Evaluation of adult salmon passage behavior in relation to fishway modifications at The Dalles and John Day Dams

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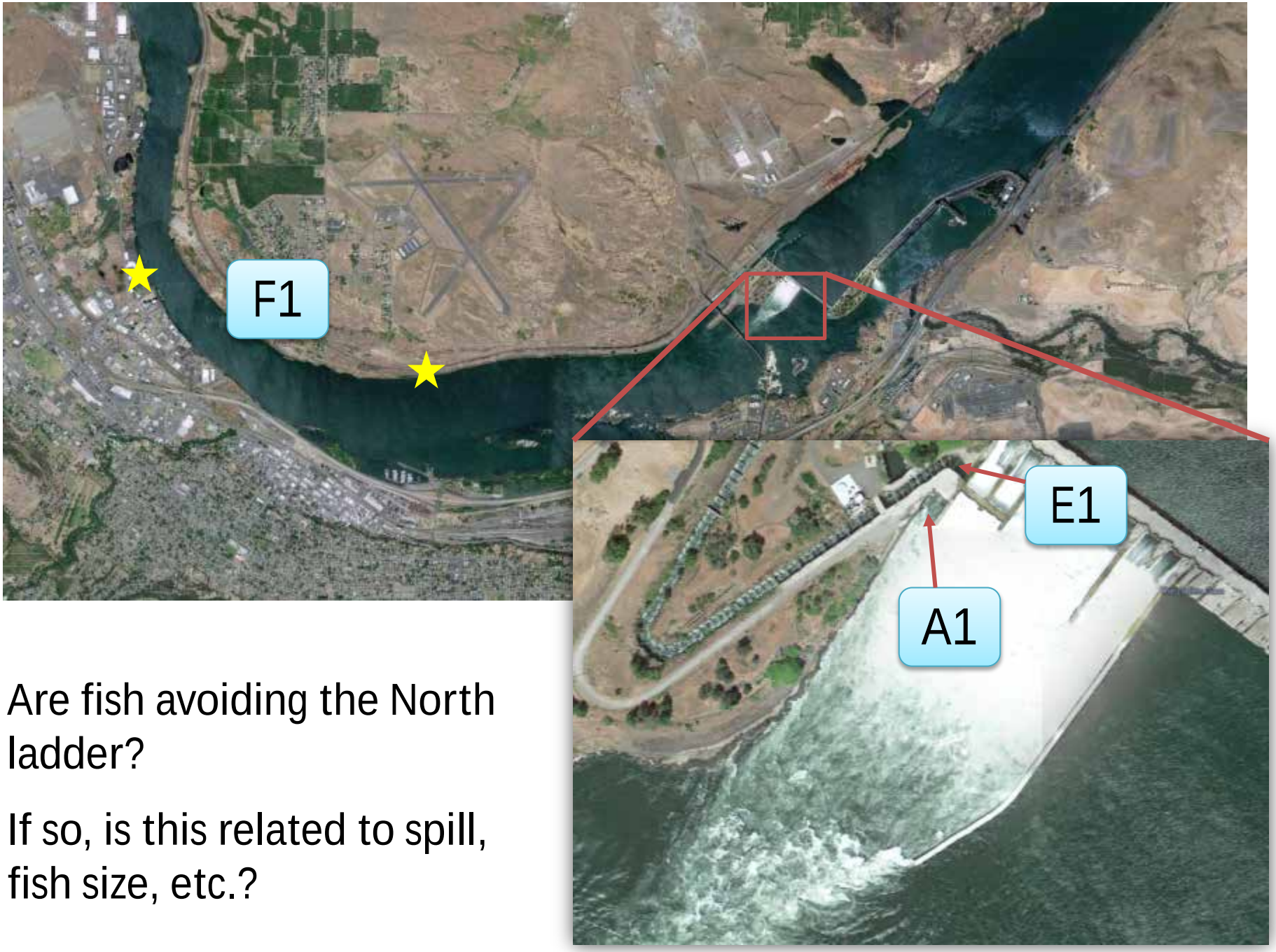
Outline

