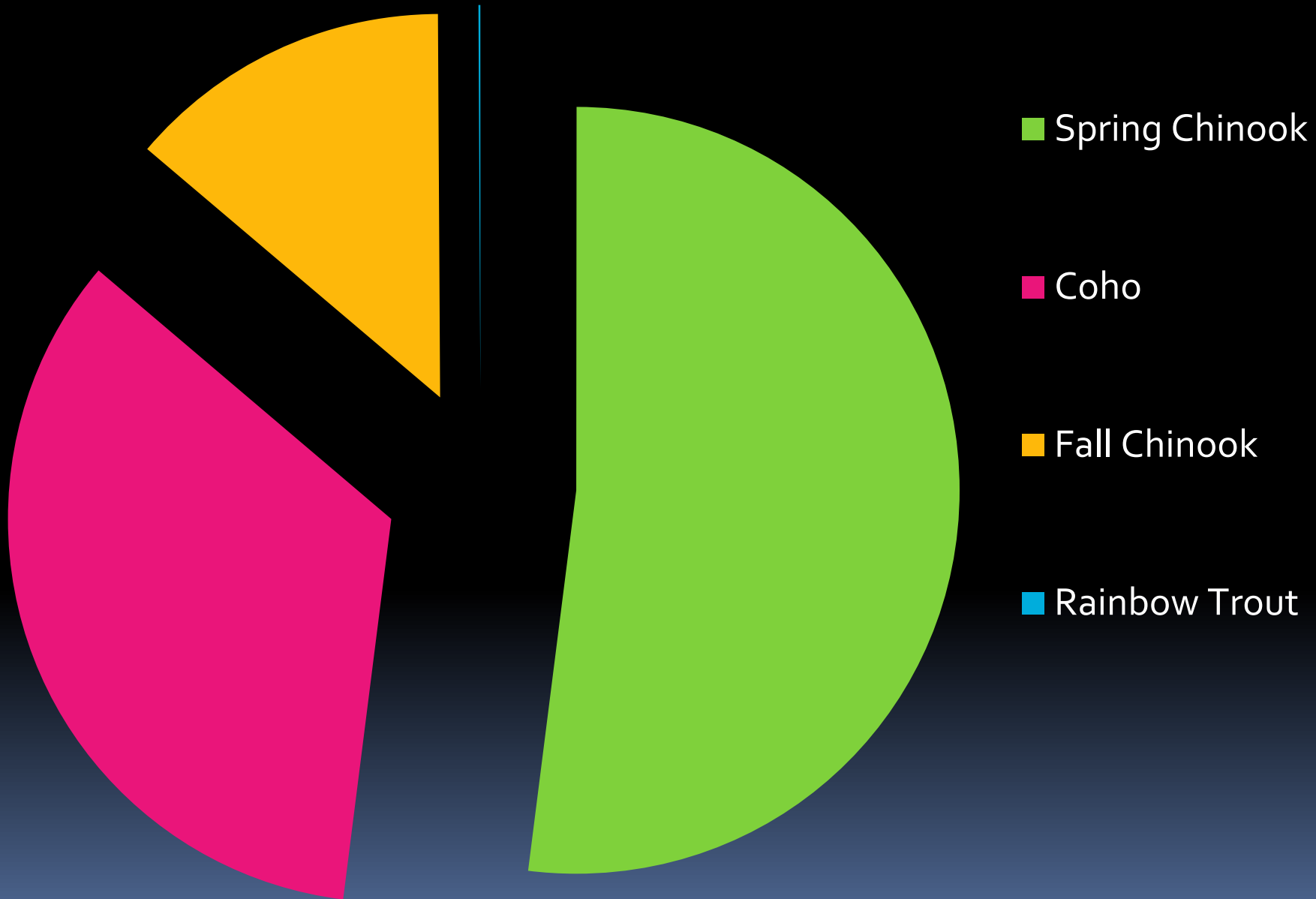
Selah Heron Rookery

Naches River

Smolt Flushing Flows are determined to be 1000 CFS for a period of three days by biologists of the Yakama Nation, BOR, and WDFW

