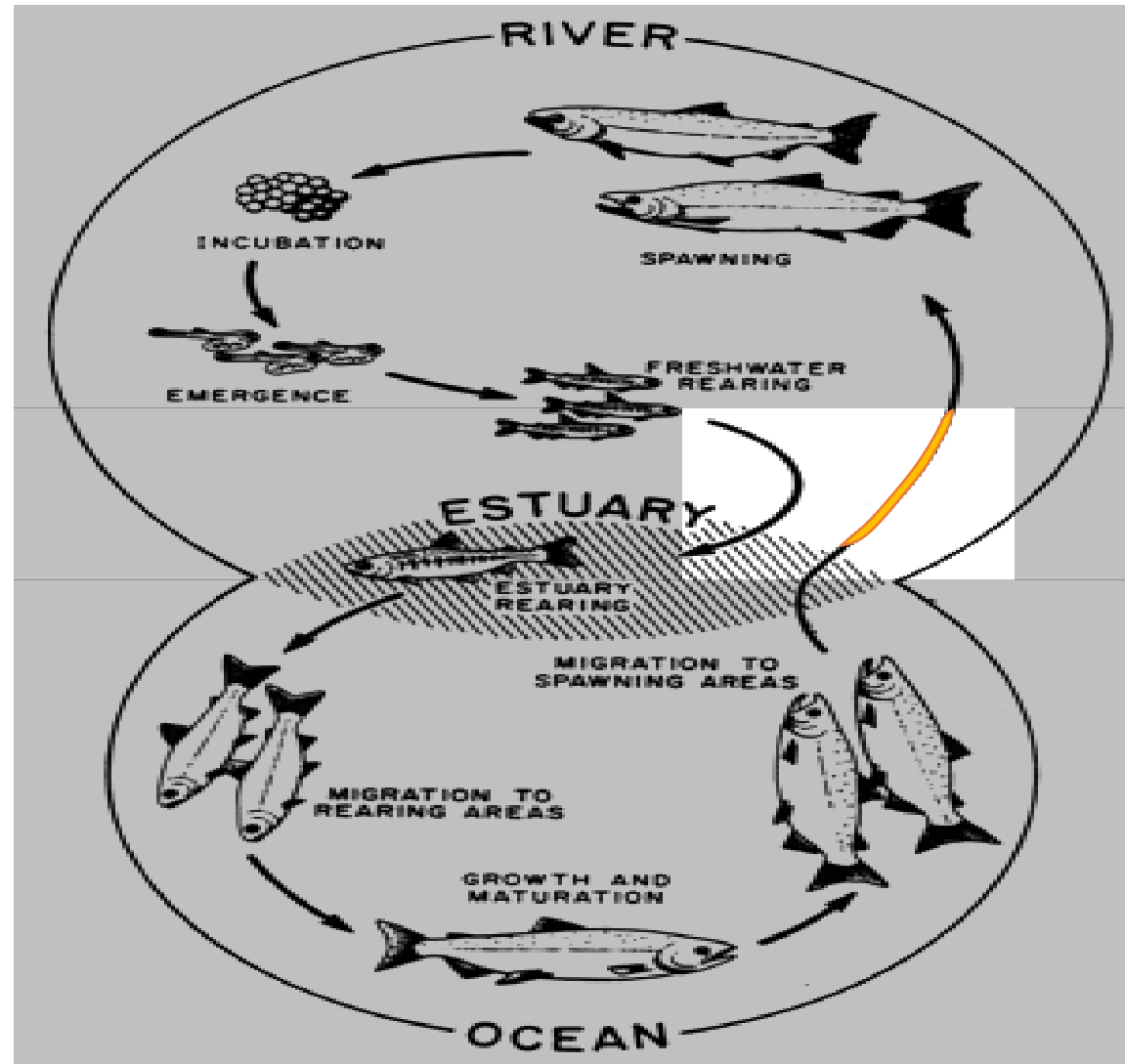


Adult Spring Chinook Passage Timing and Conversion—Continued



“It looks like you have everything under control.”

