

# Evaluation of Dam Passage and Survival of Juvenile Chinook Salmon at Roza Dam, 2013 and 2014



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# Elements of Study Design

Study year	Reach-specific monitoring array on mainstem Yakima River	Route-specific monitoring array at Roza Dam	Paired releases
2012	X		
2013	X	X	X*
2014	X	X	X**

\*1 of 5 release groups

\*\*4 of 4 release groups

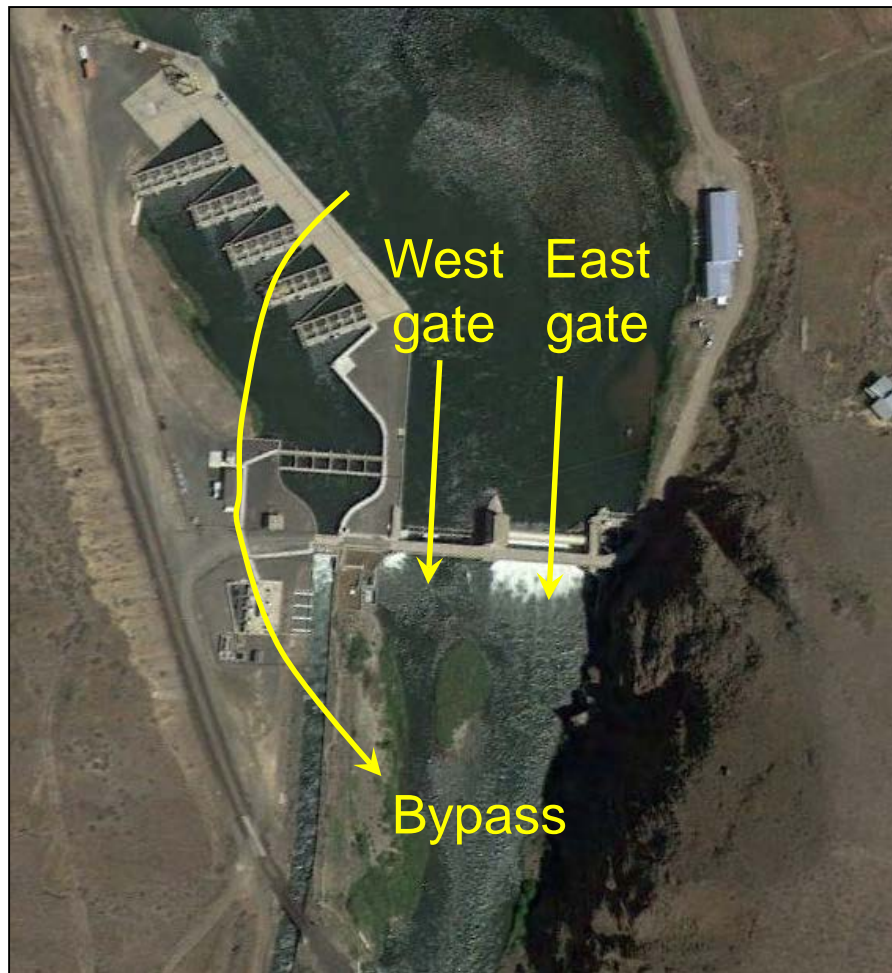
## Number of Fish

Release number	Release date	Roza Reach flow (cfs)	Number of fish
1	20 Mar 2013	1,324	46U
2	28 Mar 2013	697	46U / 39T
3	05 Apr 2013	2,636	44U
4	17 Apr 2013	1,344	47U
5	25 Apr 2013	1,842	43U
6	25 Mar 2014	860	130U / 50T
7	03 Apr 2014	1,939	130U / 50T
8	17 Apr 2014	2,081	127U / 50T
9	01 May 2014	2,275	133U / 50T

U = fish released upstream of Roza Dam

T = fish released in tailrace of Roza Dam

# Juvenile Salmon Passage at Roza Dam



- Smolt mortality occurs at Roza Dam
- West gate is preferred passage route
  - Highest passage rates
  - Fastest passage times
  - Highest survival rates
- Best fish passage conditions occur during “high flow” scenarios
- Worst fish passage conditions occur during “low flow” scenarios