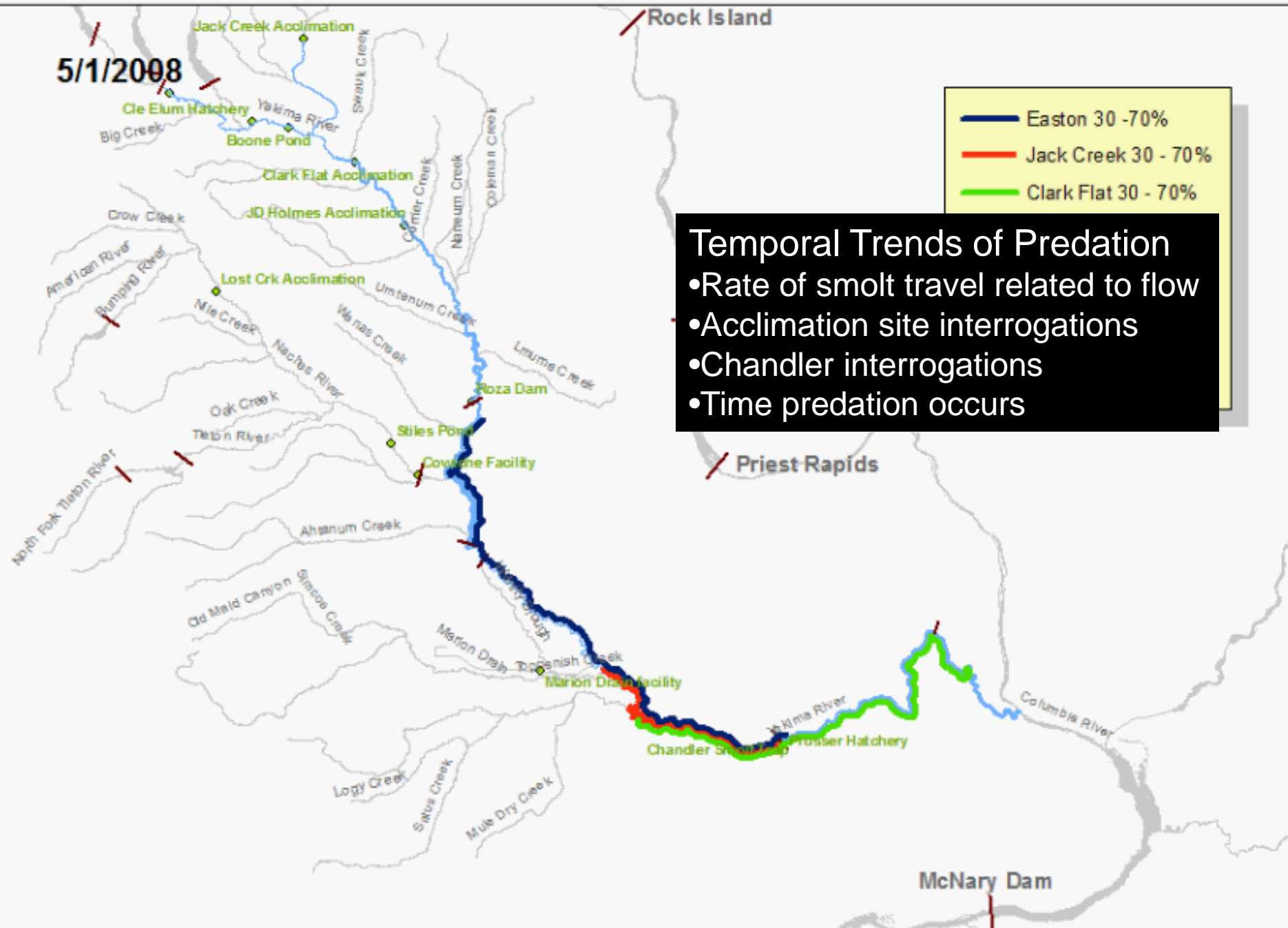


Selah Rookery PIT Tag Deposits by Species