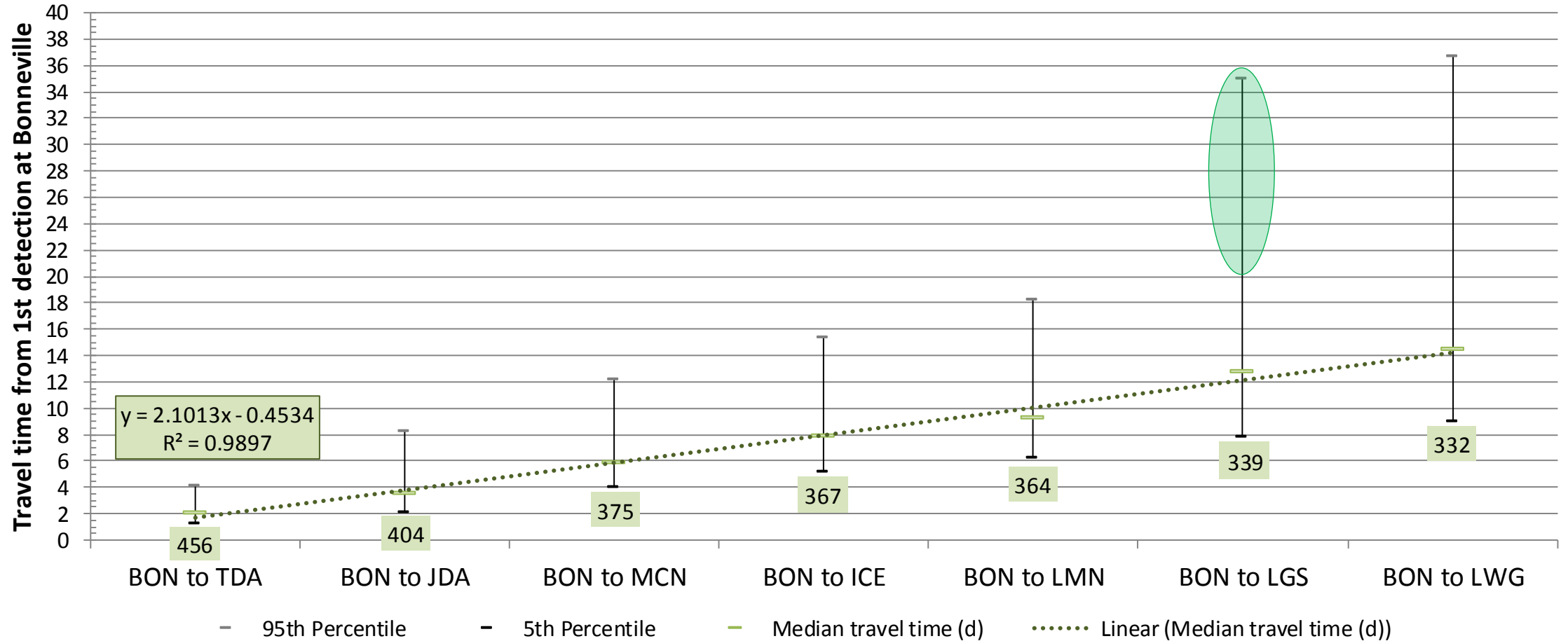
Generalized Chinook salmon life history



2019 days to travel from Bonneville

Median travel time (d) from first PIT detection at Bonneville Dam

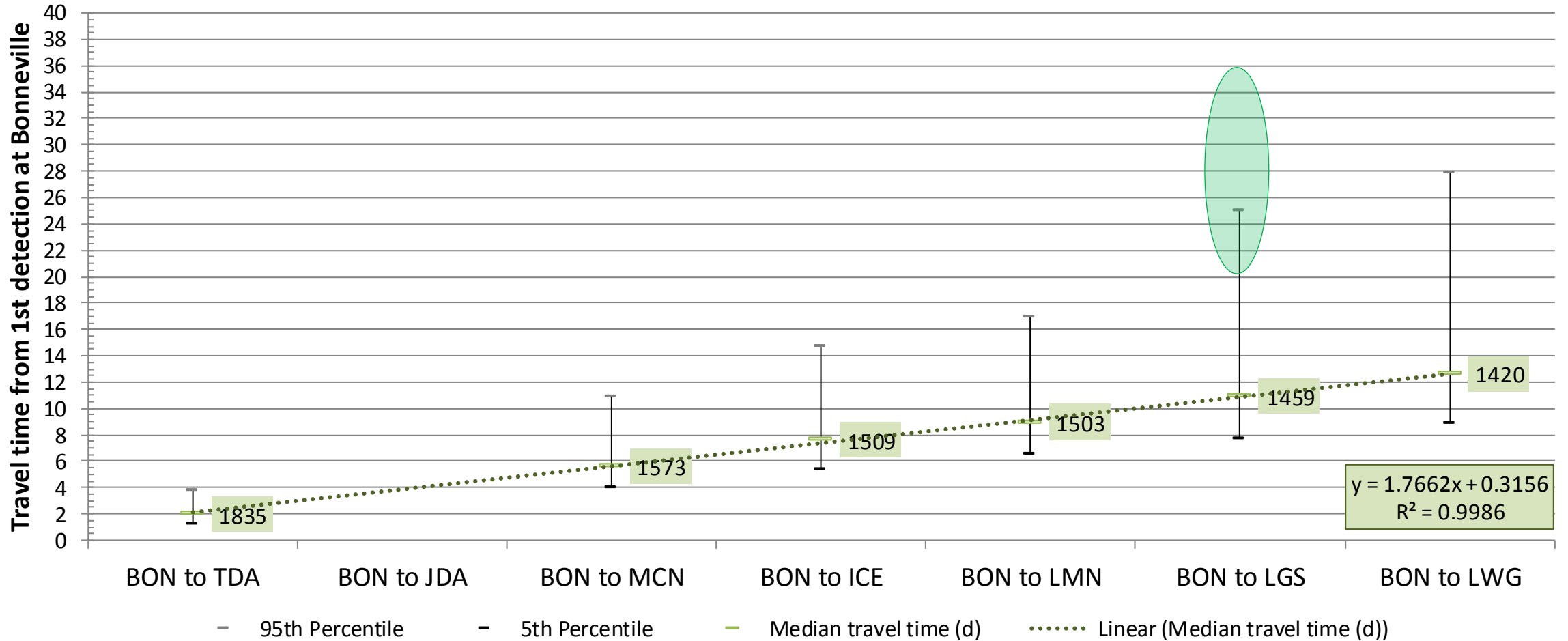
Adult Snake River spring/summer Chinook as of November 22 2019