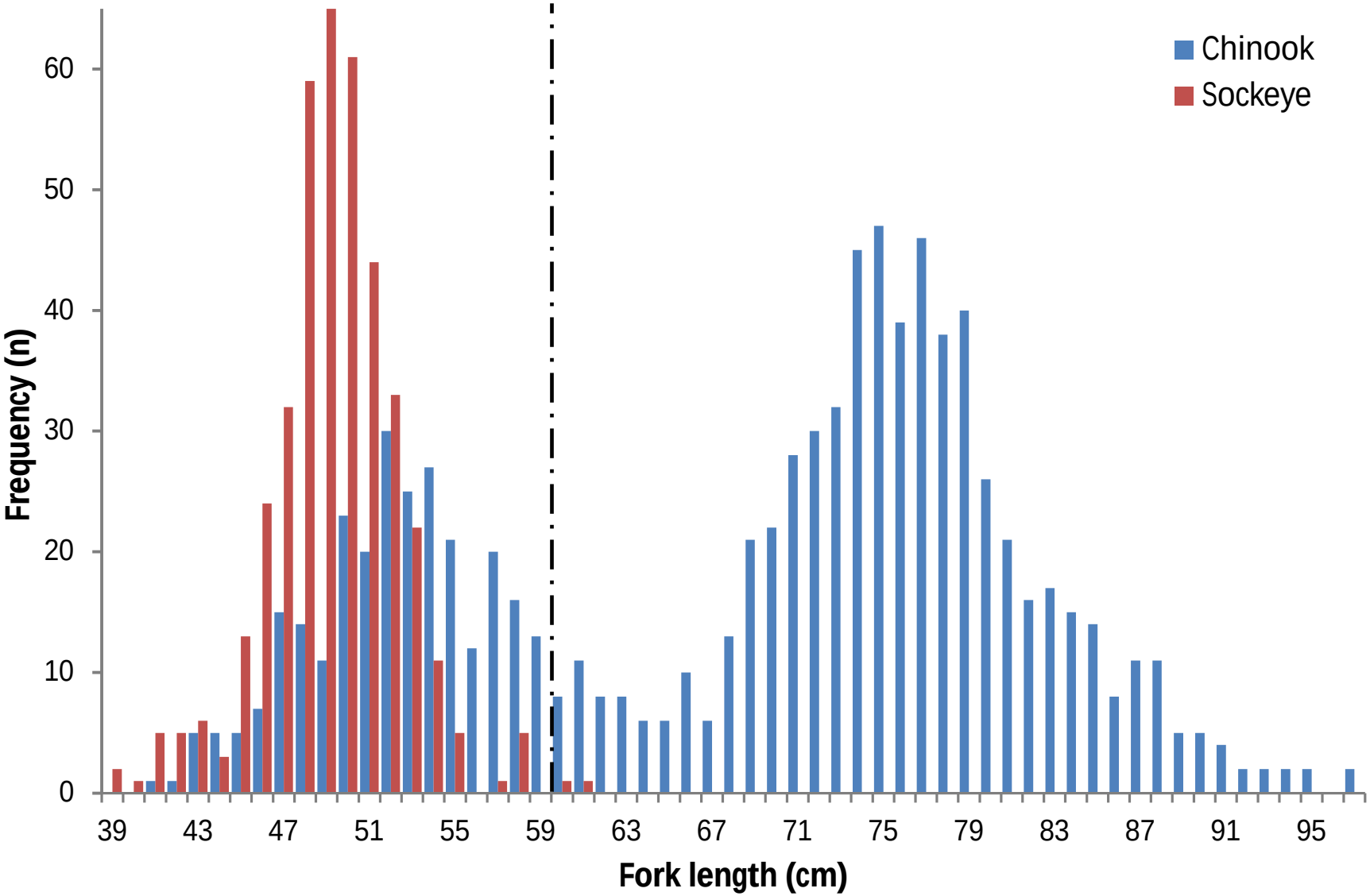
- The Dalles Dam
  - Ladder use
  - Side switching
  - Travel time
  - Entrance efficiency
- John Day Dam
  - Travel time
  - Entrance efficiency

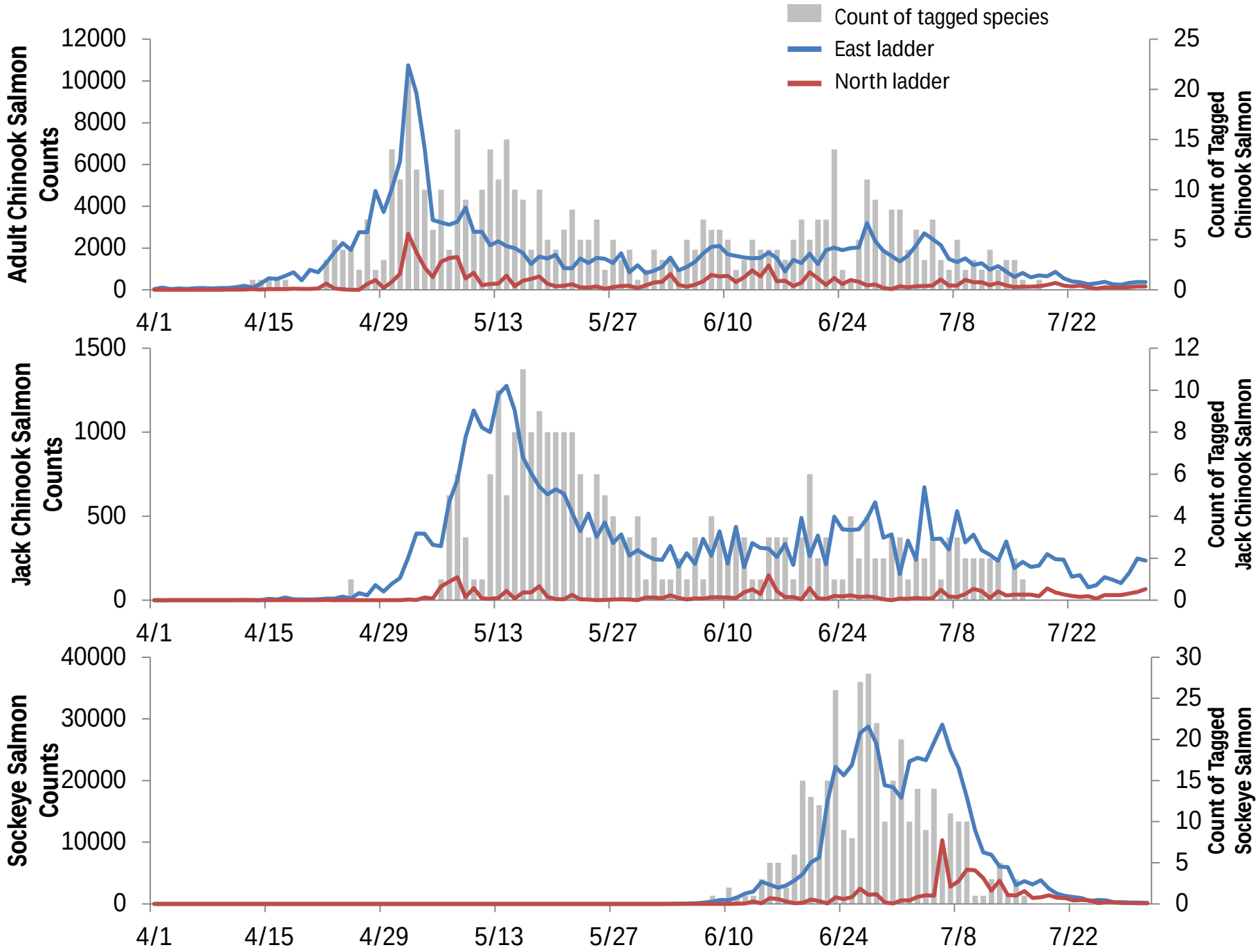


Are fish avoiding the North ladder?