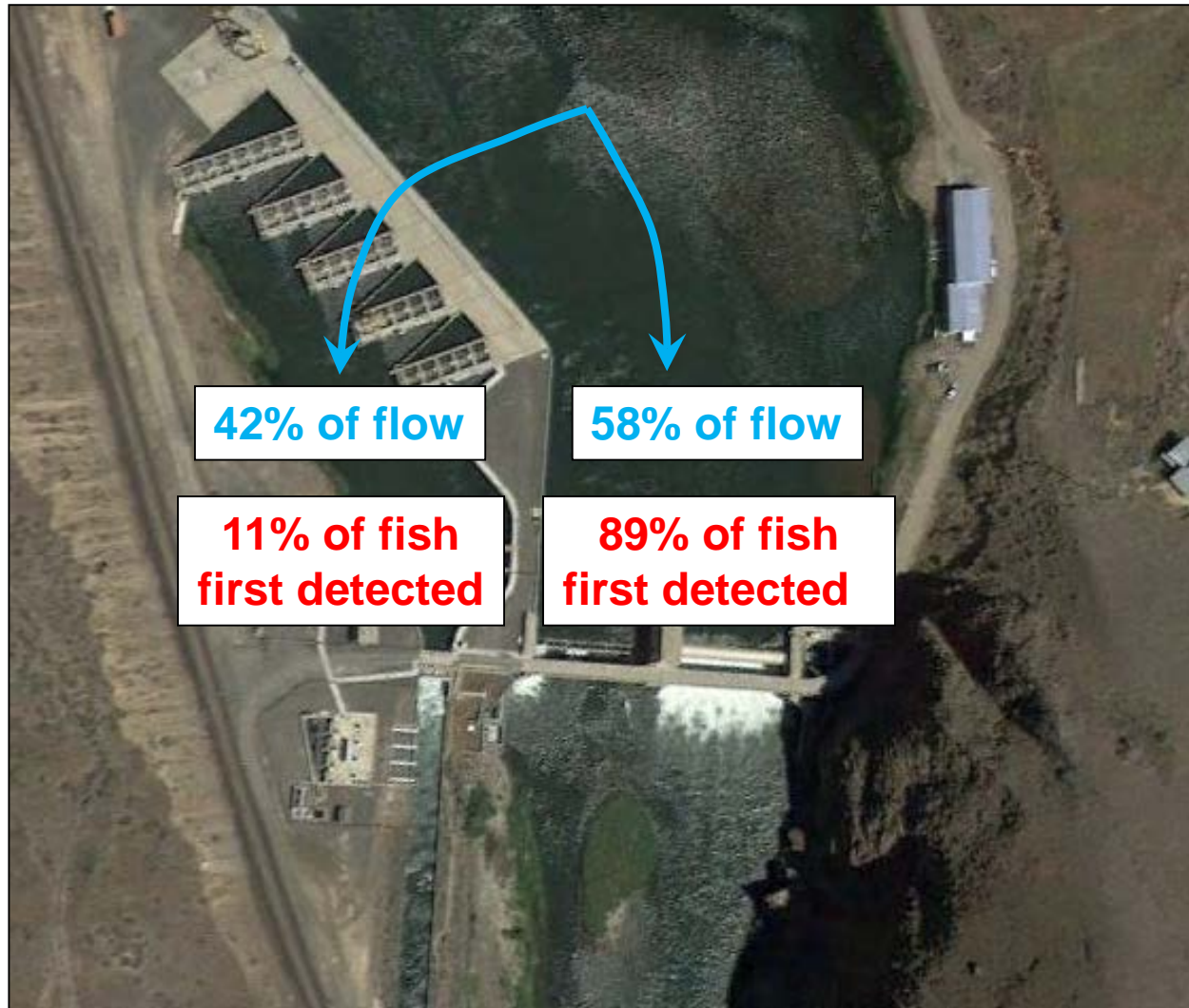




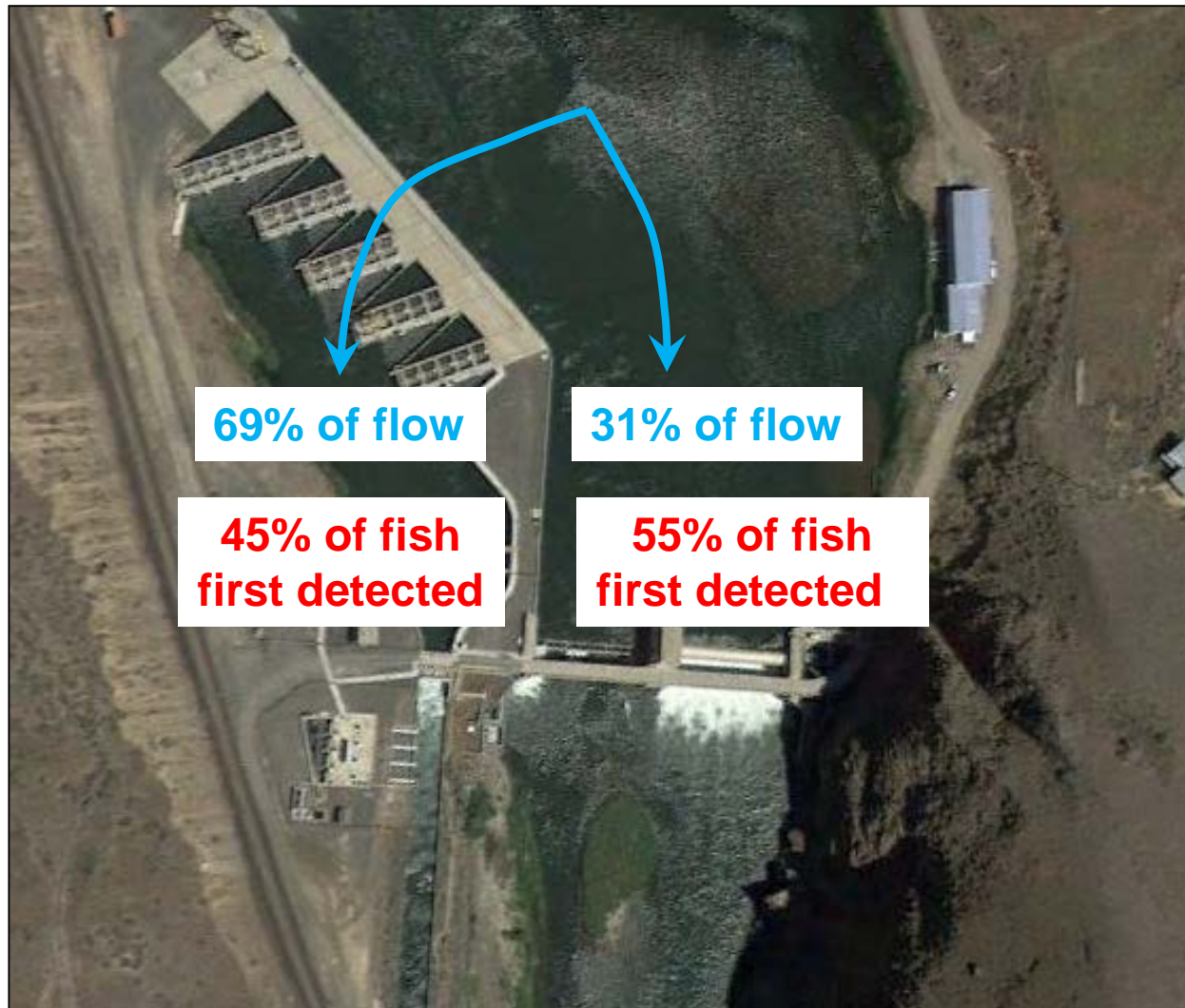
Adult ladder  
100 cfs



# Approach Behavior

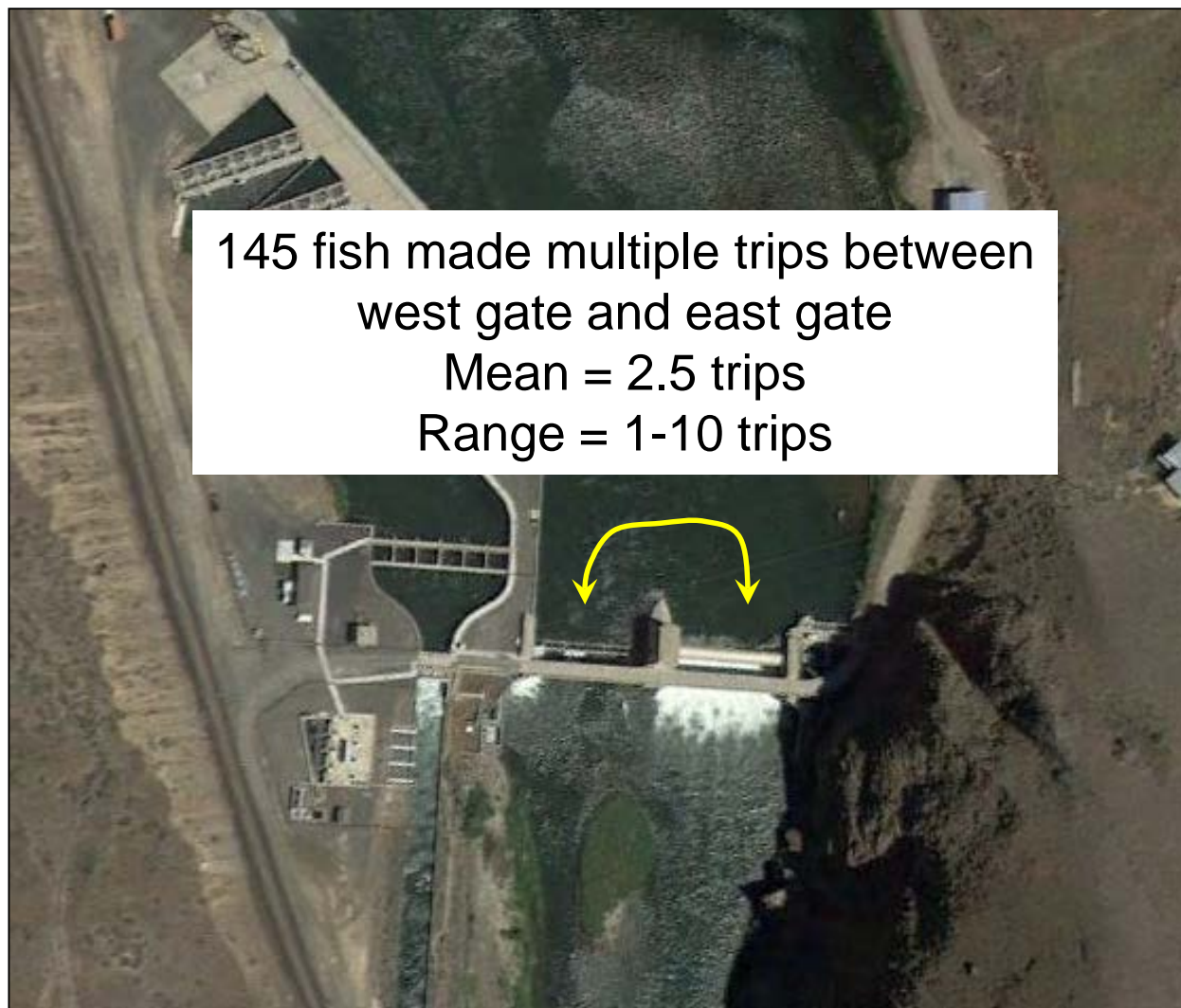


# Approach Behavior

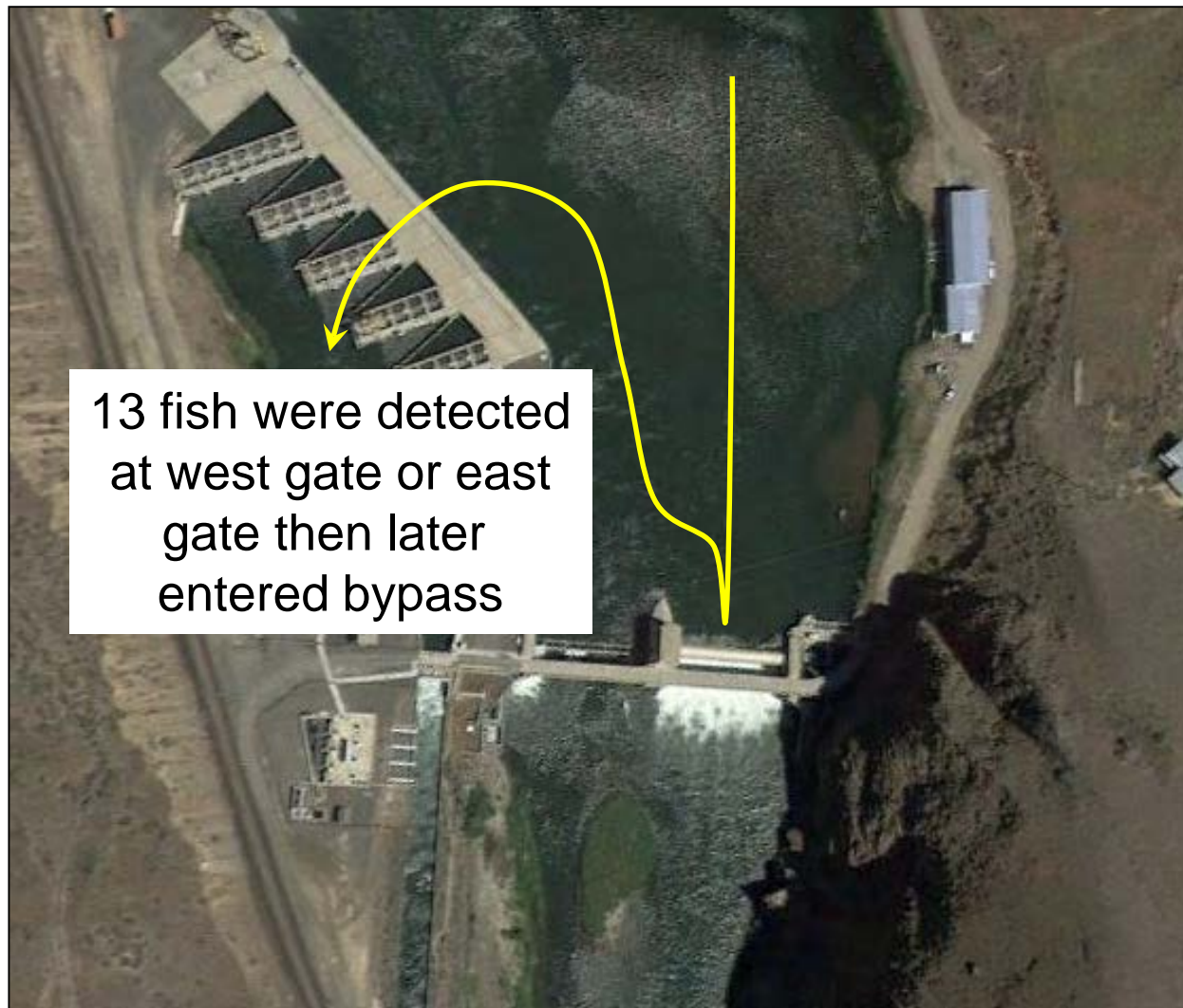