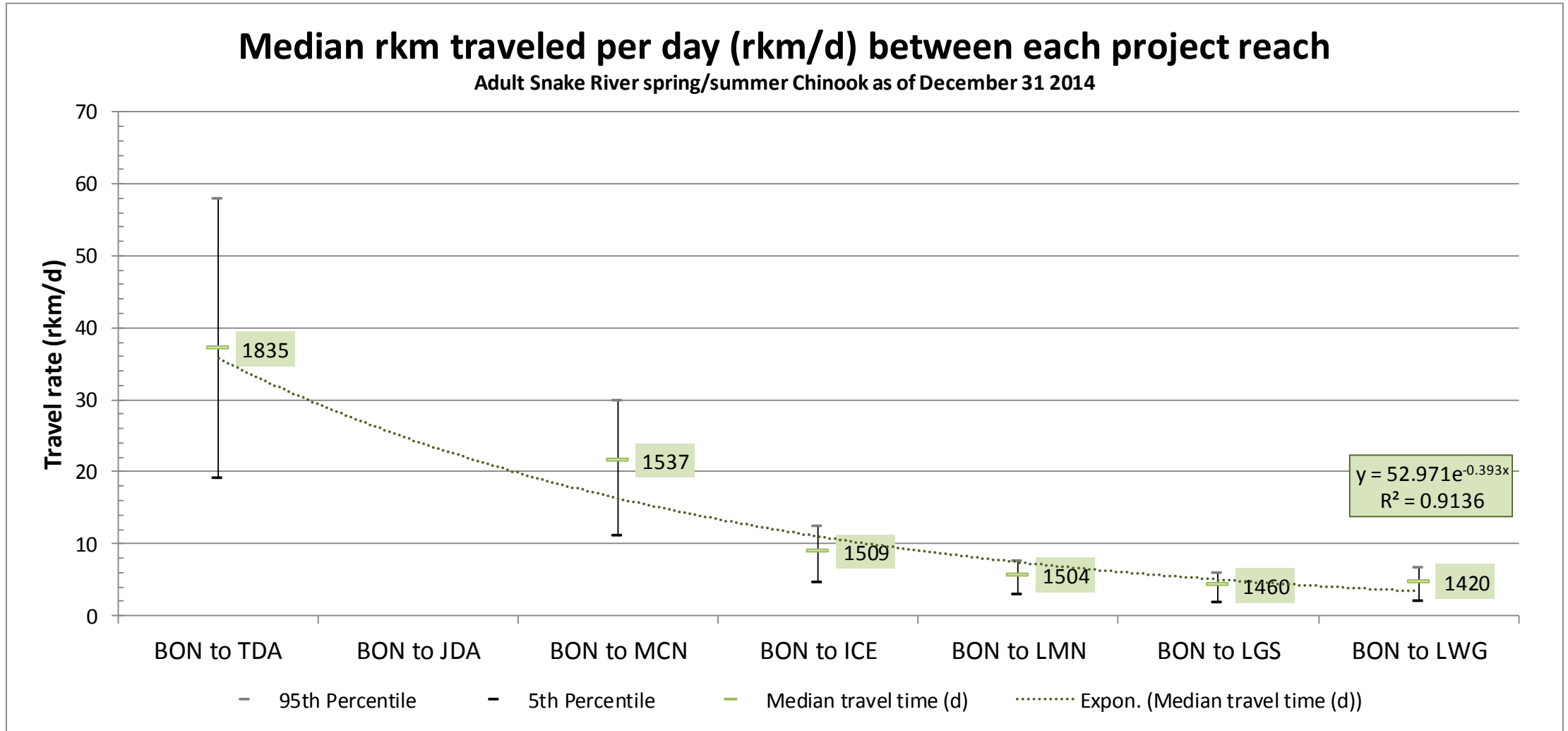
2014 days to travel from Bonneville

Median travel time (d) from first PIT detection at Bonneville Dam

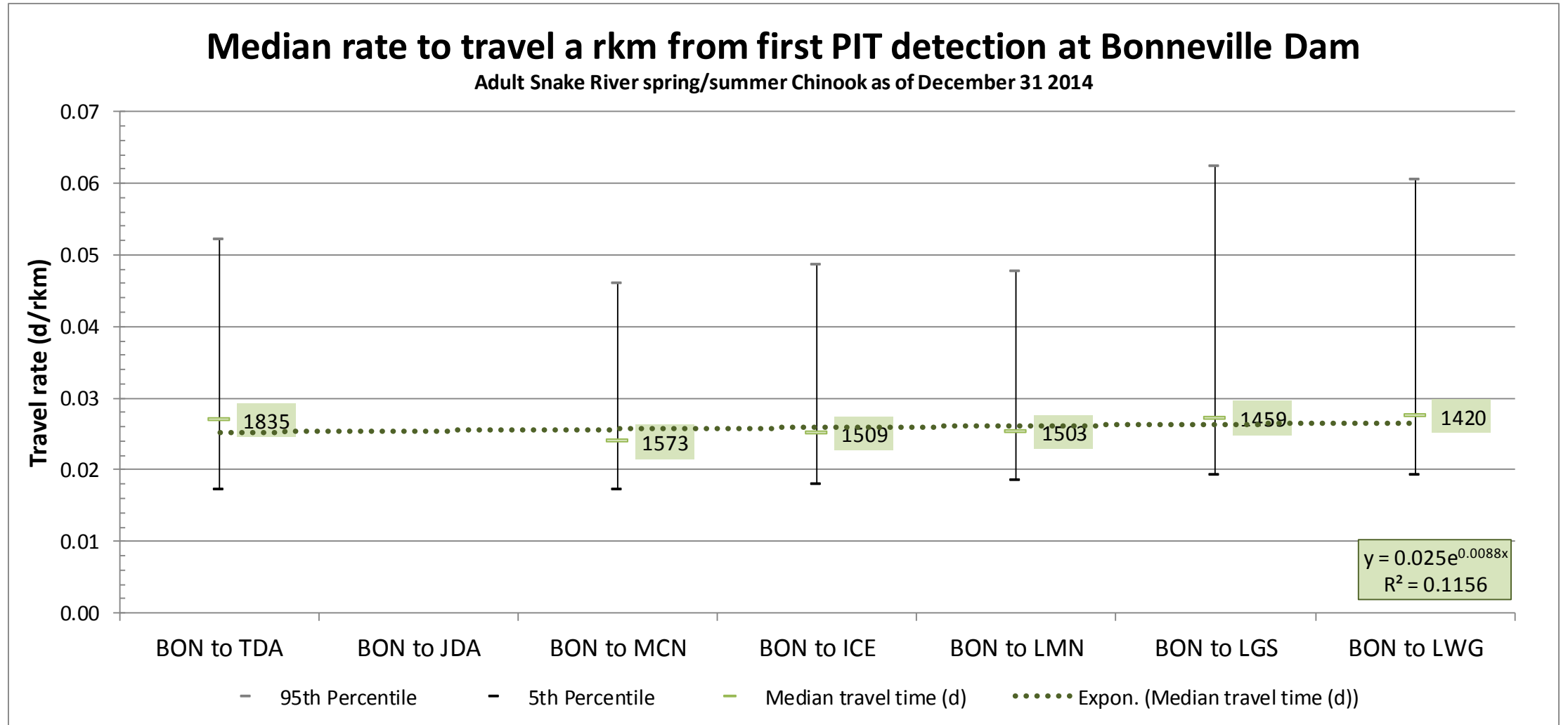
Adult Snake River spring/summer Chinook as of December 31 2014



