System Operations Advisory Committee Pulse Flow Recommendations

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What is SOAC?

- System: Yakima Project Reservoirs and Diversions
- Operations: How, where, and when
- Advisory: Provide recommendations
- Committee: WA DFW, USFWS, Yakama Nation, Irrigation Districts
- Formed in early 1980's following Quackenbush Ruling

Annual SOAC Considerations

- Flip-Flop, Spawning and Incubation Flows
- Tieton and Bumping Drawdown
- Timing of maintenance activities
- Smolt migration flows

Smolt Passage Guidelines Rationale

The following ***experimental guidelines*** are proposed for use from ***March 25 through June 30*** to determine when ***releases from Reclamation storage reservoirs*** may be necessary to ***stimulate and facilitate rapid downstream smolt passage through the lower Yakima River*** from Sunnyside Dam (Parker) to the Columbia River. SOAC's intent in testing these guidelines is to prevent stalling of the smolt migration caused by declining and/or unnaturally stable low flows in the lower Yakima River.

Hypothesis: Migration is stalled and late due to water management operations.

SOAC shall recommend a passage release based on the following criteria:

- At least 100 smolts (all species combined) were counted (Chandler JV raw count) passing Prosser Dam on three consecutive days (indicating smolt outmigration has begun); **and**

Temperature Criteria

- Mean Water Temperature
- (3-day moving average, F.)

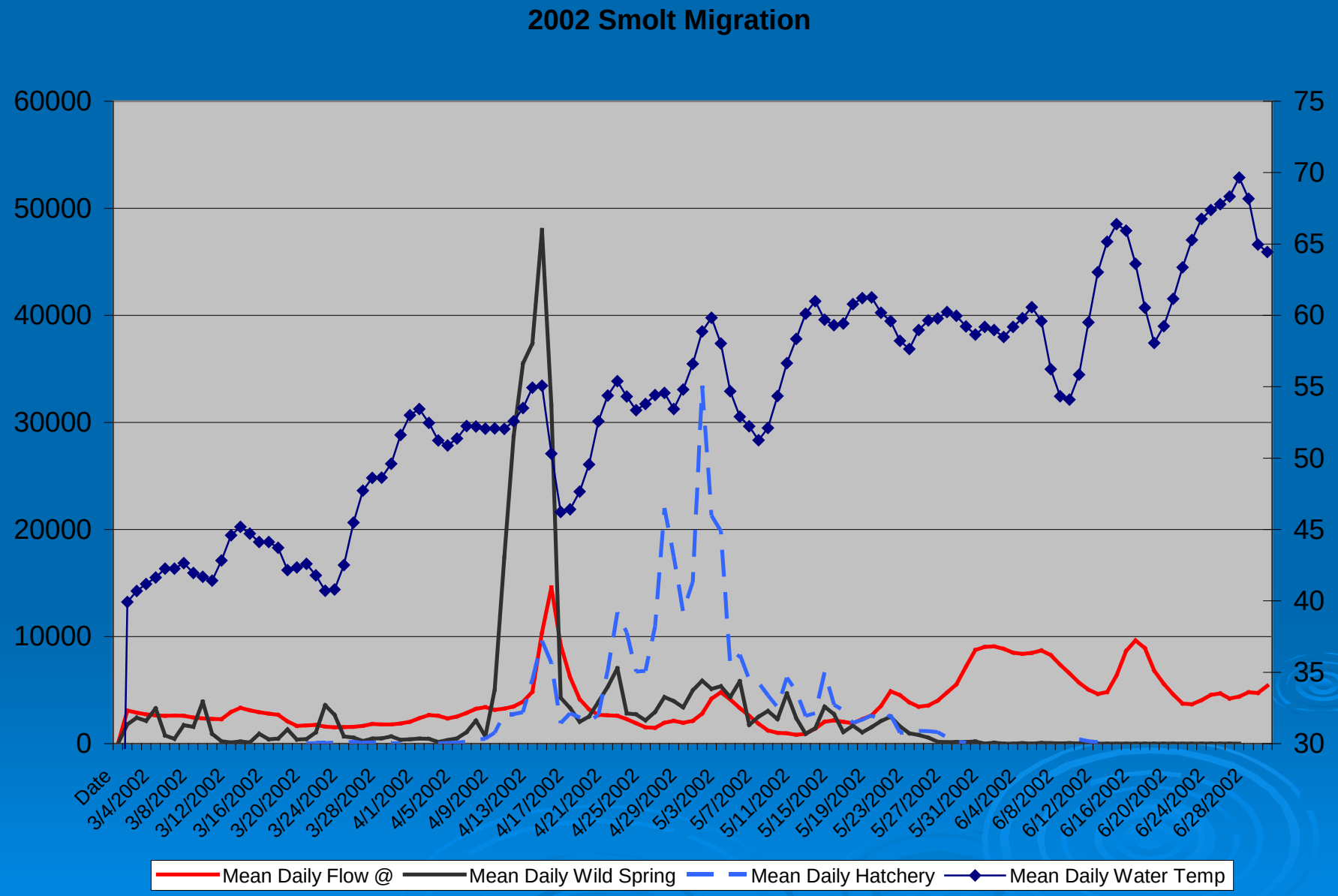
  Monitoring Interval
- 55 -- 60F 14 days
- 60 – 65F 10 days
- > 65F 7 days

