THE PORTABLE FLOATING FISH COLLECTOR ON COUGAR RESERVOIR: SUMMARIZING THREE YEARS OF OPERATIONS

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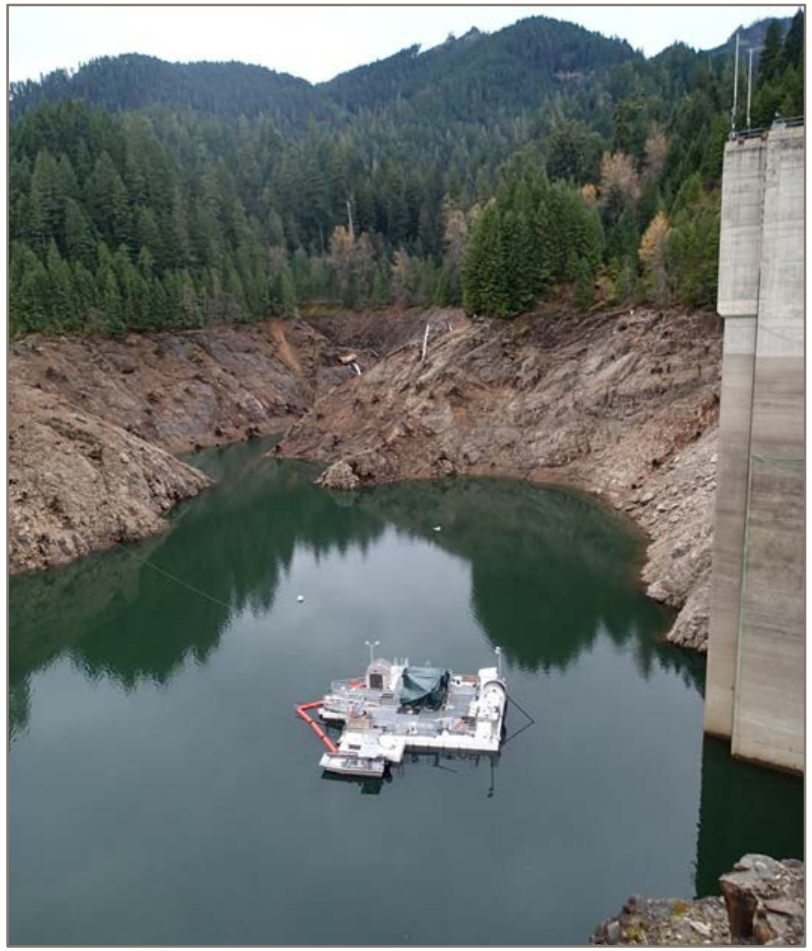
OVERVIEW

- What is the PFFC?
- Purpose of PFFC
- Season 1, 2, and 3
- What affects collection?
- Copepods
- Lessons learned/ Future applications



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WHAT IS THE PFFC?

Portable **F**loating **F**ish **C**ollector

480 volt power supply

Mooring system
- 4 hydraulic winches and anchors

Water pumps
- 2 - 40 hp/ 1 - 27 hp

Fish Holding Area
- Hopper

Staff
- Biologists, electricians, mechanics

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PURPOSE OF PFFC

Cost effective, semi-portable research prototype that will help inform operations and biological performance of future full-scale permanent downstream passage structures at Willamette Valley Projects.

Primary fish of interest:

Spring Chinook Salmon

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SEASON 1 (2014): MAY 27 – DEC. 16

Trap Operations

- 75’- 222’ from WTCT
- Sampled top 8’ of water column
- Inflow treatment schedule (randomized)
  - Low- 64 cfs
  - High- 109 cfs
- USGS equipment attached to vessel

Chinook Behavior

- Avoidance once inside trap
  - Inflow velocities not constant
- Occupying depths below trap (> 8’)
- Mortality
  - Associated with excessive debris
  - Stressors of handling/transport
    - warm collection/cold release

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SEASON 1 (2014)

Total Chinook catch (n = 157)