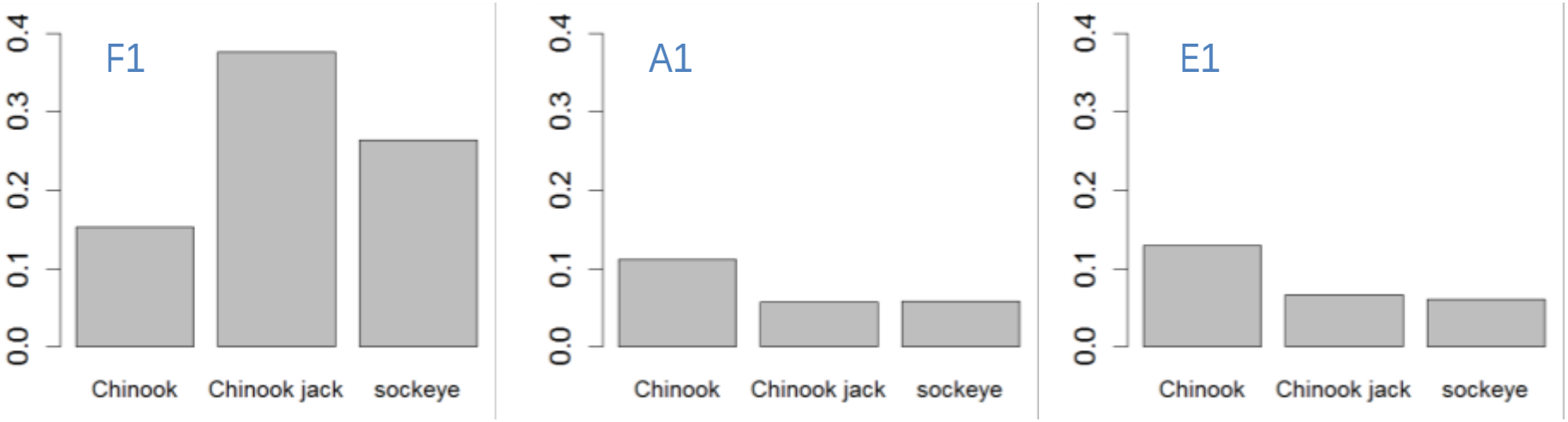
If so, is this related to spill, fish size, etc.?

Fork Length Distribution




Count of tagged species
East ladder
North ladder
Adult Chinook Salmon Counts
Count of Tagged Chinook Salmon
12000
10000
8000
6000
4000
2000
0
25
20
15
10
5
0
4/1
4/15
4/29
5/13
5/27
6/10
6/24
7/8
7/22
Jack Chinook Salmon Counts
Count of Tagged Jack Chinook Salmon
1500
1000
500
0
12
10
8
6
4
2
0
4/1
4/15
4/29
5/13
5/27
6/10
6/24
7/8
7/22
Sockeye Salmon Counts
Count of Tagged Sockeye Salmon
40000
30000
20000
10000
0
30
25
20
15
10
5
0
4/1
4/15
4/29
5/13
5/27
6/10
6/24
7/8
7/22

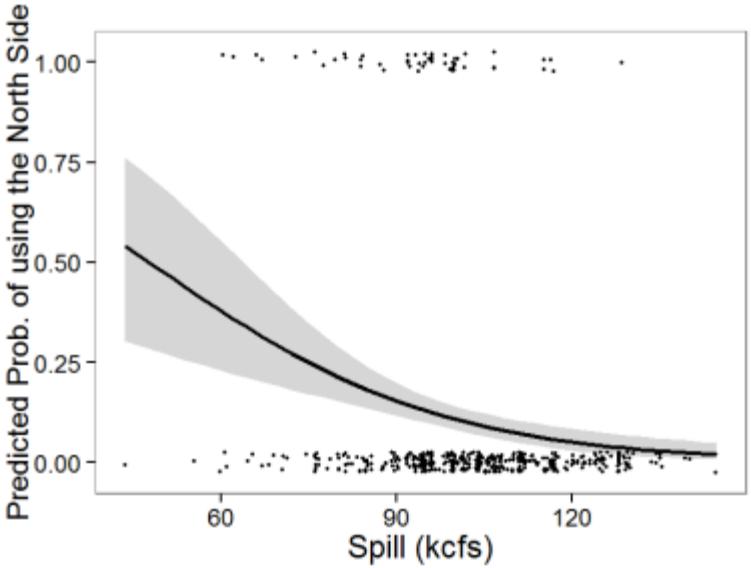
Probability of Using the North Shore/Ladder