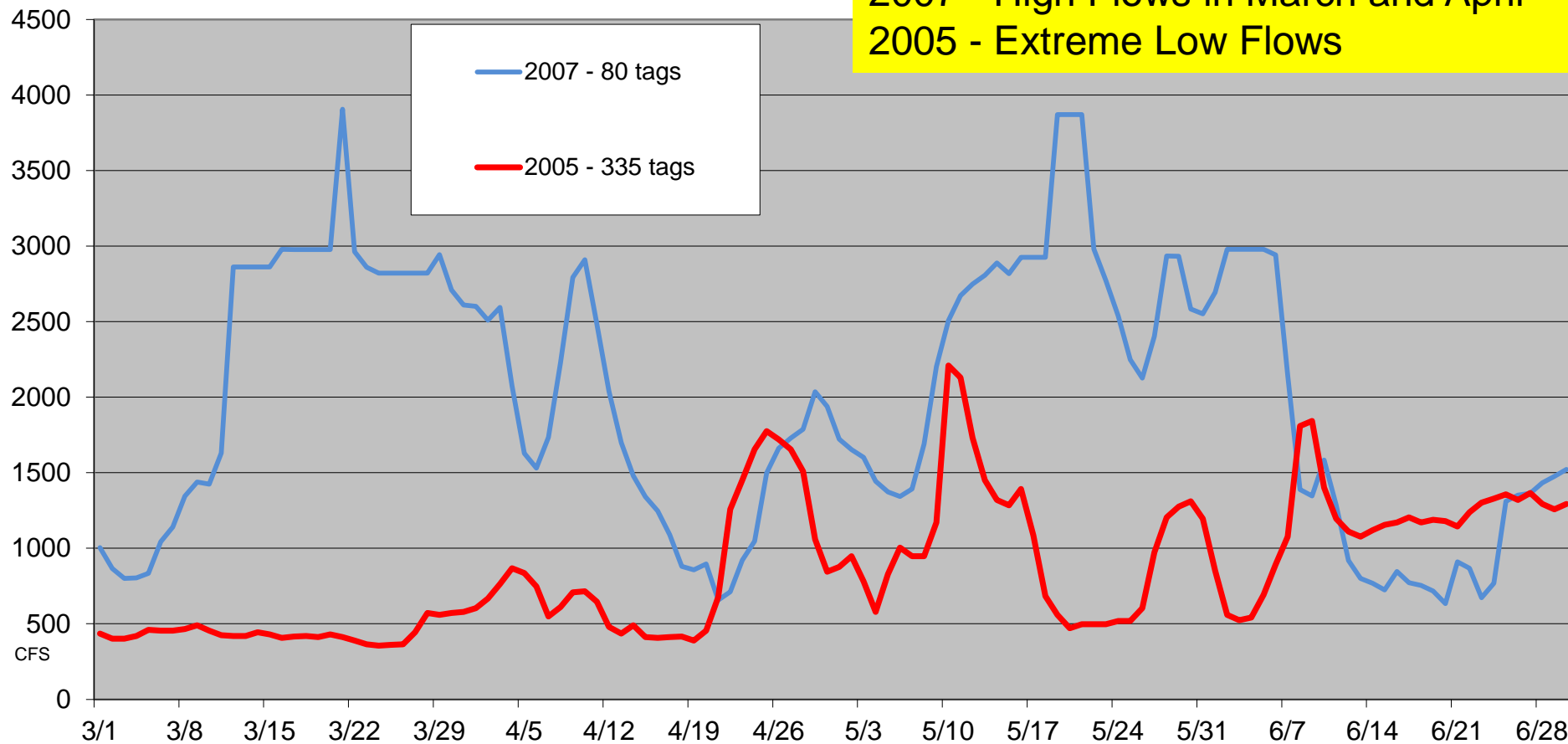
Yakima River Spring Chinook Releases and Flow in 2008