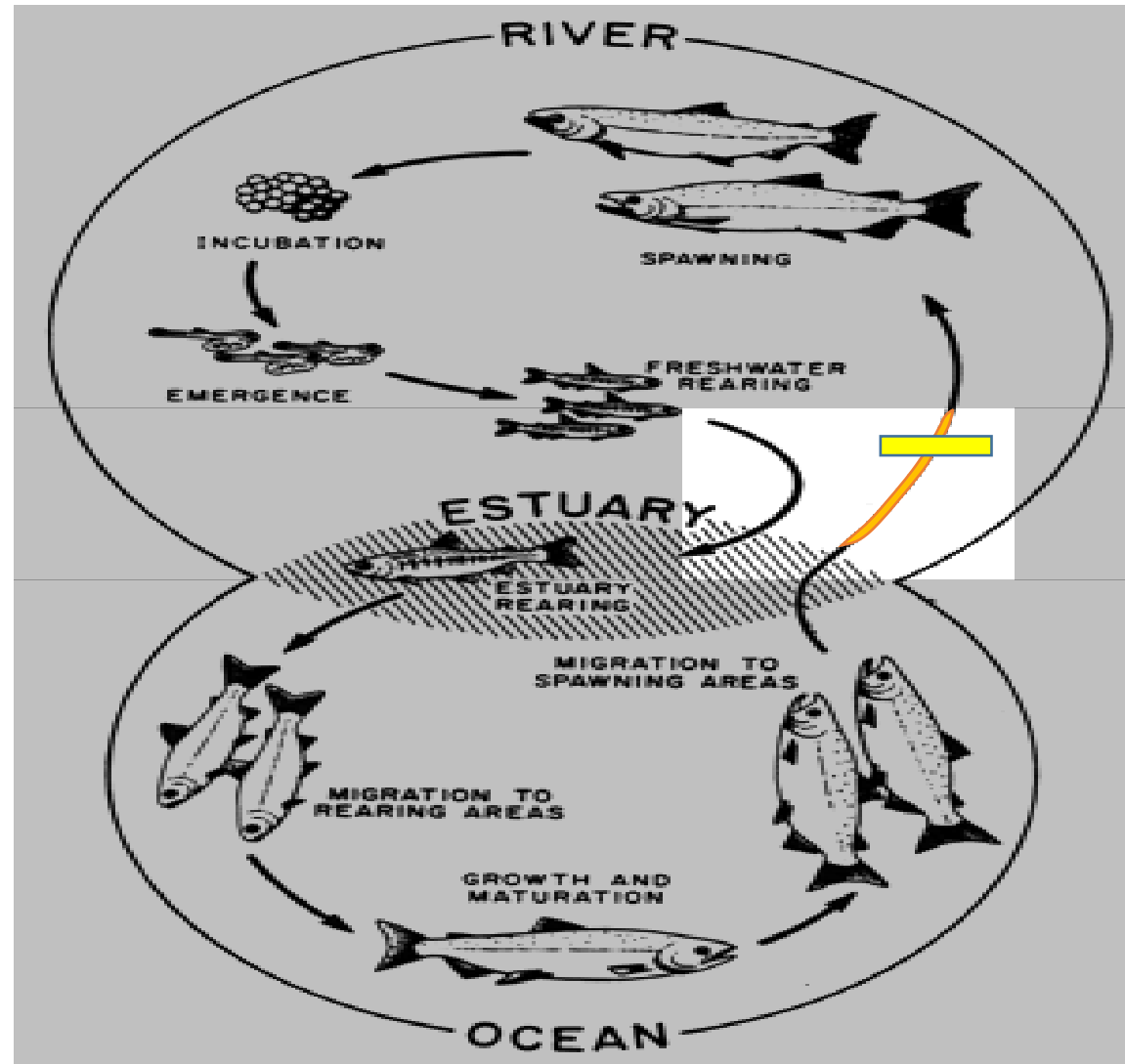
2014 rkm per day



2014 travel one rkm



Generalized Chinook salmon life history



Little Goose adult Chinook salmon passage – Brief history

- Many studies conducted before 2006 indicate Snake and Columbia River dams slow upstream migration of adult salmon and steelhead.
- Haynes and Gray (1980) identified variability in average adult passage time (hrs) for adult Chinook salmon, Mann-Whitney test support significantly different travel time (hrs) for Little Goose Dam, especially during high flow. However, they indicate that spill and turbine operations are regular events at all dams and would not appear to be solely responsible for excessive delay.
- Jepson et al. 2009 identified slow travel at higher discharges, indicating ladder counts generally increased during periods of higher discharge, but they did not point to a single condition that should be avoided.
- Suggestive results from several active tag studies show adults enter the tailrace of Little Goose favoring the north shore—becoming more apparent with higher spill percentages.
- However, in all studies final conversion to Lower Granite remain greater than 95%.

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- Little evidence of negative effects on adult upstream survival has been found for Snake River spring Chinook relative to the time spent in the Ice Harbor to Lower Granite reach or the Lower Monumental to Little Goose reach.
- Adult salmon and steelhead that were subject to the smolt transportation program have slower upstream migration, have lower upstream migration success, and higher dam reascension rates, all contributing to delay.
- When considering adjusting operations to aid adult passage, consideration must also be given to downstream passage of juvenile salmonids. Each juvenile powerhouse encounter reduces subsequent SAR by a relative 9-13% (Chapter 7, McCann et al. 2016).
- Water temperatures, fishway temperatures, TSW operations, seasonality, distance to point of origin, specific project operations, and flow all affect upstream migration rates. The TSW operation in particular appears to negatively affect adult passage rates.

Central tendency and variability

- Median rkm traveled per day
 - Entire population participate—not just those that train to compete
 - Mid-points represent observations not “recipe for success”
- Percentile ranges
 - System survival important when describing a perceived problem