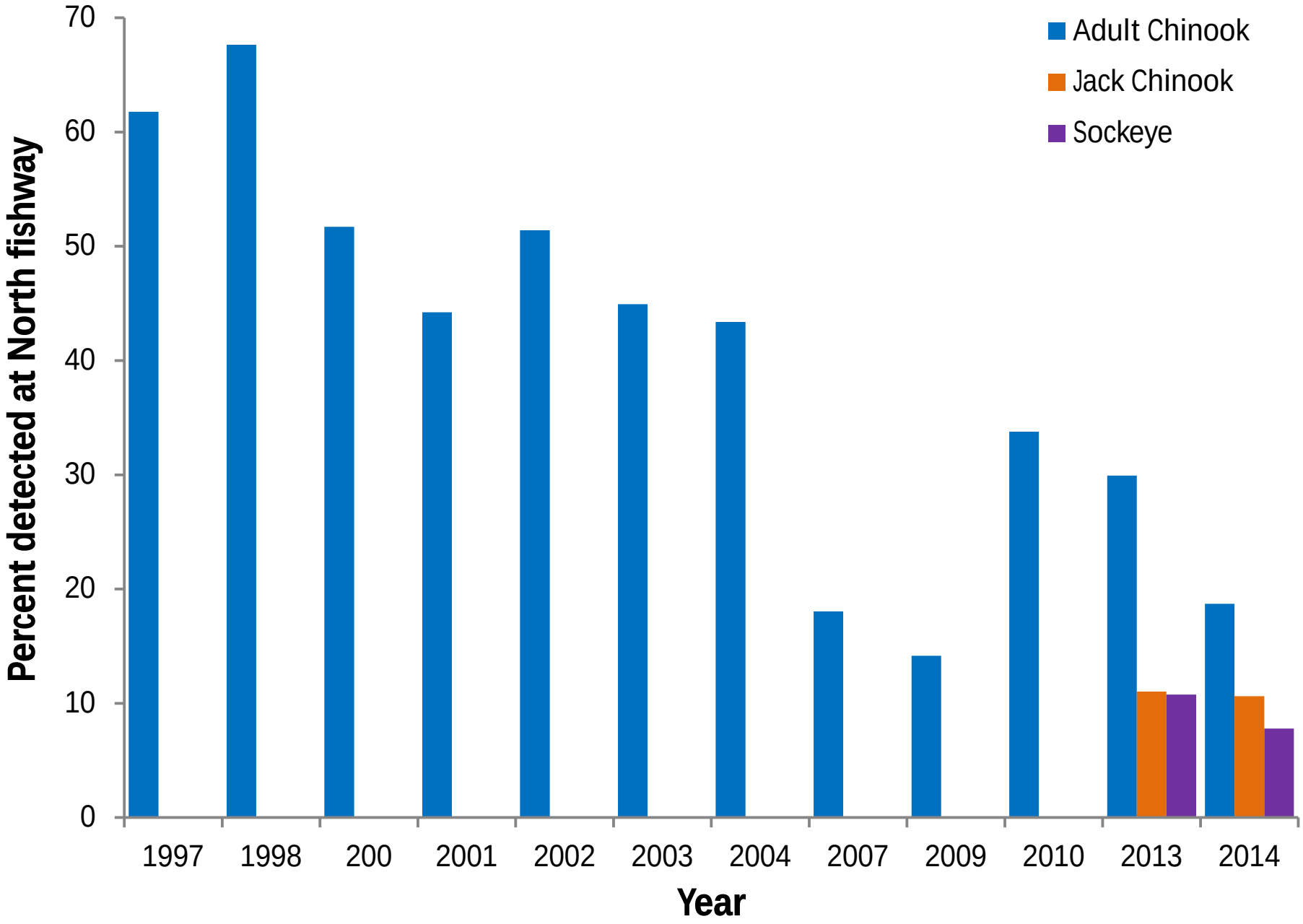


Probability of Using the North Shore/Ladder

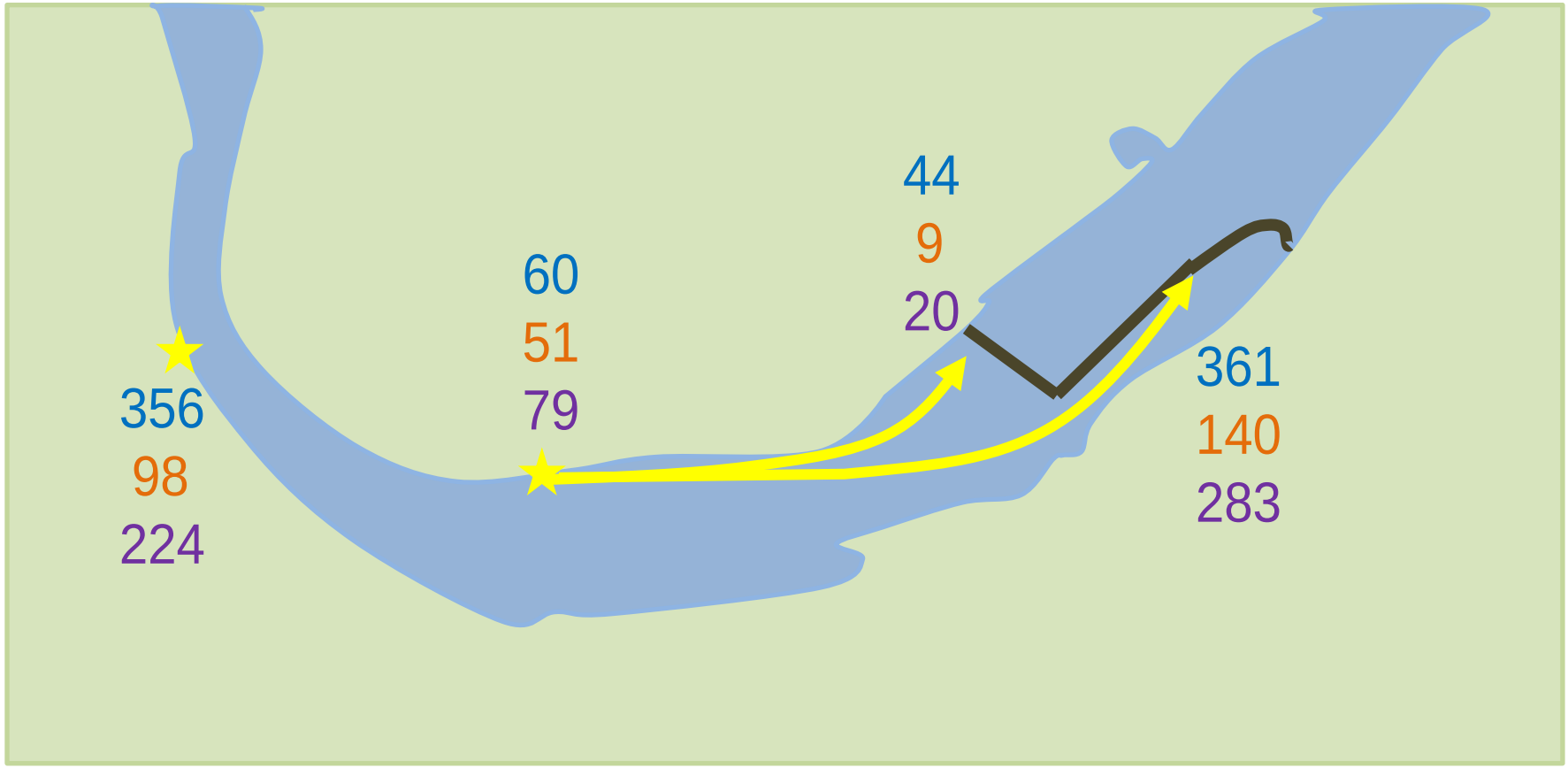
		Chinook	Ch. Jacks	Sockeye
F1	Length (cm)	-	-	-48%
	Night	+52%	-	-
	Date	-	-	+1,457%
	Passed	-123%	-	+22%
	Temperature (°C)	-	-	-
	Flow (kcfs)	-	-	+2%
	Spill	-	-	+2%
	Dis. Gas (mmHg)	-	-	-
A1	Length (cm)	-	-	-
	Night	-	-	-
	Date	-	-	-
	Passed	-	-	-
	Temperature (°C)	-	-	-
	Flow (kcfs)	-	-	-
	Spill	-4%	-9%	-6%
	Dis. Gas (mmHg)	-	+3%	-
E1	Length (cm)	-	-	-
	Night	-	-	-
	Date	-	-	-
	Passed	-	-	-
	Temperature (°C)	-	-	-
	Flow (kcfs)			
	Spill	-4%	-8%	-5%
	Dis. Gas (mmHg)	-	-	-