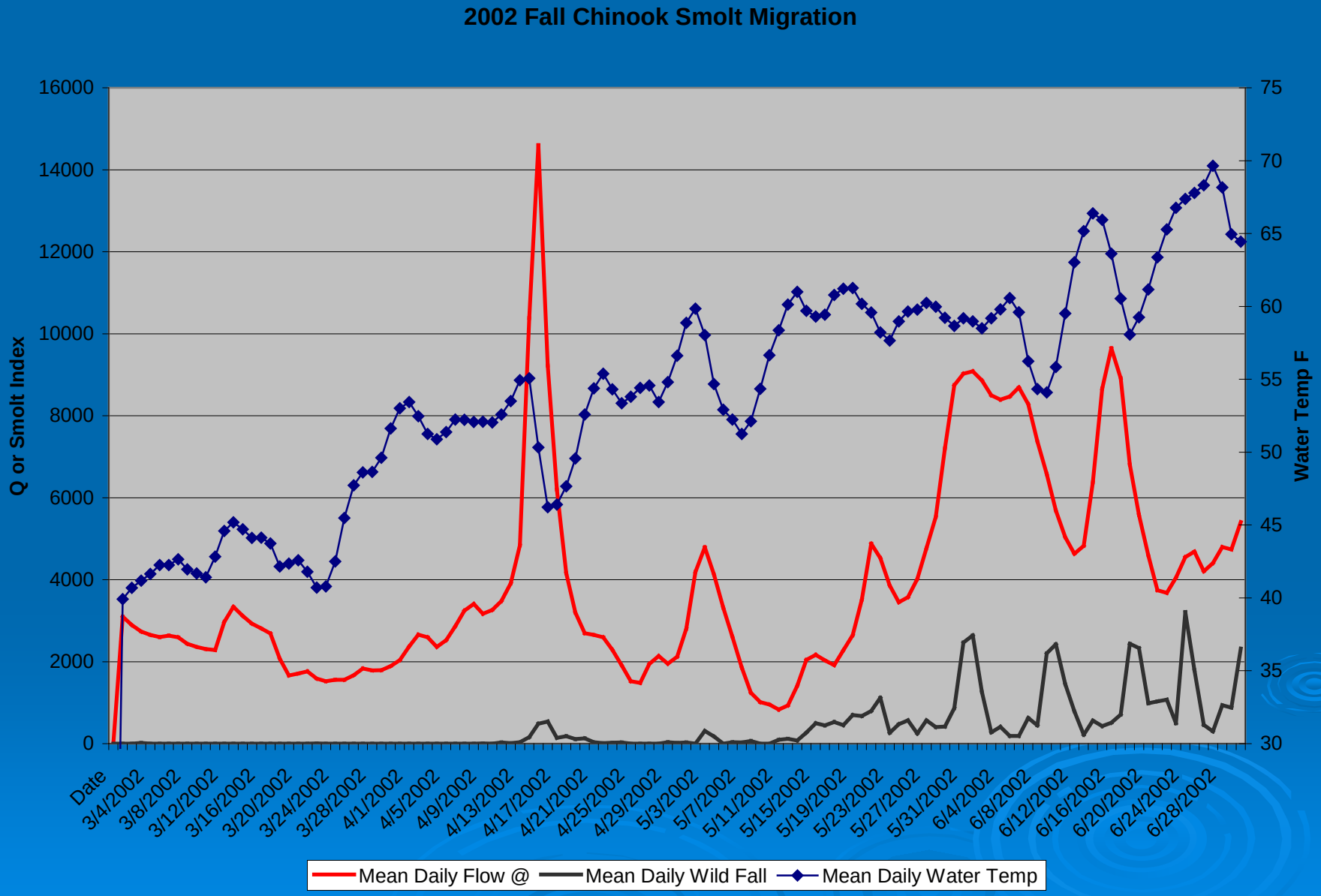
Significant Fish Passage Event

Significant Fish Passage Event = Composite Smolt Passage $> \left(\frac{CSP_{N-3} + CSP_{N-2} + CSP_{N-1}}{3}\right) \times 2$

- A Significant Fish Passage Event (SFPE) is said to have occurred if the Composite Smolt Passage (CSP) on Day N is greater than twice the moving average CSP for the previous three days. CSP is the sum of daily estimated passage past Prosser Dam for all wild and hatchery smolts by species.