 - Faster travel vs slower travel by itself may not equate to better or worse
 - Can operations influence the “slower travelers to travel faster”
 - Will influencing the slower travelers to travel faster benefit the population and recovery
- Optics prioritize unintended consequences rather than life cycle approach
 - Adult ladder observations (counts, PIT detection)
 - Fallback/reascension (PIT redetections, **not** all reascend)
 - PIT conversion rates, travel times
 - Spawning

Lessons Learned—Fish Passage

- Adult cumulative passage percentage to Lower Granite Dam exceeded 95% and were within a spread of 2.7% 2014–2019.
- Little Goose operation changes meant to address adult passage concerns increased PIT PH at more than Little Goose Dam. Each juvenile powerhouse encounter reduces subsequent SAR by a relative 9-13%.
- Additional evaluation is needed to identify operations that retain the necessary survival benefits for both juvenile and adult salmon and steelhead traveling through the FCRPS.
- Learning while doing requires acting but should not stand in the way of over-arching principle for improvement

How have we applied recent learning?



Found at : <https://app.hedgeye.com/insights/61081-cartoon-of-the-day-leaning-tower-of-pisa?type=cartoon>

TMT YER 2018 Lessons Learned—Action Tools

- Multiple levels of evidence provided a better atmosphere for further discussion during adaptive management discussions.
- Both action tools were useful for identifying important periods to begin discussing coordination options.
- More evaluation is needed to verify if the action tools provided an early warning of an unintended consequence.
- The tools could benefit from additional sensitivity evaluation to support what time-step best reflects the precision of metrics at alerting in-season management discussions.
- Still need to work together to establish an agreed upon criteria, other than status quo operations to help in-season management decisions.

Agreement "Pillars"

Result: Avoid Litigation on 2019 Columbia River System BiOp

FISH

2019 ~ ≥ 2018

2020 > 2018

POWER

2019/20 ~ ≥ 2018

OPERATIONS

Feasible

PITPH, Reach Survival, Travel Time, Power Flexibility, Resource Integration, Revenue Requirements, Collaboration, Adaptive Implementation, Navigation, Safety, Structural Integrity

Spill Operations Agreement Fish Benefit Logic Path

Increased Spill



Decreased Powerhouse Encounter Probability
(PITPH)