A1 for Chinook




Percent detected at North fishway
70
60
50
40
30
20
10
0
Adult Chinook
Jack Chinook
Sockeye
1997
1998
200
2001
2002
2003
2004
2007
2009
2010
2013
2014
Year

Side Switching



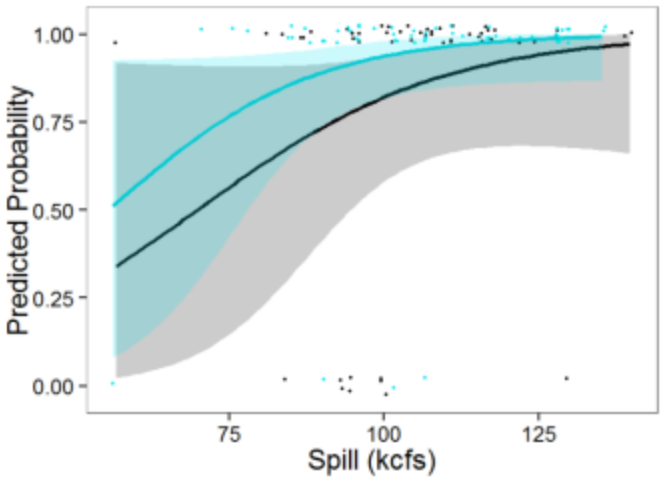
Adult Chinook

Jack Chinook

Sockeye

Numbers: Fish detected at both downstream receivers and entrances.

Probability of Switching Sides Between F1 and E1



		Chinook (56)	Ch. Jacks (34)	Sockeye (165)
F1 in Washington	Length	-	-	-
	Night	+157%	-	-
	Date	-	-	-
	Passed	-	-	-
	Temperature	+53%	-	-
	Flow	-	-	-
	Spill	+5%	+6%	-
	Dis. Gas	-	-	-