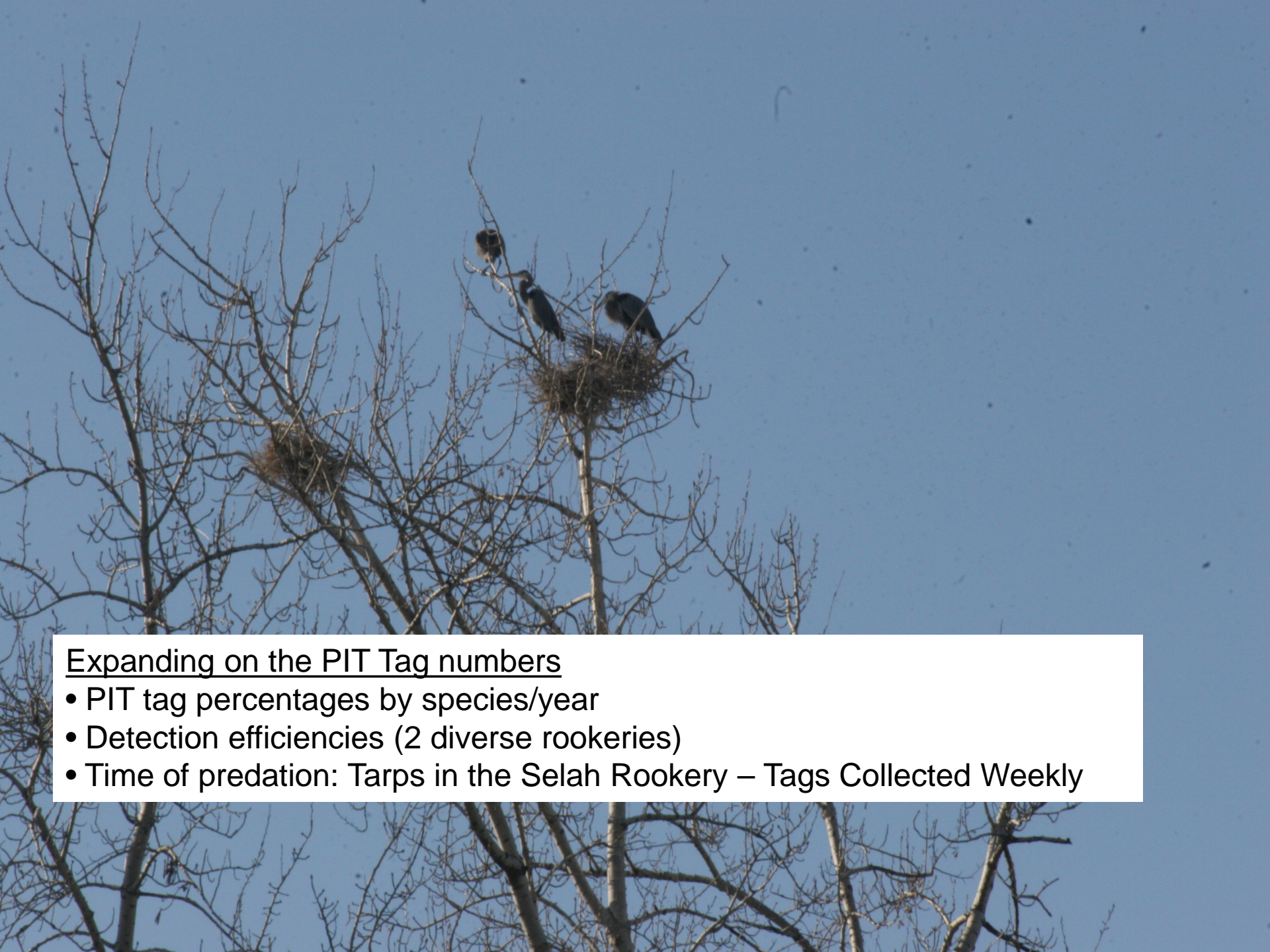
5/1/2008



Number of Flushing Flows for 2008		Number of Flushing Flows for 2007		Number of Flushing Flows for 2006		Number of Flushing Flows for 2005	
March	0	March	0	March	0	March	0
April	4	April	3	April	6	April	2
May	10	May	10	May	5	May	3
June	3	June	3	June	5	June	8
Total	16	Total	16	Total	20	Total	14
Average QD	1187		1988		1240		860

2007 - High Flows in March and April
 2005 - Extreme Low Flows





Expanding on the PIT Tag numbers

- PIT tag percentages by species/year
- Detection efficiencies (2 diverse rookeries)
- Time of predation: Tarps in the Selah Rookery – Tags Collected Weekly