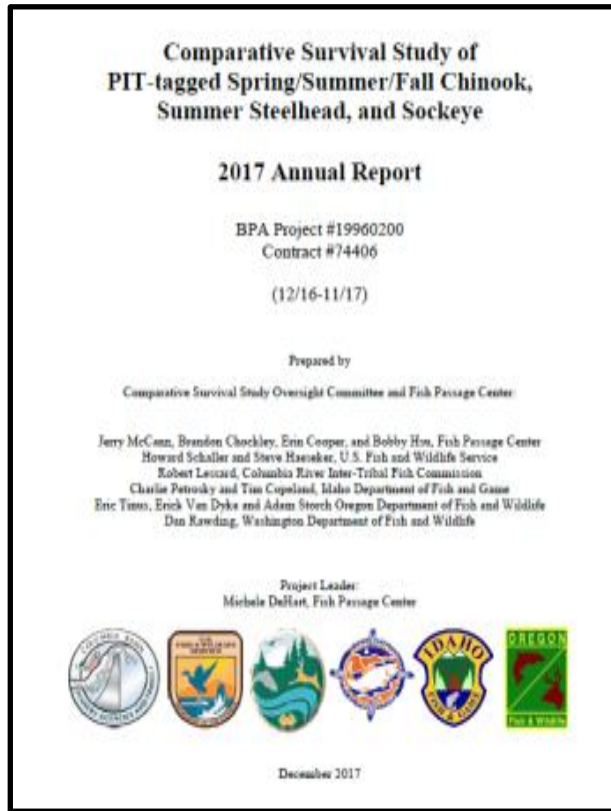
Increased SAR



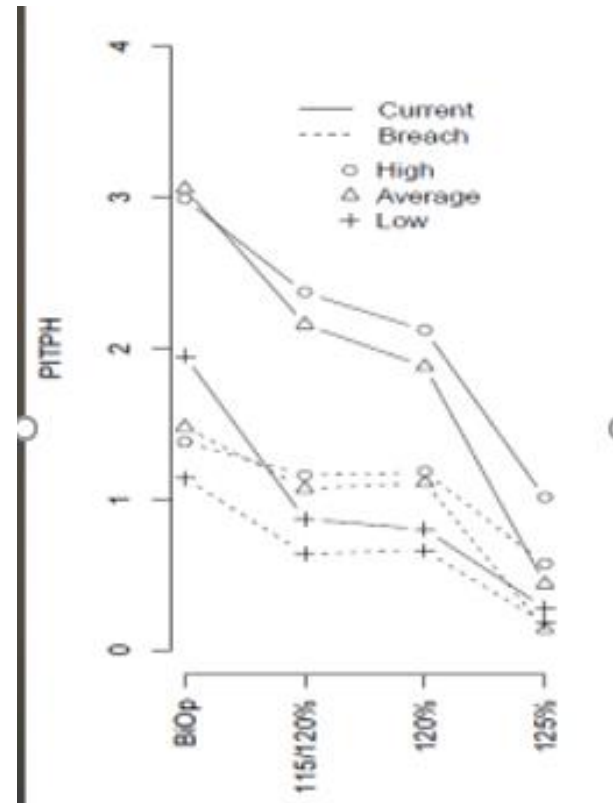
Increased Adult Return

Fish Benefit Modeling CSS-based PITPH Index

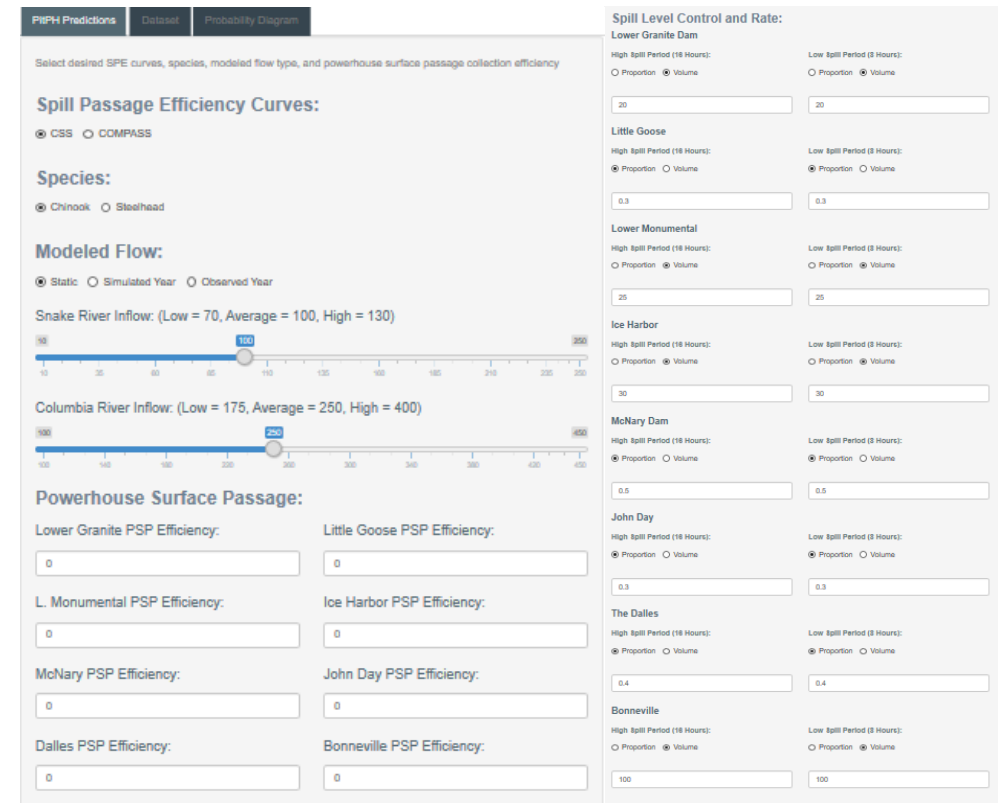
<https://nptfisheries.shinyapps.io/pitph2/>