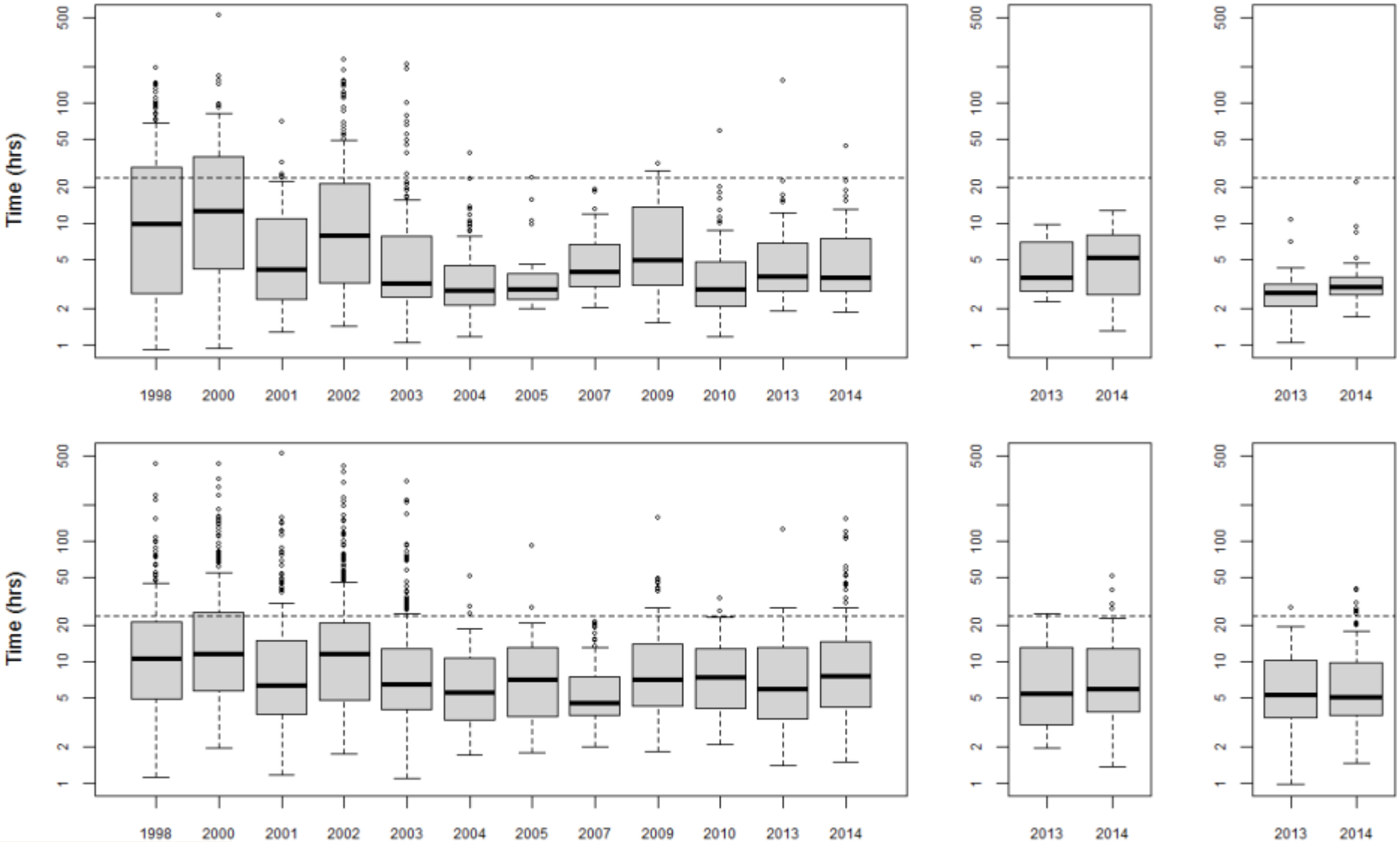
Travel time from F1 to E1

North Ladder (WA)

Adult Chinook

Jack Chinook

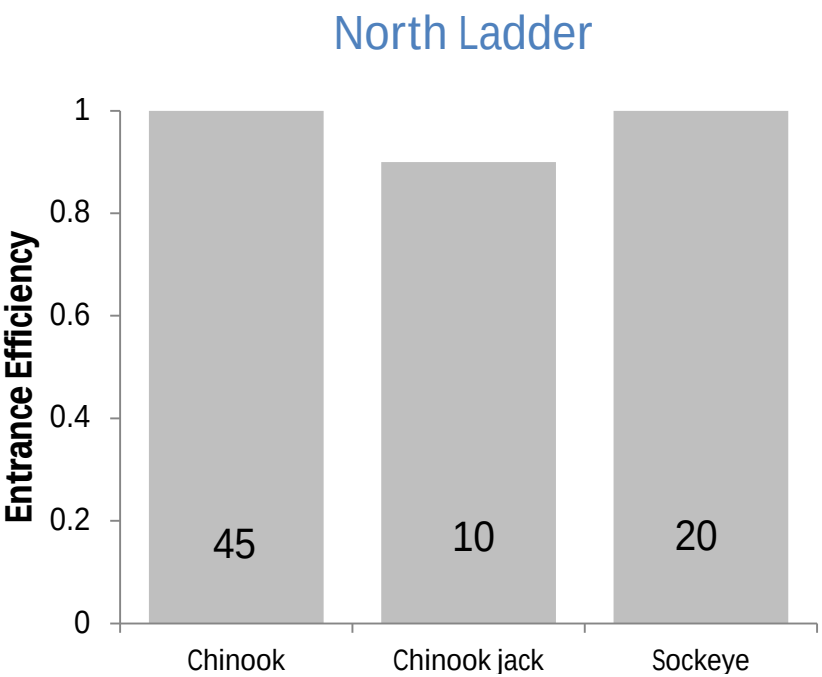
Sockeye

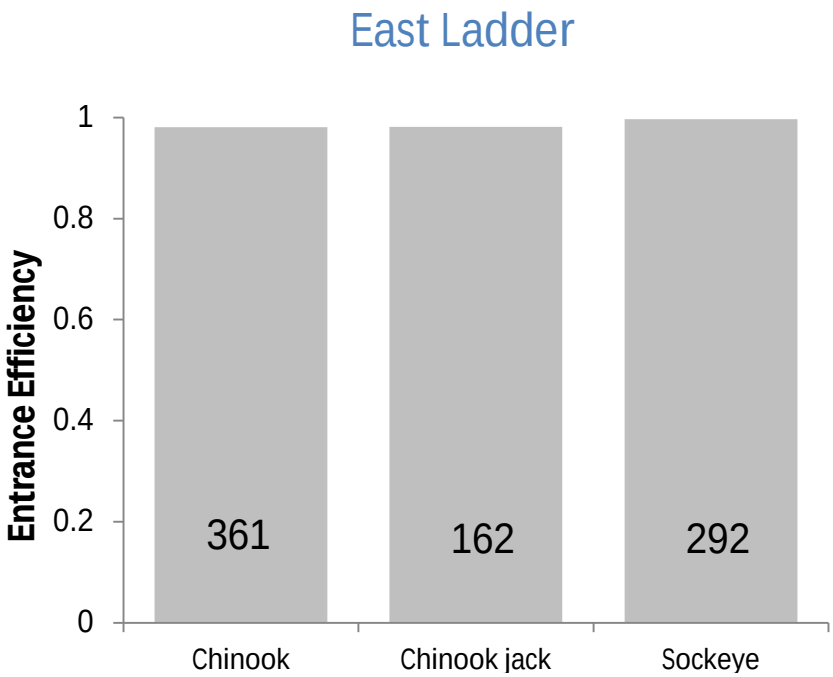


East Ladder (OR)

