BUREAU OF RECLAMATION

Modified OMR

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Real-Time Adjustments
2019 BiOp vs. 2021 LTO PA

2019 BiOp Real-Time Adjustments:

- Some seasonal actions based on exceedance of fish salvage thresholds
- Some undefined actions based on real-time information and discussions about current conditions

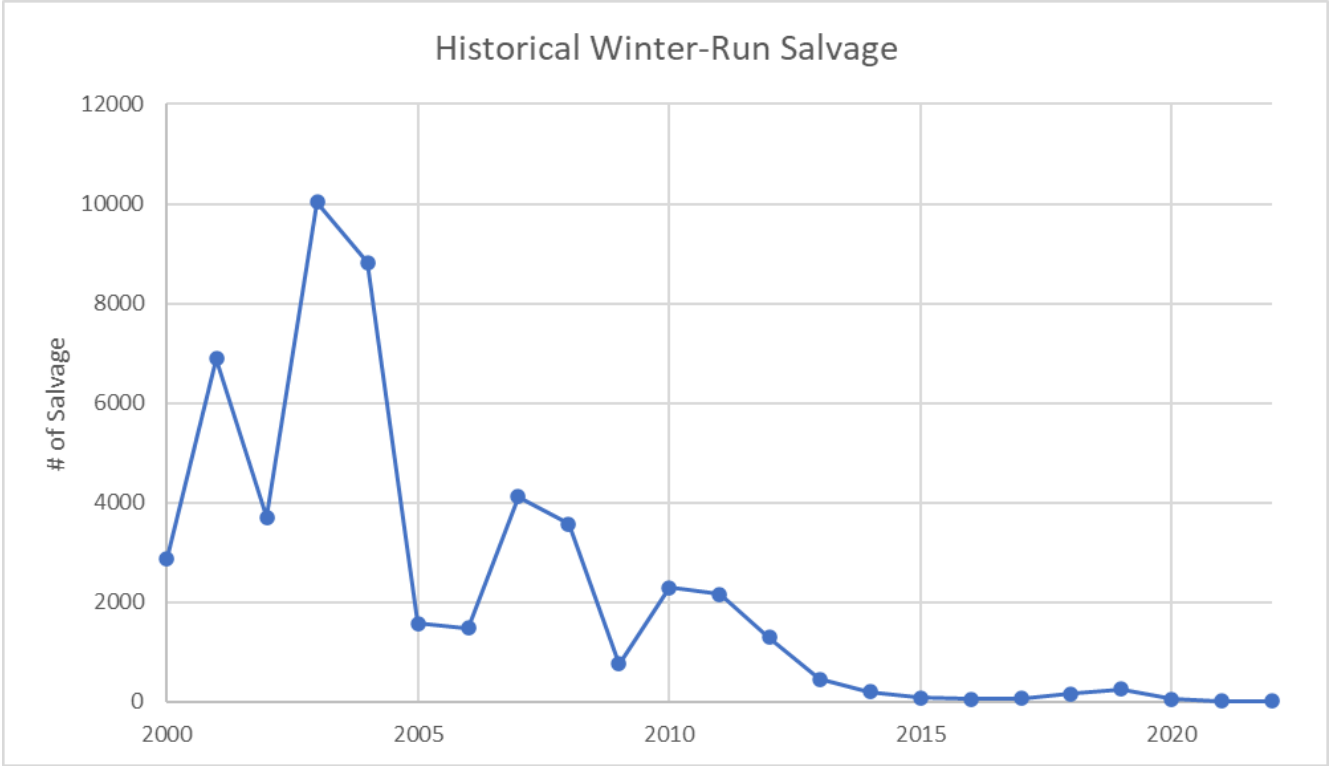
2021 LTO PA Real-Time Adjustments:

- Explicit triggers based on daily thresholds
- Explicit length of days applied to each action
- Reassessed weekly to continue the actions