NPCC Program Project
Empirically-based



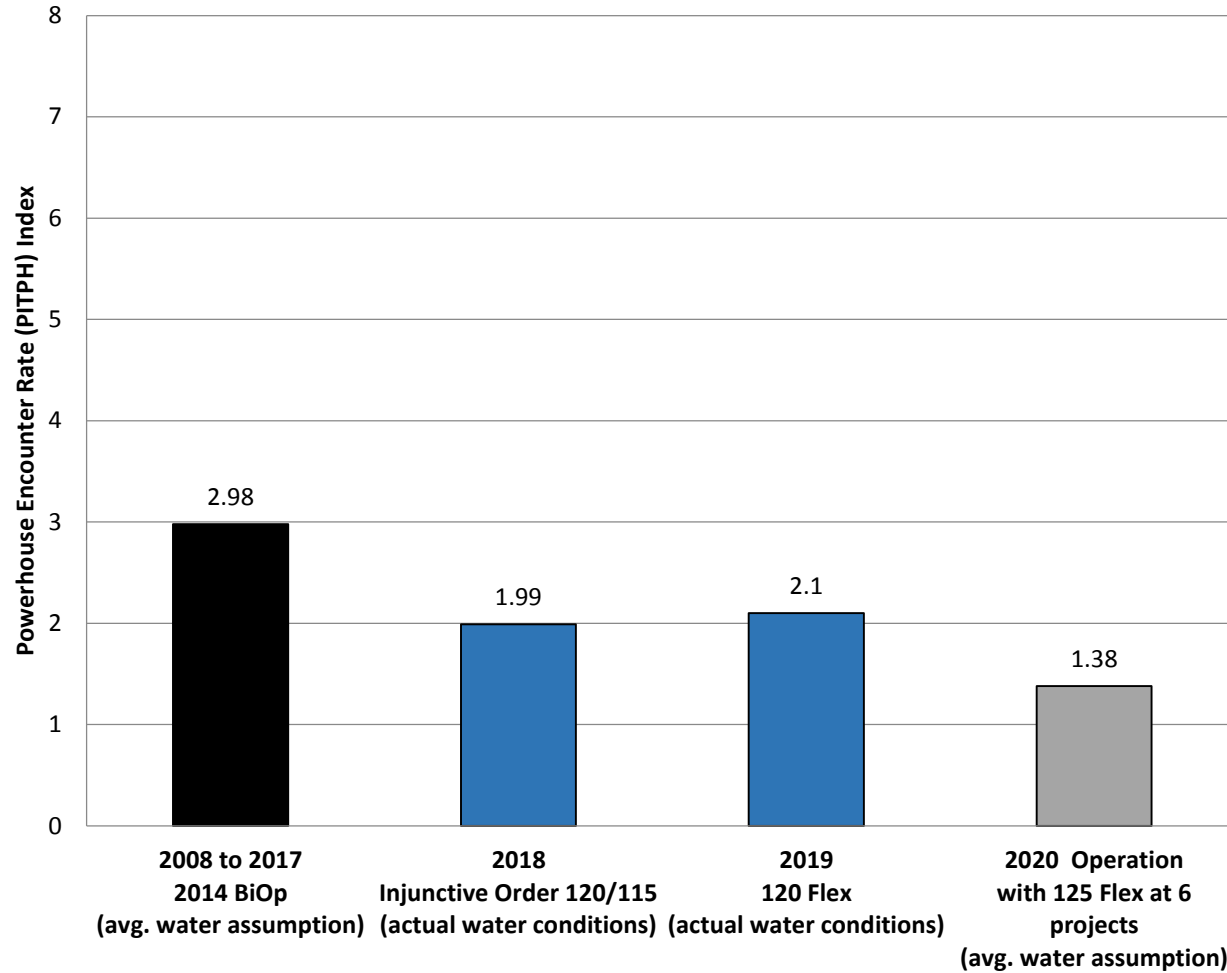
Spill Operations have Mechanistic
Linkage to PITPH



Web-accessible Open Access
Dynamic Scenario Capability (i.e. Flex)