Entrance Efficiency

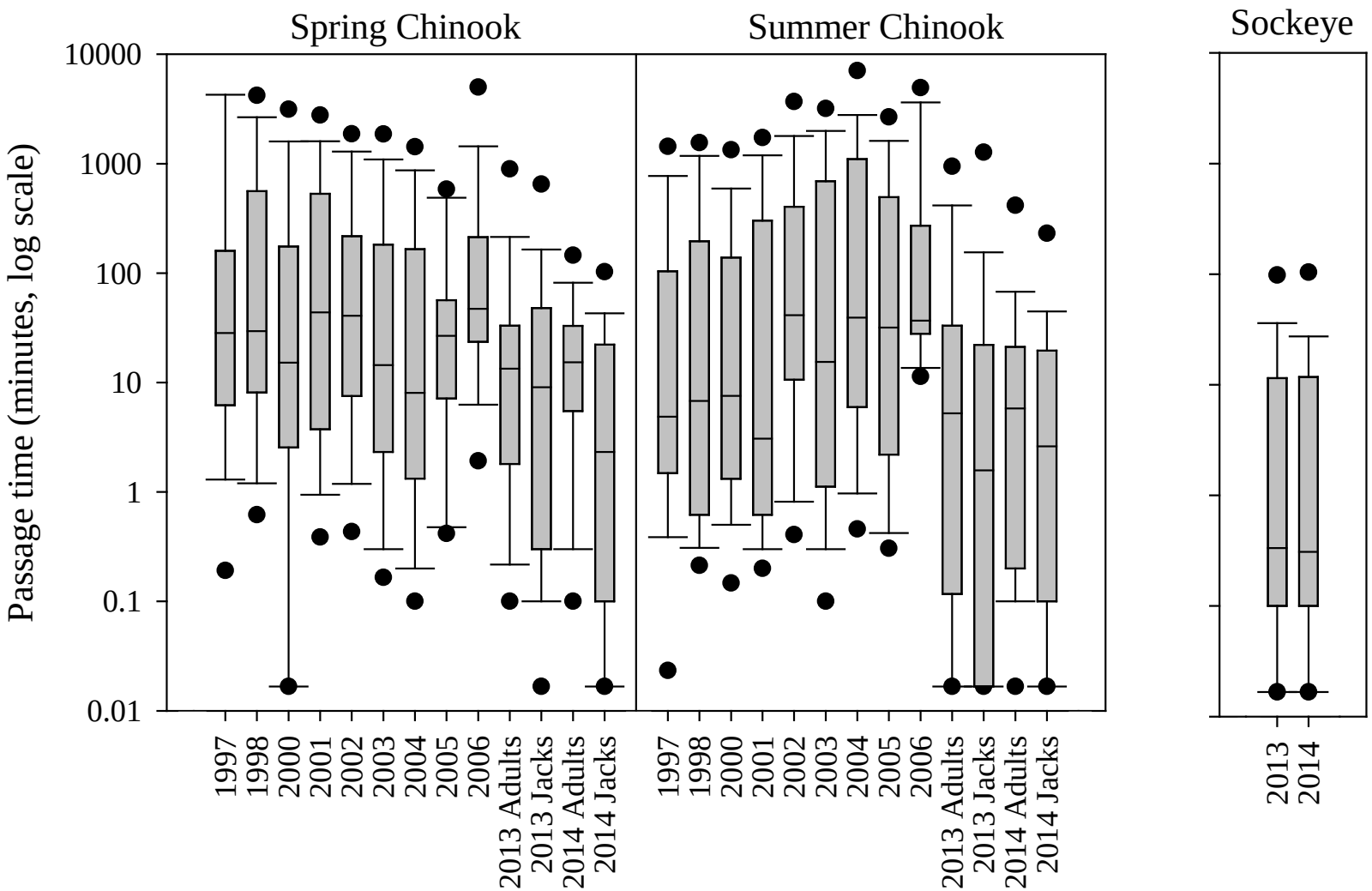
Number approaching/Number entering



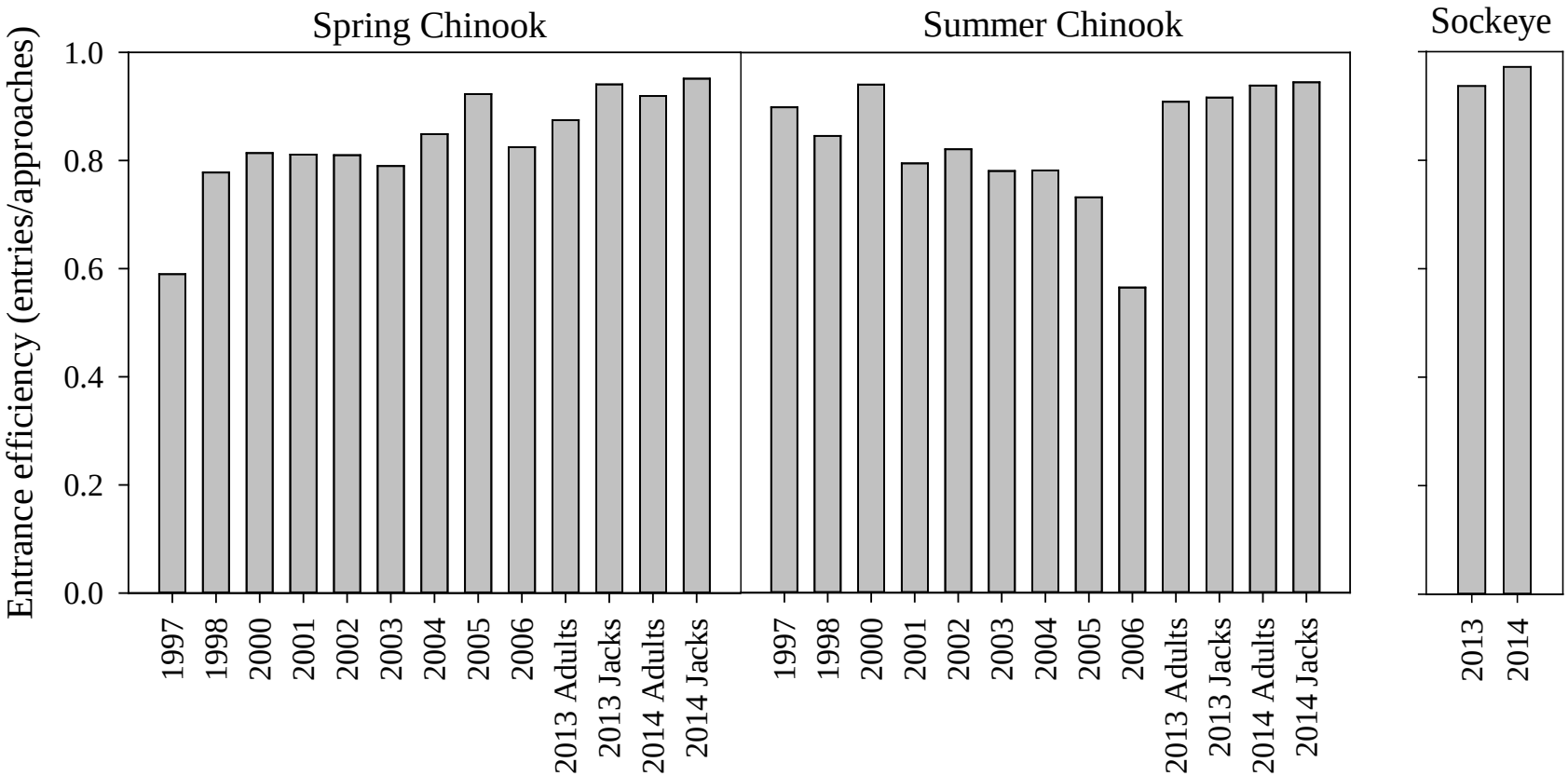


John Day Dam – North Entrance Modifications

JD-North passage time: first approach to first entry



JD-North Entrance Efficiency



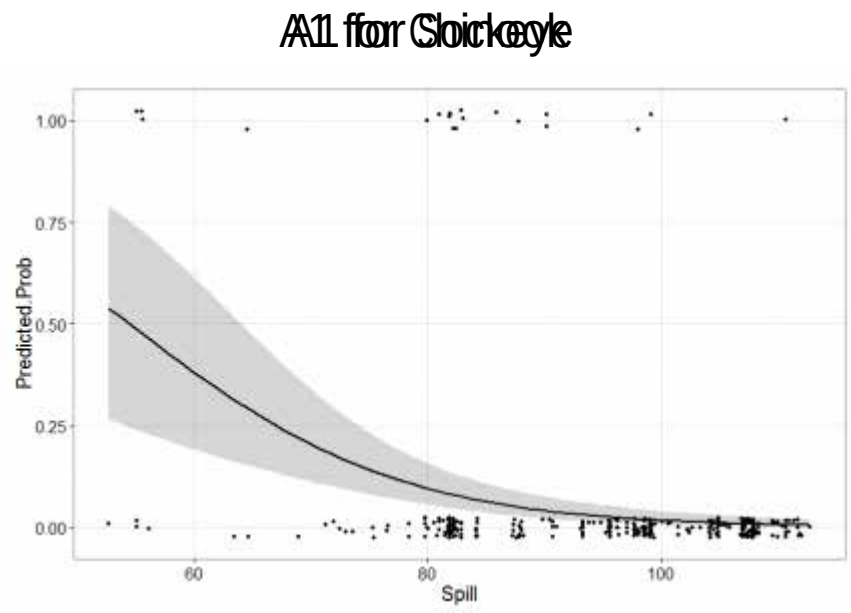
Summary

- The Dalles Dam
  - Most Chinook use the Oregon shore of the river when approaching
  - Spill
    - reduces usage of the North fishway
    - Increases side switching from Washington shore
  - Fish size had no effect in 2014
  - Approaching the North does not cause significant delays; passage times unchanged since spill wall installed

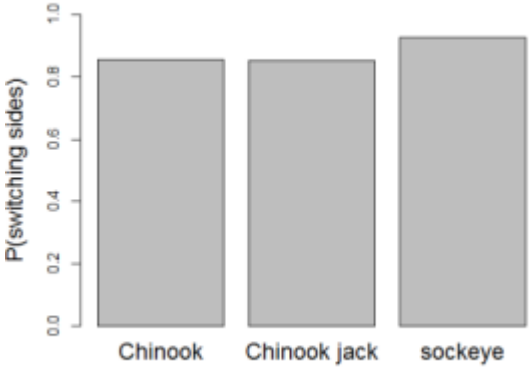
- John Day Dam
  - Similarly to 2013, entrance efficiency and entrance time have improved since pre-modification years