Overview of LTO PA Modeling Assumptions

Modeling Challenges

- OMR actions happen as real-time adjustments
- Fish presence, salvage, or water temperature are often triggers for OMR actions
- Limited historical dataset
  - 2009 BiOps to 2019 BiOps
  - 2019 BiOps to 2021 LTO
- Holes in the historical dataset



Development Process

Steps to Implementing Each Action:

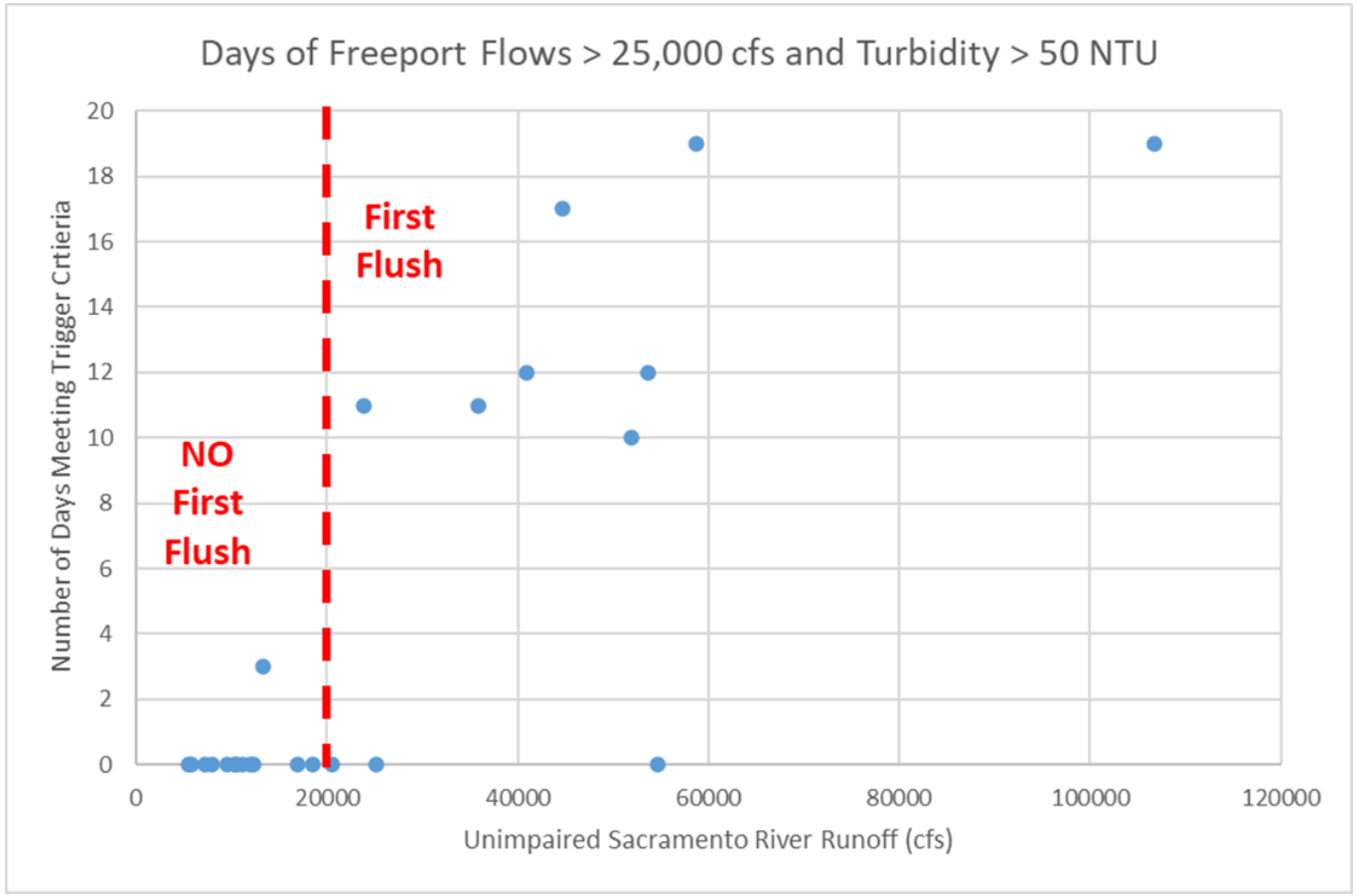
1. Attempt to correlate triggers to flow for dynamic implementation
2. If no correlation is found, look at the historical timing
3. As a last resort, use categorical averages of the historical record