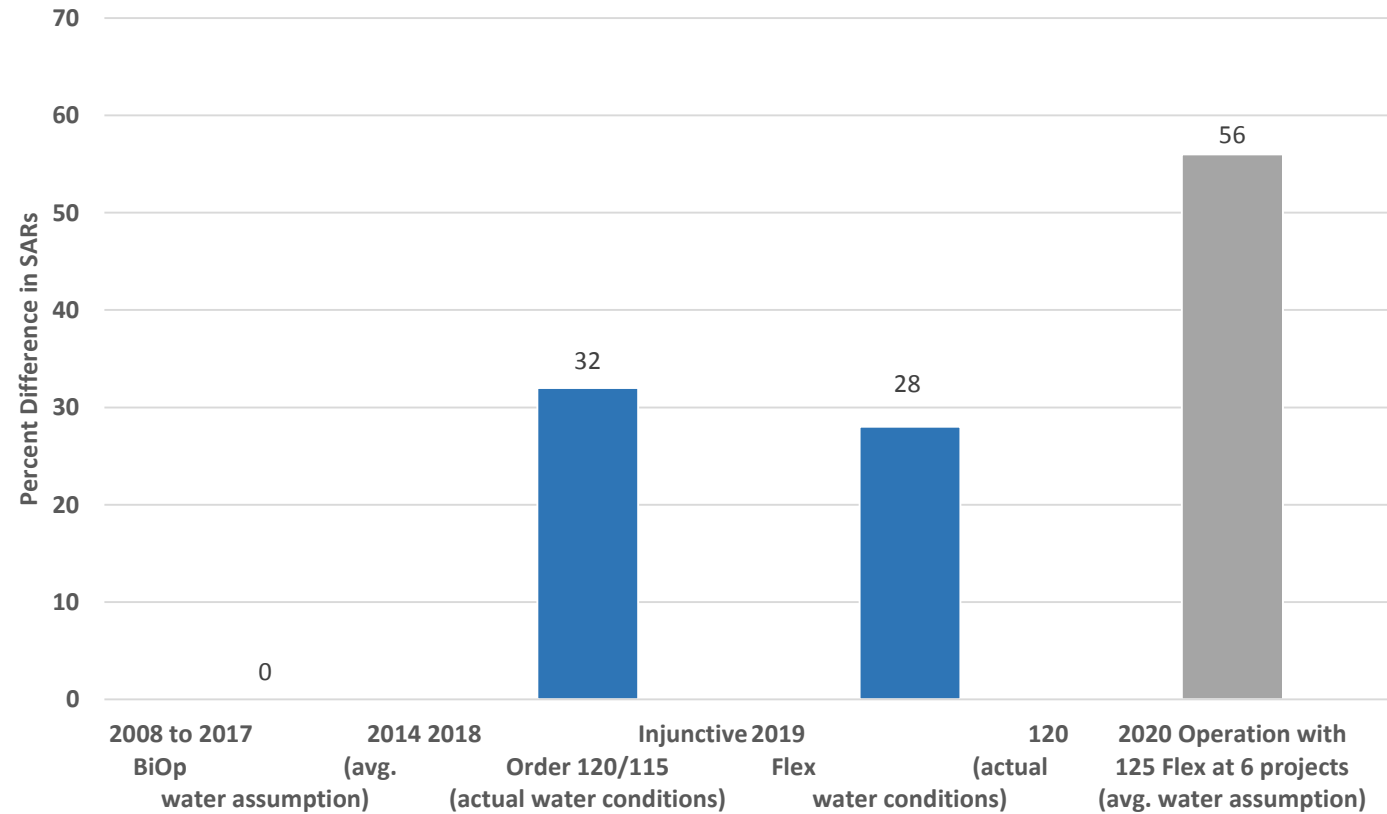
Increased Spill = Decreased Powerhouse Encounter Probability

2019 - 2021 Spill Operations Agreement Fish Benefit - PITPH Modeling Estimates



Decreased Powerhouse Encounter Probability = Increased SAR

2019 - 2021 Spill Operations Agreement
Fish Benefit (Snake River Chinook Salmon)
Modeled SAR Percent Change Relative to the 2014 BiOp
Operation



Attachment A
2019 – 2021 Spill Operation Agreement Addendum
 2020¹ Spring Spill Operation Refinement

Table 1.5 Planned (refined tables 1.3.a-b) 2020 spring spill operation, applying estimated 125% mean total dissolved gas (TDG) spill caps and performance standard spill² operations at six projects (“125 flex”), applying estimated 120% mean TDG spill caps and performance standard spill (“120 flex”) at John Day Dam (JDA), and 24 hour performance standard spill (40%) at The Dalles Dam (TDA).

Location	Estimated mean 125% Total Dissolved Gas Spill Cap (16 hours), with alternative operation at JDA and TDA.	Performance Standard Spill (8 hours).
Lower Granite (125 flex)	72 kcfs	20 kcfs
Little Goose (125 flex)	79 kcfs	30%
Lower Monumental (125 flex)	98 kcfs	30 kcfs
Ice Harbor (125 flex)	119 kcfs	30%
McNary (125 flex)	265 kcfs	48%
John Day (120 flex)	146 kcfs	32%
The Dalles (Performance Standard)	40%	40%
Bonneville (125 flex with 150 kcfs spill constraint)	150 kcfs	100 kcfs

¹ This operation will also be implemented if the Agreement remains in effect in 2021.

² “Performance standard” spill is a NOAA Fisheries term and refers to spill level intended to meet NOAA’s performance standard testing, as described in the 2008 FCRPS Biological Opinion and accompanying administrative record.

2020 Little Goose Operations

125% Flex Spill*

- The 8-hours of performance standard spill may occur (April 3–June 20) with some flexibility prior to exception criteria being met (exceptions below).
- No more than 5-hours of performance spill may occur between sunset and sunrise.
- Performance spill shall not be implemented between 2200 and 0300.
- No Ponding above current MOP assumptions except as noted below.

*Exceptions:

1. **When a cumulative total of 25 adult spring Chinook salmon are counted at Lower Monumental, operate Little Goose at 30% spill for 8 consecutive AM hours**, starting at 5AM (April 1–15) or 4AM (April 16–June 20).
2. **During uncontrolled spill, spill at 30% for 8 consecutive FPP day light hours and store any additional inflow exceeding hydraulic capacity in the forebay above MOP if necessary.** Stored water should be drafted to pass inflow from 1200 to 1600. In the event addition draft is needed to return to MOP increase spill from 1600–0400. In the event that returning to MOP is forecasted to exceed 130% TDG use all 16 hours to avoid exceeding 130%.

What's next?