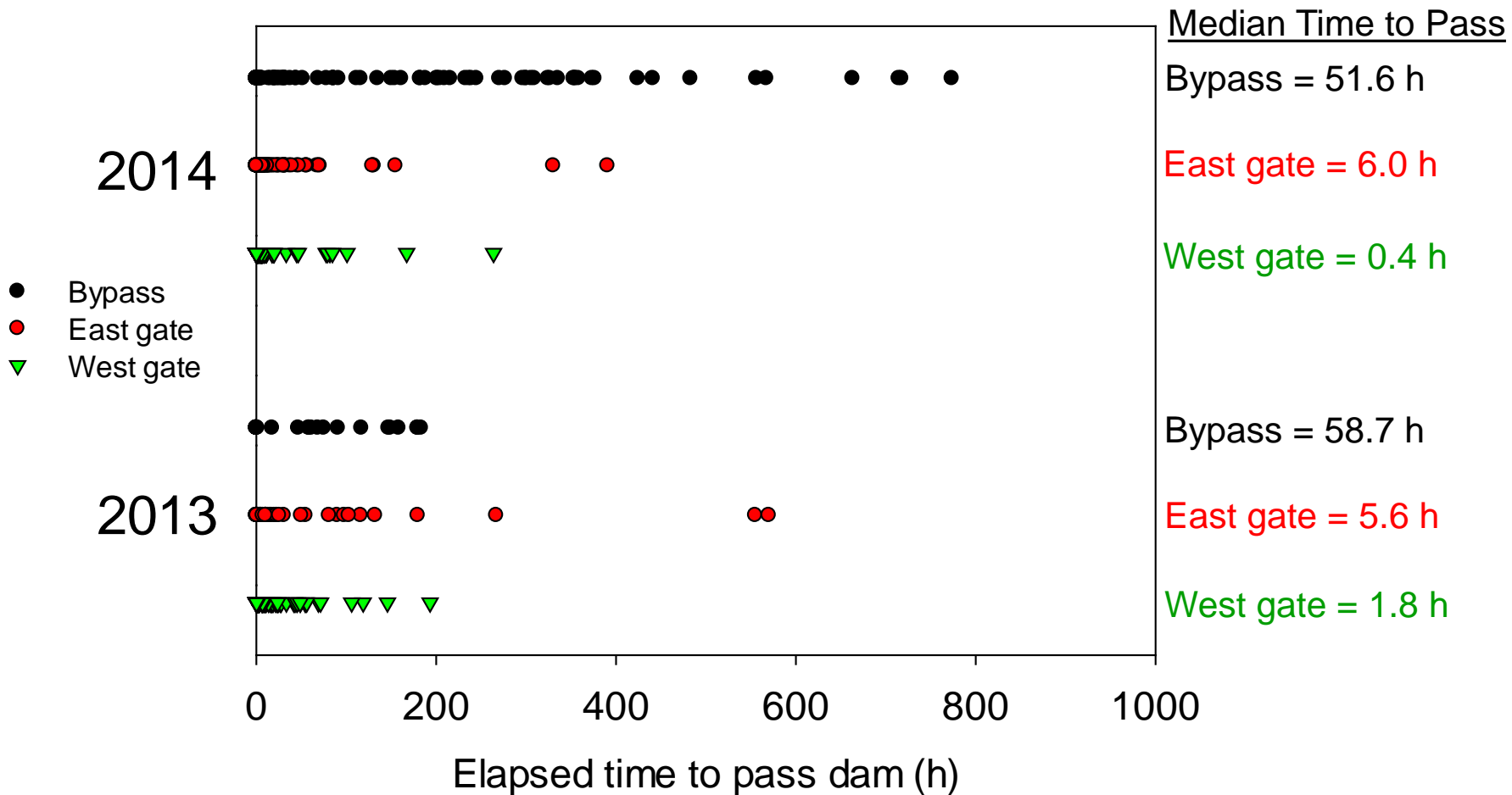
# Near Dam Behavior



# Near Dam Behavior



# Time to Pass Dam

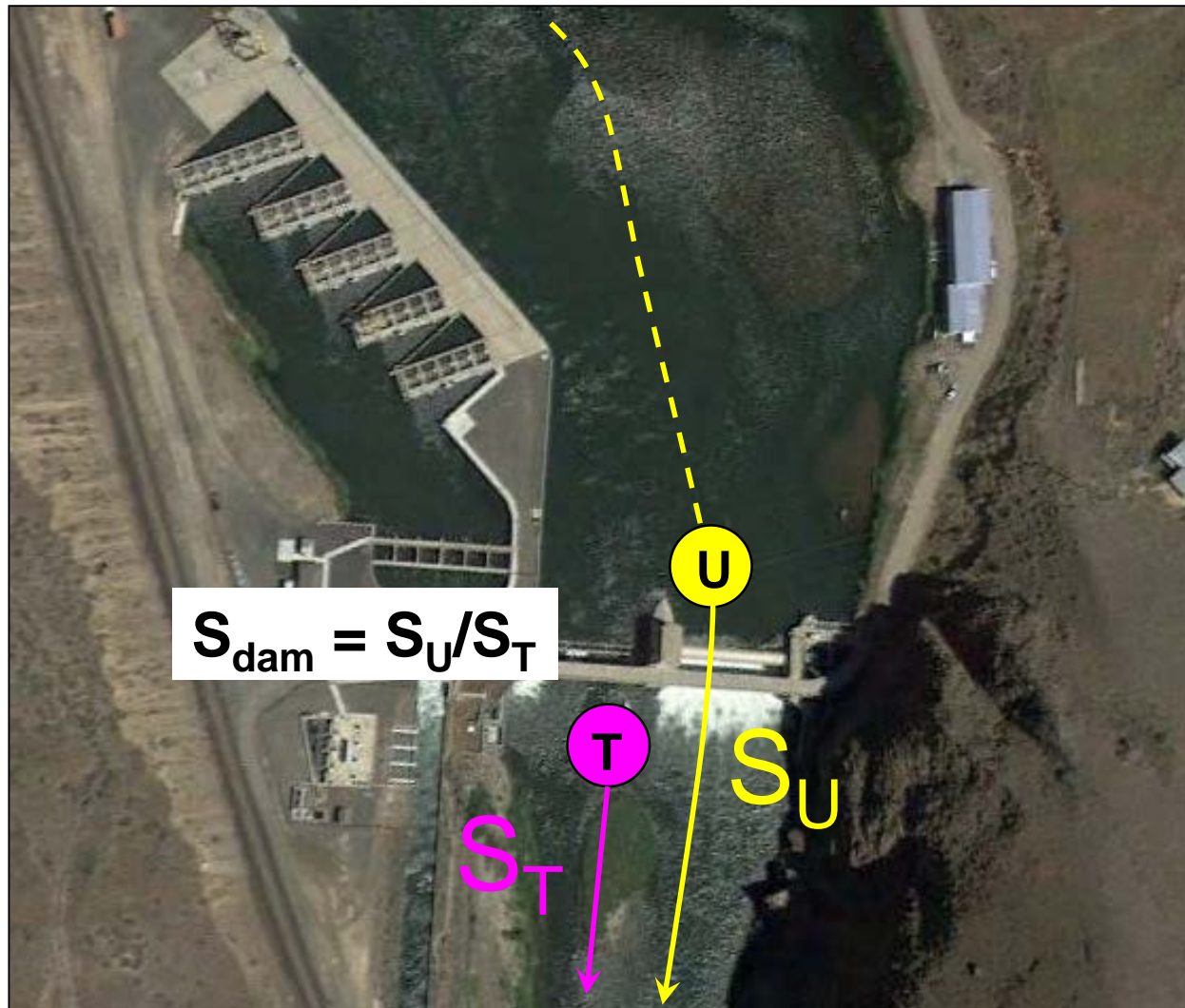


# Passage Route Probabilities

Release #	Flow (cfs)	Bypass	West gate	East gate
1	1,324	0.25	0.70	0.05
2	697	0.24	0.52	0.24
3	2,636	0.16	0.55	0.30
4	1,344	0.07	0.50	0.43
5	1,842	0.00	0.49	0.51
6	861	0.63	0.17	0.20
7	1,939	0.19	0.62	0.19
8	2,081	0.16	0.54	0.30
9	2,276	0.15	0.44	0.41

**0.15-0.25**      **>0.44**      **0.19-0.51**

# Dam Passage Survival



Mouth of Wenas Creek

# Dam Passage Survival

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R	2	6	7	8	9
Flow (cfs)	697	860	1,939	2,081	2,275
$S_U$	0.55	0.75	0.88	1.00	1.00
$S_T$	0.82	0.94	0.94	0.98	1.00