- A significant fish passage event, measured at the Chandler Juvenile Fish Evaluation Facility, has not occurred during the previous _____ day (see temperature ranges above) monitoring interval (indicating that smolt migration in the lower Yakima River has stalled); **and**
- During the previous _____ day monitoring interval, there has been a continuous decline in mean daily flow measured at Parker (PARW), when the _____ day mean flow is between 2,000 and 600 cfs; **or**


2002 Smolt Migration
60000
50000
40000
30000
20000
10000
0
75
70
65
60
55
50
45
40
35
30
Date
3/4/2002
3/8/2002
3/12/2002
3/16/2002
3/20/2002
3/24/2002
3/28/2002
4/1/2002
4/5/2002
4/9/2002
4/13/2002
4/17/2002
4/21/2002
4/25/2002
4/29/2002
5/3/2002
5/7/2002
5/11/2002
5/15/2002
5/19/2002
5/23/2002
5/27/2002
5/31/2002
6/4/2002
6/8/2002
6/12/2002
6/16/2002
6/20/2002
6/24/2002
6/28/2002
Mean Daily Flow @
Mean Daily Wild Spring
Mean Daily Hatchery
Mean Daily Water Temp


2002 Fall Chinook Smolt Migration
Q or Smolt Index
Water Temp F
16000
14000
12000
10000
8000
6000
4000
2000
0
75
70
65
60
55
50
45
40
35
30
Date
3/4/2002
3/8/2002
3/12/2002
3/16/2002
3/20/2002
3/24/2002
3/28/2002
4/1/2002
4/5/2002
4/9/2002
4/13/2002
4/17/2002
4/21/2002
4/25/2002
4/29/2002
5/3/2002
5/7/2002
5/11/2002
5/15/2002
5/19/2002
5/23/2002
5/27/2002
5/31/2002
6/4/2002
6/8/2002
6/12/2002
6/16/2002
6/20/2002
6/24/2002
6/28/2002
Mean Daily Flow @
Mean Daily Wild Fall
Mean Daily Water Temp

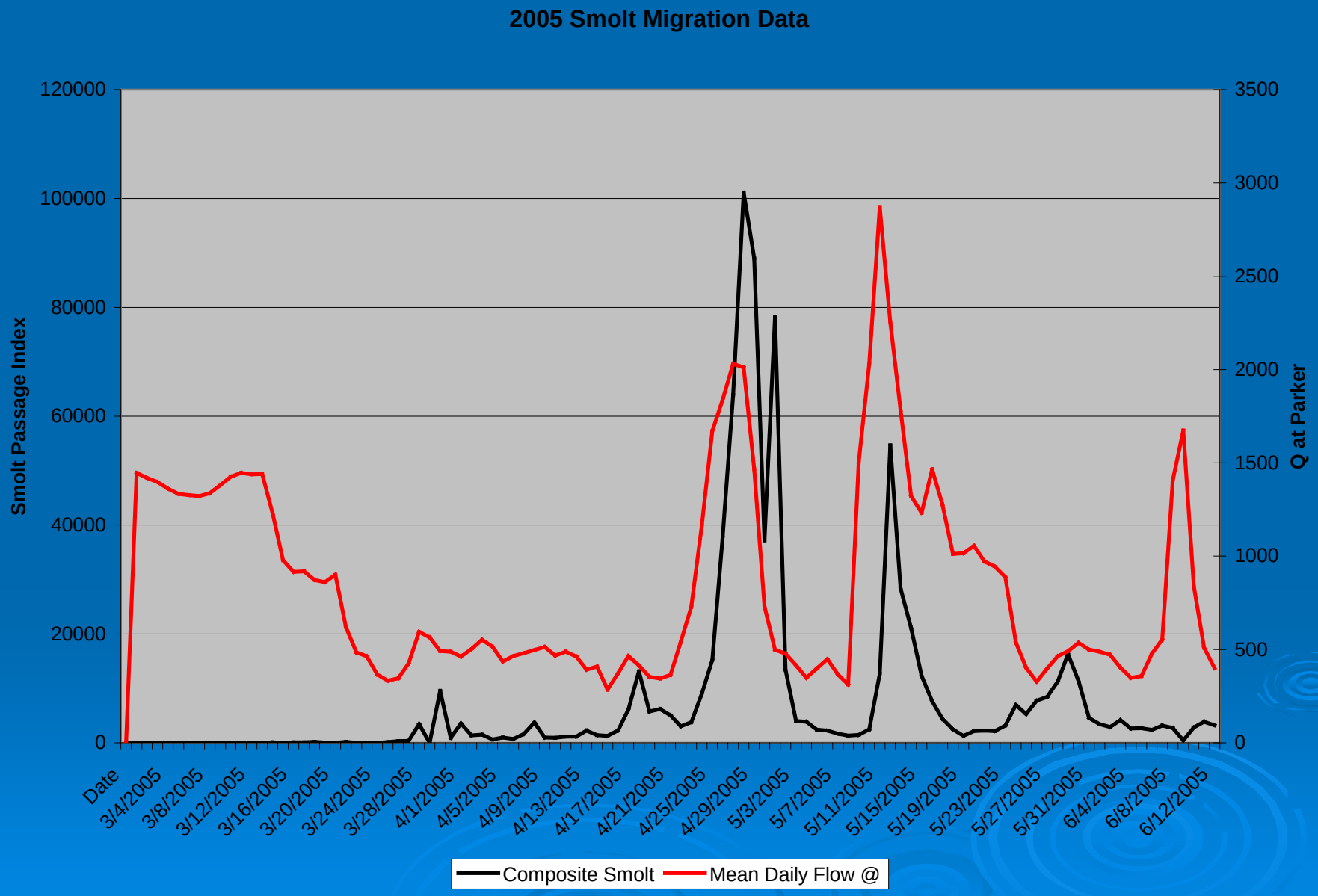
What is a Pulse Flow?