Correlated to Flow	Historical Timing	Historical Triggers
First Flush	Start of OMR Management	Delta Smelt Larval and Juvenile Protection
Onset of OMR Management	Turbidity Bridge Offramp	Longfin Smelt Adult Entrainment Protection
Turbidity Bridge	End of OMR Management	Longfin Smelt Larval and Juvenile Protection
High-flow Offramps		Winter-Run Chinook Salmon
Storm-Flex		Salmonid Loss Thresholds

Correlation to Flow Example

First Flush Triggers:

- Running 3-day average of the daily flows at Freeport is greater than 25,000 cfs, AND
- Running 3-day average of the daily turbidity at Freeport is 50 NTU or greater



Historical Timing Example

End of OMR Management Triggers:

- For Delta Smelt and Longfin Smelt:
  - 3 consecutive days of water temperature at Clifton Court Forebay (CLC) at 77.0°F (25°C) or higher, OR
  - June 30th, whichever comes first
- For Salmonids:
  - Daily mean water temperature at Mossdale (MSD) exceeds 72.0°F (22.2°C) for 7 non-consecutive days in June, AND
  - Daily mean water temperature at Prisoner's Point (PPT) exceeds 72.0°F (22.2°C) for 7 non-consecutive days in June

	CLC	MSD	PPT
2010	30-Jun	-	-
2011	30-Jun	30-Jun	-
2012	30-Jun	30-Jun	-
2013	30-Jun	30-Jun	-
2014	9-Jun	30-Jun	-
2015	11-Jun	30-Jun	-
2016	5-Jun	30-Jun	-
2017	23-Jun	30-Jun	-
2018	25-Jun	30-Jun	-
2019	30-Jun	30-Jun	-
2020	26-Jun	30-Jun	2-Jun
2021	21-Jun	30-Jun	7-Jun
2022	27-Jun	30-Jun	22-Jun

Historical Triggers Example

Winter-Run Chinook Salmon Weekly Distributed Loss Threshold:

- Trigger action when the weekly distributed loss threshold is exceeded on any single day by the 7-day rolling sum
- Operate to 7-day average OMR index no more negative than -3,500 cfs for 7 days

WYT	Jan Avg	Feb Avg	Mar Avg	Apr Avg	May Avg	Jun Avg
C	0%	0%	0%	6%	0%	0%
D	25%	0%	23%	25%	0%	0%
BN	5%	0%	60%	13%	0%	0%
AN	8%	0%	35%	15%	0%	0%
W	0%	0%	10%	17%	0%	0%