Probability of Using the North Shore/Ladder - 2013

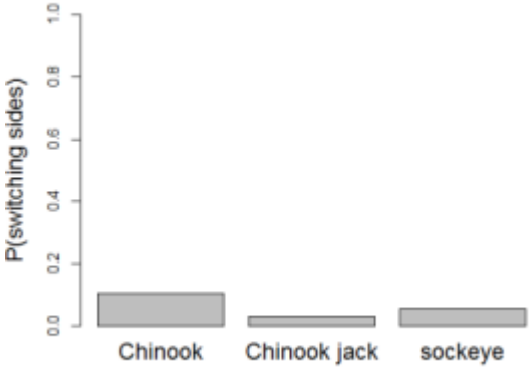
		Chinook	Ch. Jacks	Sockeye
F1	Length (cm)	+5%	-	+6%
	Date (d)	+13%	+3%	-7%
	Temperature (°C)	-42%	-	+162%
	Spill (kcfs)	-	-	-
	Flow (kcfs)	+2%	-	+3%
	Dis. Gas (mmHg)	-	-	-
A1	Length	+4%	-	+21%
	Date	-	-	-
	Temperature	-	-	-
	Spill	-2%	-6%	-8%
	Flow	-		-
	Dis. Gas	-	-	-
E1	Length	+4%	-	+21%
	Date	-	-	-
	Temperature	+20%	-	-
	Spill	-	-	-
	Flow	-	-	-4%
	Dis. Gas	-	-7%	-



Probability of Switching Sides Between F1 and E1 - 2013



		Chinook (55)	Ch. Jacks (34)	Sockeye (160)
F1 in Washington	Length	-	-	-39%
	Date	-	-	-
	Dis. Gas	-	-	+7%
	Temperature	-	-	-
	Spill	-	+8%	-
	Flow	-	-	-



		Chinook (296)	Ch. Jacks (142)	Sockeye (144)
F1 in Oregon	Length	-	-	-
	Date	+3%	-	-
	Dis. Gas	-	-	-
	Temperature	-	-	-
	Spill	-	-6%	-12%
	Flow	-	-	-