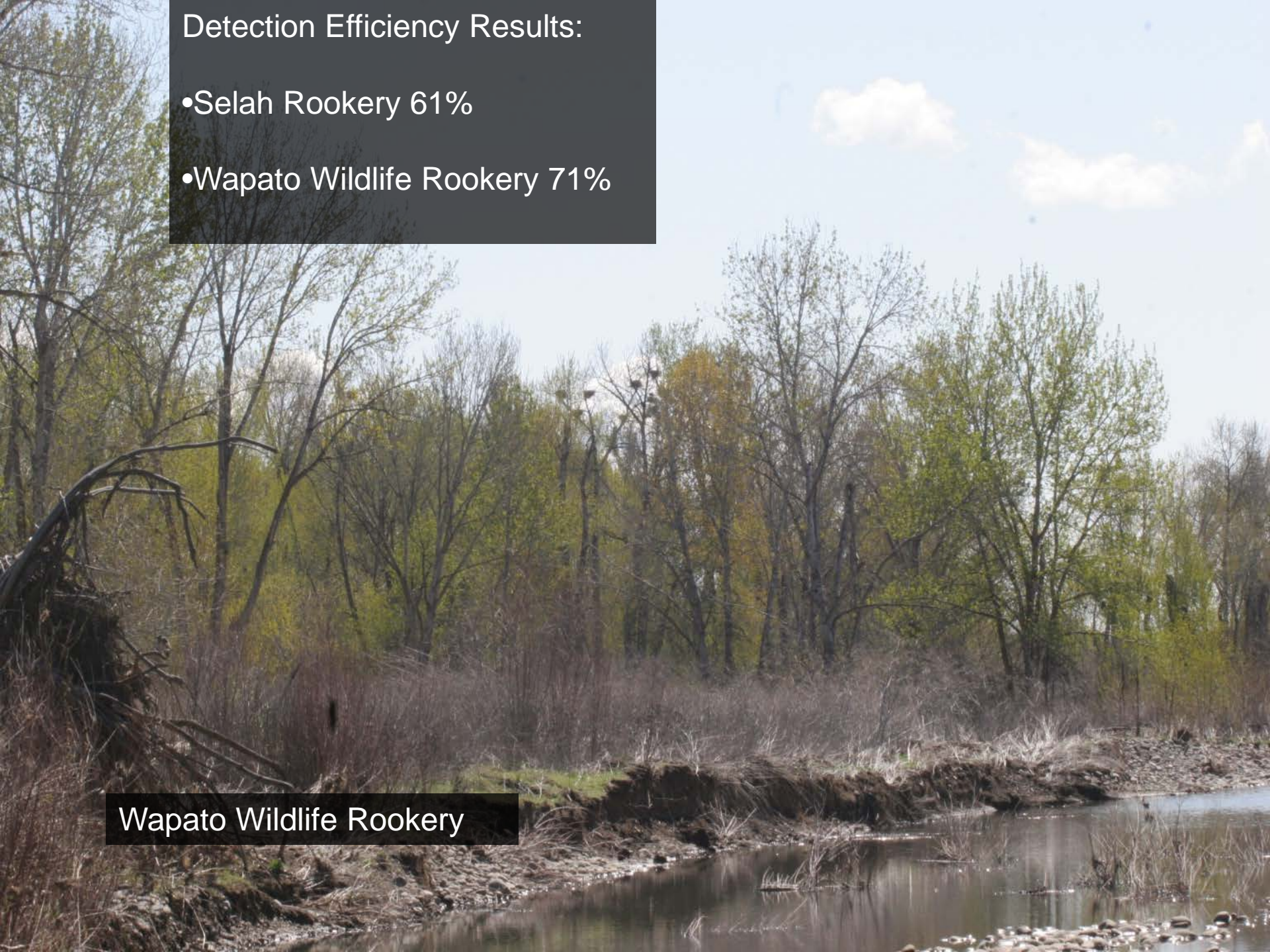
PIT Tag Detecting Efficiency

Total of 100 PIT tags were seeded at two rookeries in Mid-April (eggs are hatching) and Mid-July (fledging) 2009.

Detection Efficiency Results:

- Selah Rookery 61%
- Wapato Wildlife Rookery 71%

Wapato Wildlife Rookery



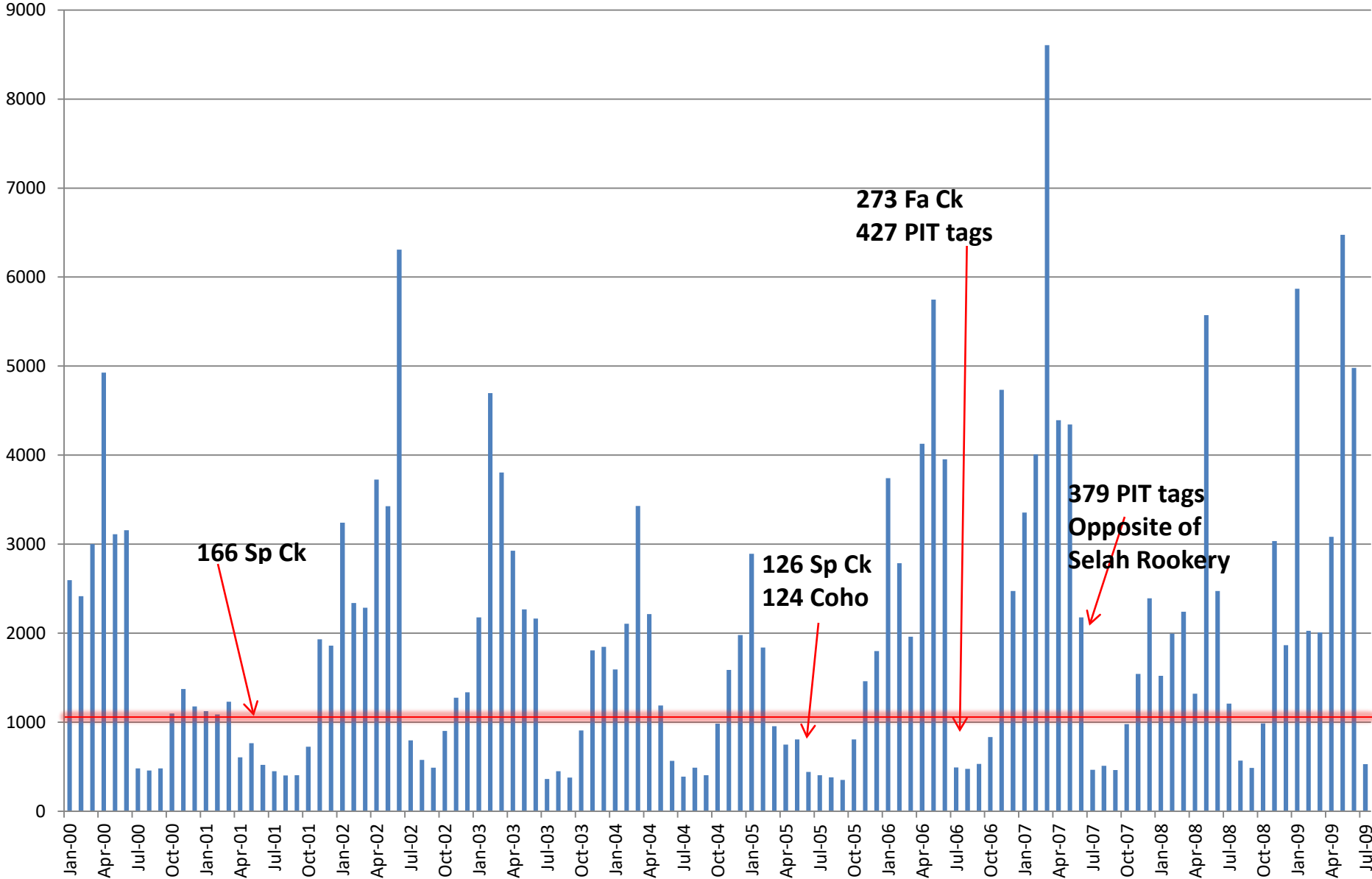
Wapato Wildlife Great Blue Heron Rookery: PIT Tag Numbers

	2009	2008	2007	2006	2005	2004	2003	2002	2001	2000	1999	1998	Yrs combined
Fall Chinook		74	105	273	40	1							493
Spring Chinook	61	78	118	66	126	55	89	57	163	33	1		847
Summer Chinook	120												120
Steelhead		1	1		5	3		1					11
Coho	74	108	155	88	124	58	106	57	70	55	2	1	898
Unknown Chinook													0
Total	255	261	379	427	295	117	195	115	233	88	3	1	2369

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Monthly Avg Flow at Parker



Sunnyside Wildlife Area Rookery

- 7 - Great Blue Heron Nests
- 15 - Double Crested Cormorant Nests

PIT tags detected for 2009 smolt migration year:

Great Blue Heron:	501 - total PIT tags all years
	113 - MIG YR 2009
Double Crested Cormorant:	1340 - total PIT tags all years
	457 - MIG YR 2009

Questions?