- Increase the flow at the Parker gage (PARW) by 1,000 cfs as rapidly as possible;
- Maintain pulse at PARW for 48 hours;
- Decrease the discharge and return to the applicable Title XII target flow at PARW, following established ramping rates when reducing releases from storage.

SOAC Recommendation

- Criteria were met on June 6, 2005
- SOAC recommended pulse flow
- Discussed at River Operations Meeting

- Result:


2005 Smolt Migration Data
Smolt Passage Index
Q at Parker
120000
100000
80000
60000
40000
20000
0
3500
3000
2500
2000
1500
1000
500
0
Date
3/4/2005
3/8/2005
3/12/2005
3/16/2005
3/20/2005
3/24/2005
3/28/2005
4/1/2005
4/5/2005
4/9/2005
4/13/2005
4/17/2005
4/21/2005
4/25/2005
4/29/2005
5/3/2005
5/7/2005
5/11/2005
5/15/2005
5/19/2005
5/23/2005
5/27/2005
5/31/2005
6/4/2005
6/8/2005
6/12/2005
Composite Smolt
Mean Daily Flow @

Why Did 2005 Pulse Flow Fail to Stimulate Smolt Migration

- Yearling species were gone, fall chinook have different behavior
- Pulse was not of sufficient duration or magnitude
- Artificially created “freshet” with reservoir water doesn’t have all migration cues (example from Teanaway)
- ???

Year	SPFE Date	Mean Daily Flow @ Parker (cfs)	Previous 3-day Mean Daily Flow @ Parker (cfs)	Difference (cfs)	Percent Change (+/-)
2002	3/29/2002	1,793	1,763	30	2
	4/6/2002	2,865	2,492	373	15
	4/7/2002	3,247	2,582	665	26
	4/9/2002	3,166	3,174	-8	0
	4/10/2002	3,264	3,274	-10	0
	4/11/2002	3,476	3,280	196	6
	4/21/2002	2,653	3,350	-697	-21
	4/22/2002	2,597	2,848	-251	-9
	4/27/2002	1,942	1,636	306	19
	5/1/2002	2,803	2,070	733	35
	6/7/2002	8,283	8,517	-234	-3
	6/9/2002	6,579	8,116	-1,537	-19
	6/10/2002	5,686	7,412	-1,726	-23
	6/18/2002	6,808	9,075	-2,267	-25
	6/24/2002	4,553	3,822	731	19
	6/30/2002	5,405	4,645	760	16

N = 16, 6 negative, 8 positive, 2 Neutral

What were the costs to irrigation districts?

- No effect on senior water rights
- Junior districts prorationing at 39%
- Pulse flow may have used 5000-6000 acre-feet of storage
- For comparison, water purchases were $115-125/AF—pulse flow >$600,000
- About 1% of prorated water supply
- Effects unknown until end of June weather report

Future of Pulse Flows?

- Re-evaluate criteria
- Improve understanding of fall chinook migration
- Use YRBWEP saved water rather than storage water?