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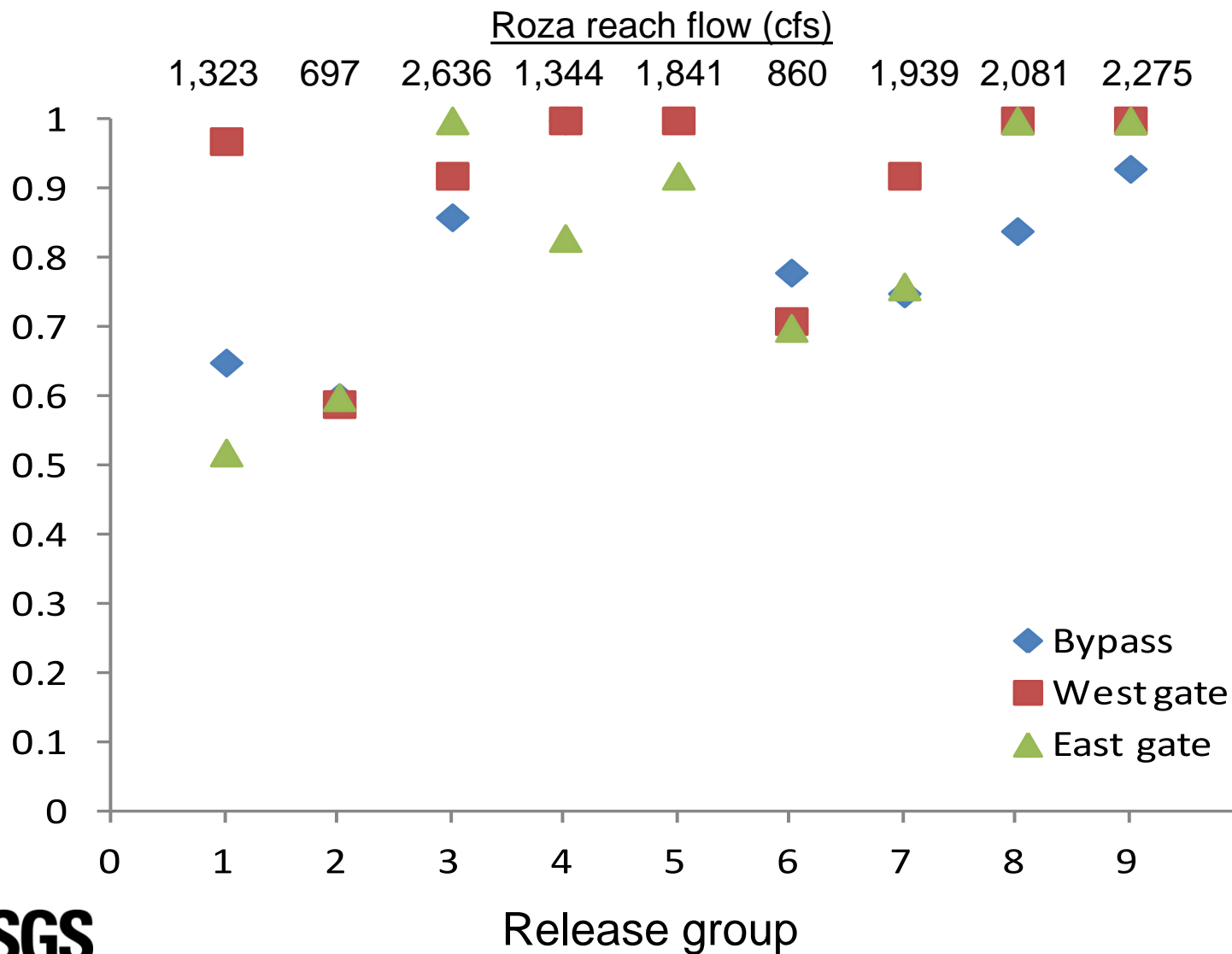
# Dam Passage Survival

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R	2	6	7	8	9
Flow (cfs)	697	860	1,939	2,081	2,275
$S_U$	0.55	0.75	0.88	1.00	1.00
$S_{Dam}$	0.67	0.80	0.94	1.02	1.00
$S_T$	0.82	0.94	0.94	0.98	1.00