Historical Triggers – Combined Coverage

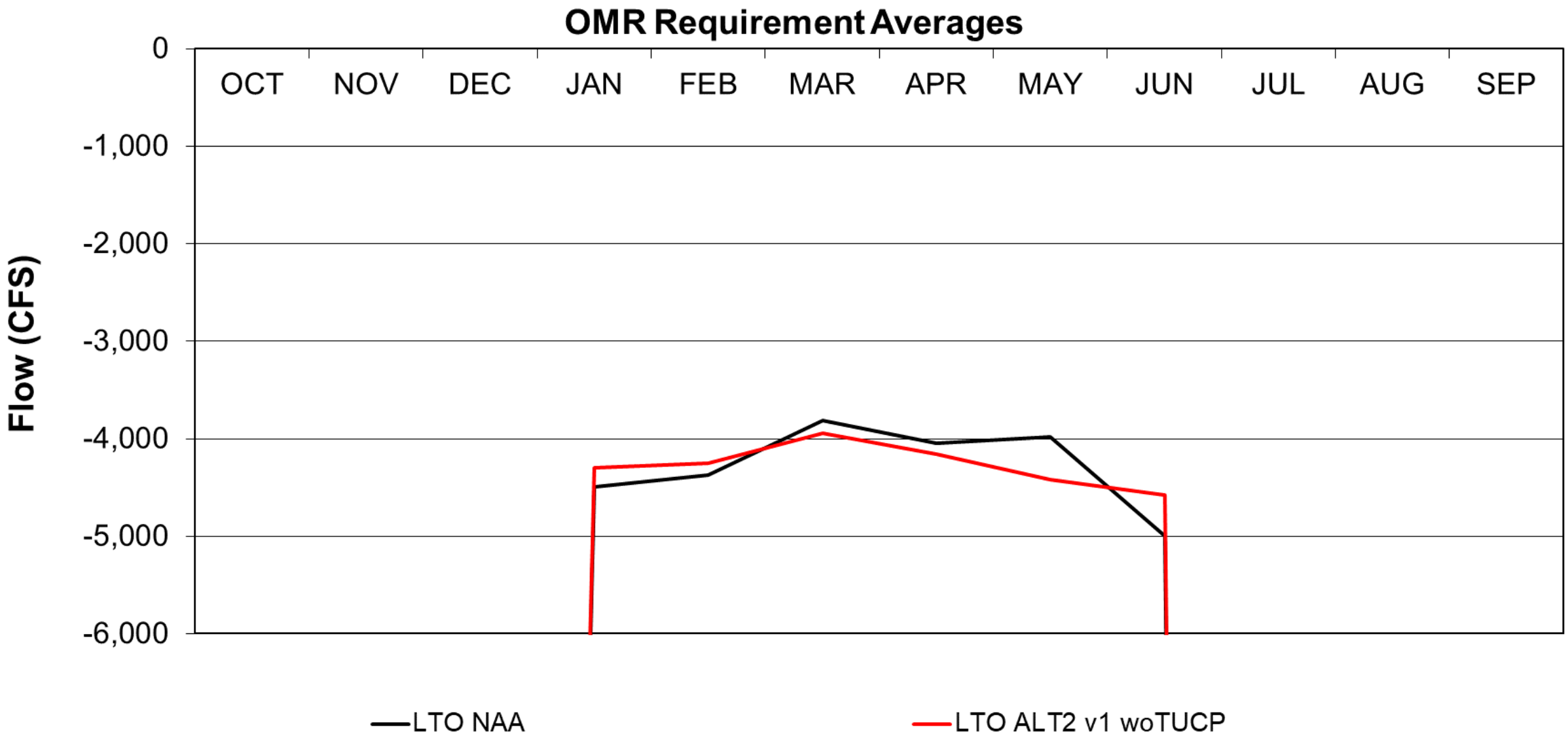
- Each action covered calls for operating to an OMR index > -3,500 cfs
- High-Flow Off-Ramp dynamically removes the coverage of the Larval and Juvenile Smelt actions

Combined Coverage

WYT	Jan Avg	Feb Avg	Mar Avg	Apr Avg	May Avg	Jun Avg
C	25%	25%	45%	38%	13%	10%
D	63%	50%	73%	75%	50%	40%
BN	15%	45%	100%	75%	75%	35%
AN	17%	75%	95%	67%	54%	34%
W	0%	0%	90%	58%	33%	33%

Combined Coverage with High-Flow Off-Ramp

WYT	Jan Avg	Feb Avg	Mar Avg	Apr Avg	May Avg	Jun Avg
C	0%	0%	0%	6%	0%	0%
D	25%	8%	43%	63%	25%	0%
BN	0%	30%	100%	38%	19%	10%
AN	17%	25%	65%	27%	9%	5%
W	0%	0%	30%	17%	0%	0%


OMR Requirement Averages
0
-1,000
-2,000
-3,000
-4,000
-5,000
-6,000
Flow (CFS)
OCT
NOV
DEC
JAN
FEB
MAR
APR
MAY
JUN
JUL
AUG
SEP
LTO NAA
LTO ALT2 v1 woTUCP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