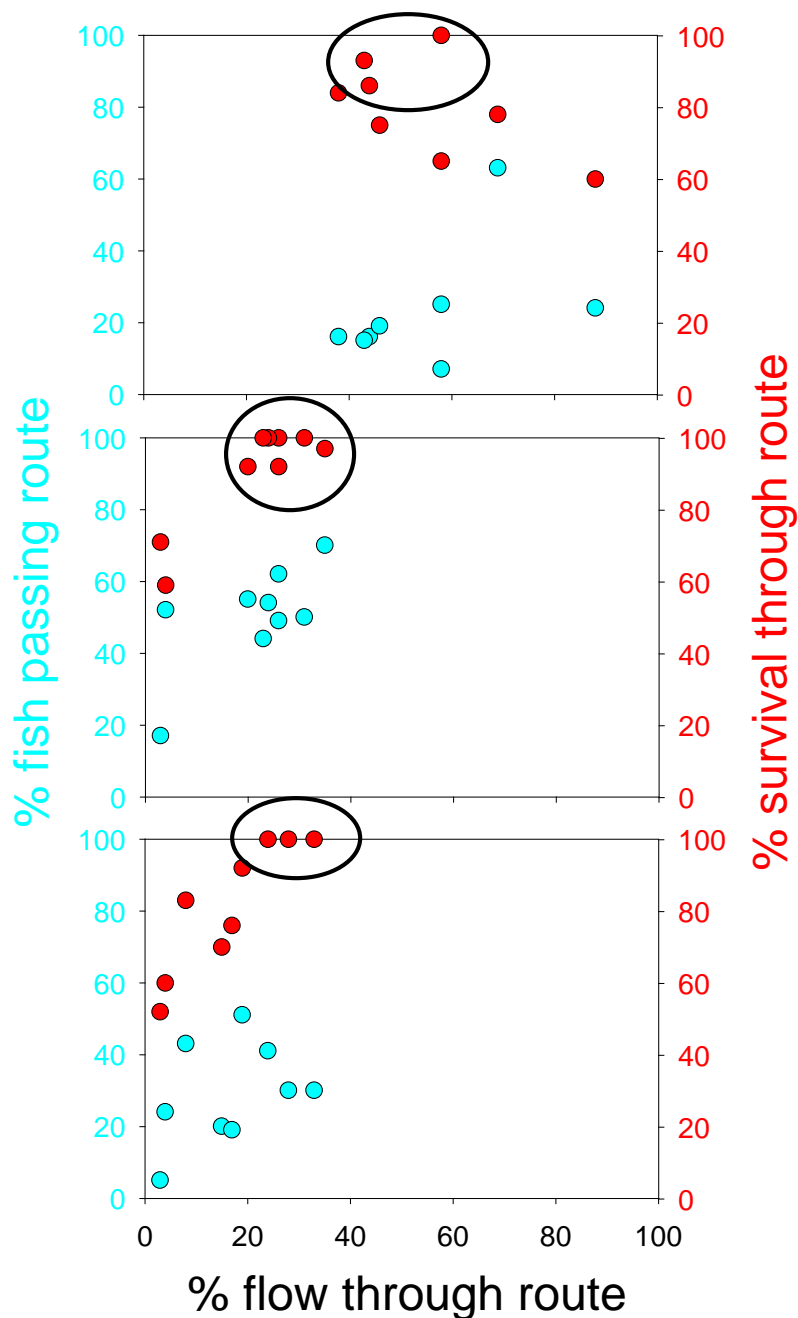
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# Route-Specific Survival





High survival =  
Low diversion %



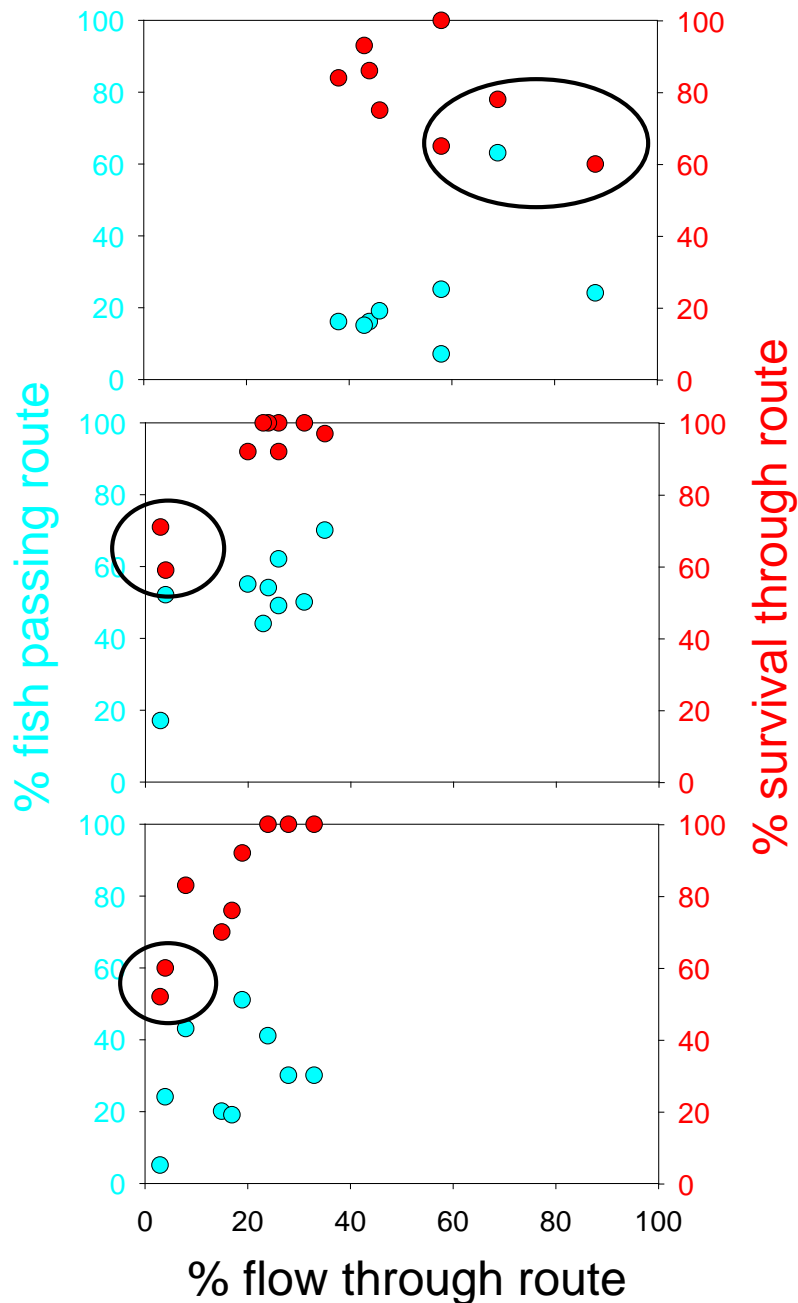
Bypass

West gate

East gate



Low survival =  
High diversion %



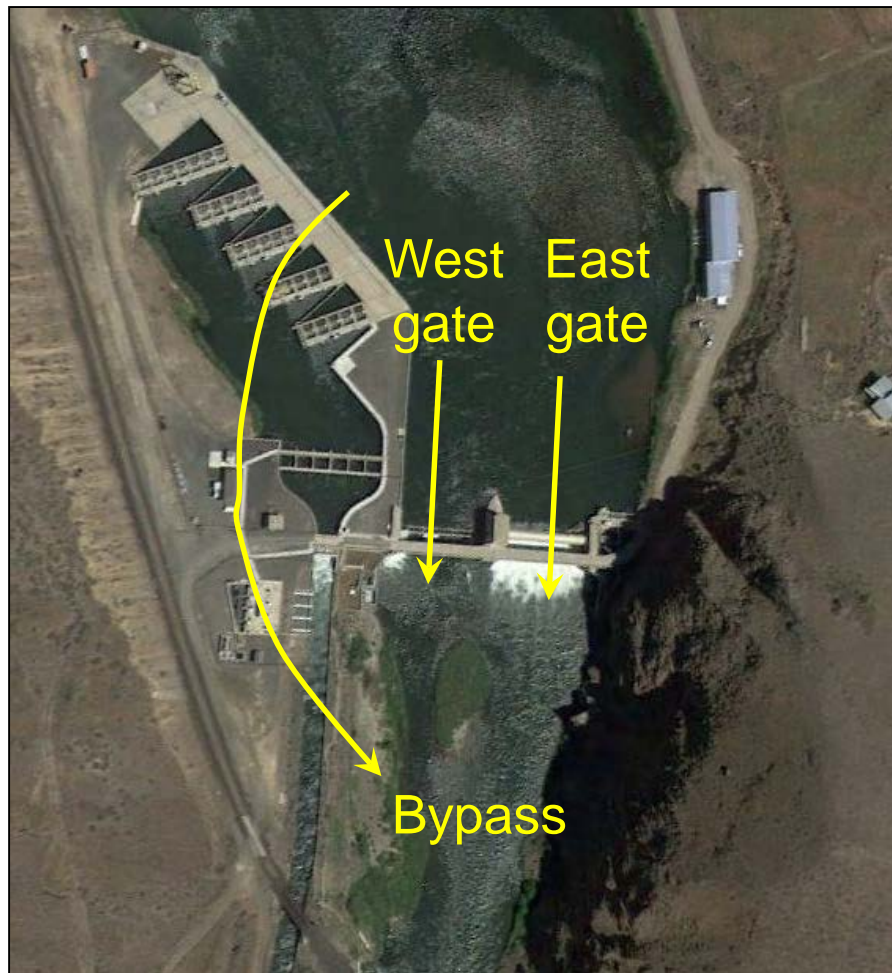
Bypass

West gate

East gate

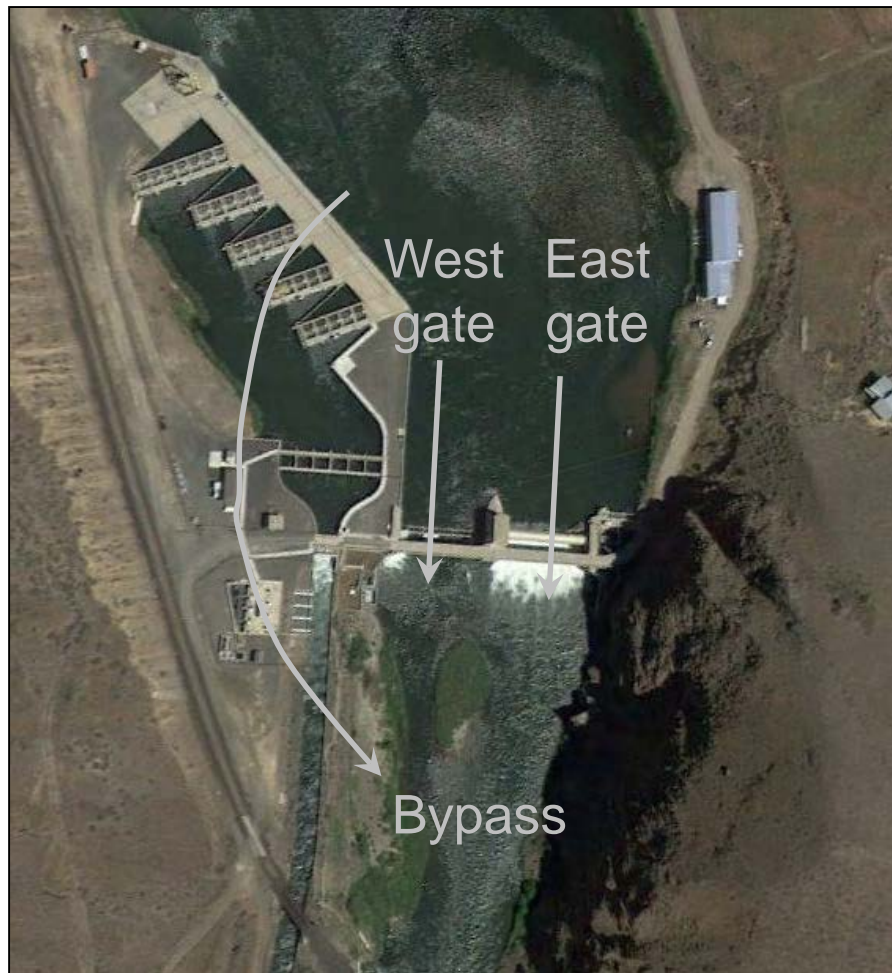


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# “Low Flow”