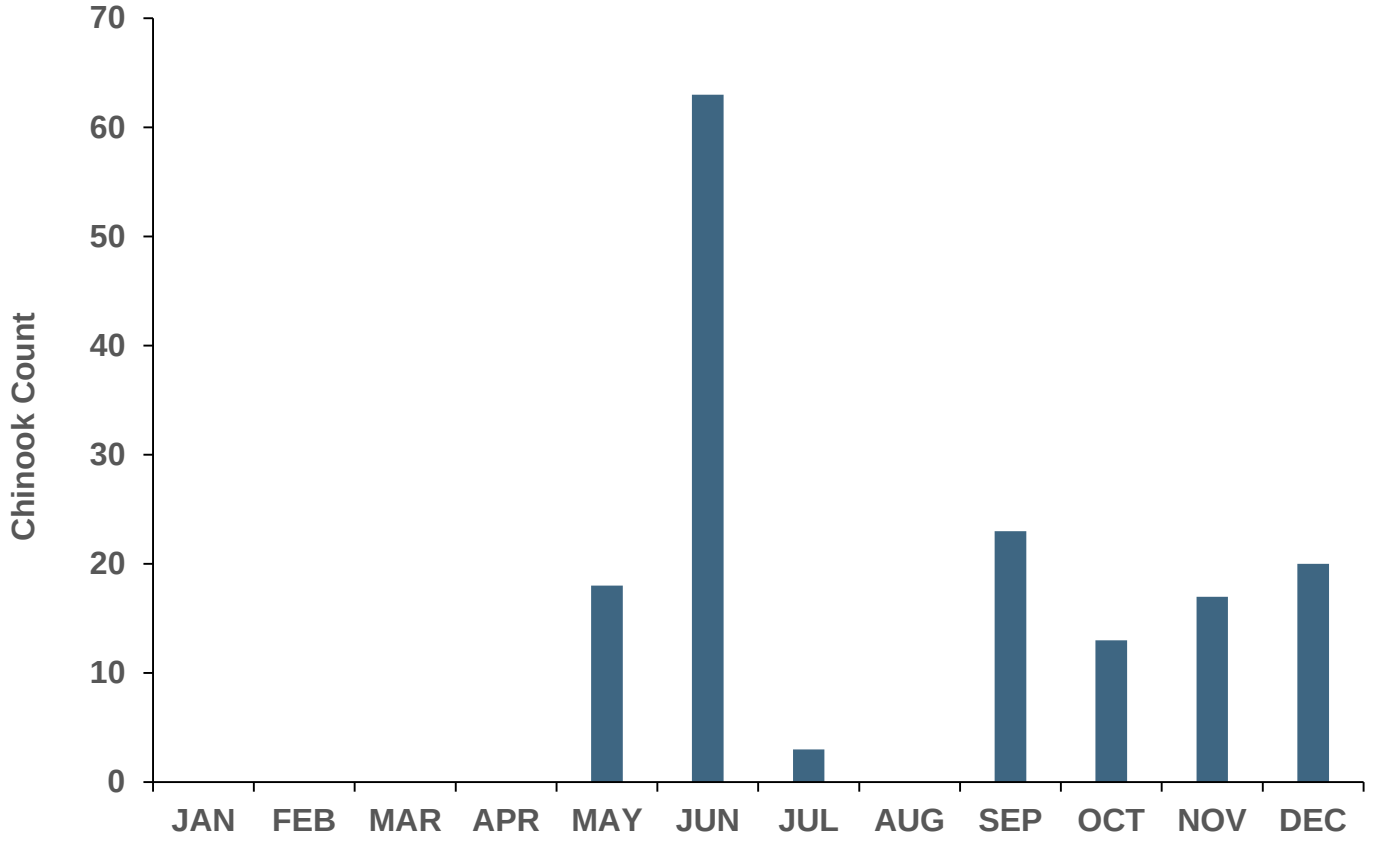
Missed early spring catch (construction)

Epilimnion very warm
- 24.4 degrees Celsius at surface

Swimming out/ avoidance within trap

Temporary debris boom installed

46.5% of total catch in fall/ winter



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TRAP MODIFICATIONS - SHUTDOWN

Trap off from December 2014 - March 2015

Flow Collection Module raised to achieve proper inflow velocities

Anchors relocated

Permanent debris boom

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SEASON 2 (2015): MARCH 2 – DEC. 31

Trap Operations

- 42’ - 111’ from WTC tower
- Inflow treatment schedule (randomized)
  - Low- 72 cfs
  - High- 122 cfs
- USGS equipment attached to vessel

Chinook Behavior

- Minimal avoidance once inside trap
- Occupying depths below trap (> 8’)
- Mortality
  - Stressors of handling/transport
    - warm collection/cold release
  - Isolated debris events
  - High parasite (copepod) loads
  - Predator occupancy

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COLLECTION EFFICIENCIES- 2015

2015 USGS Surrogate JSATS and/or PIT release groups collection efficiency

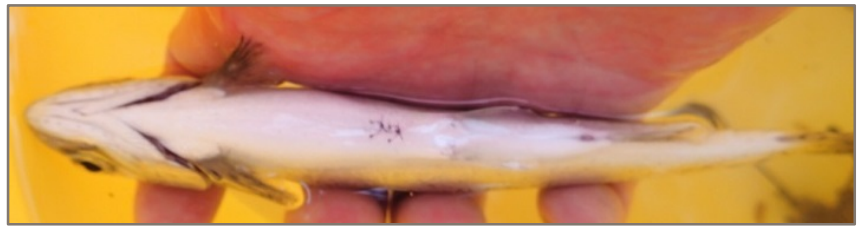
Release groups:

March: 4 of 503 = 0.80%

June: 2 of 505 = 0.40%

September: 0 of 489 = 0.00%

September to November: 6 of 532 = 1.13%



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SEASON 2 (2015)

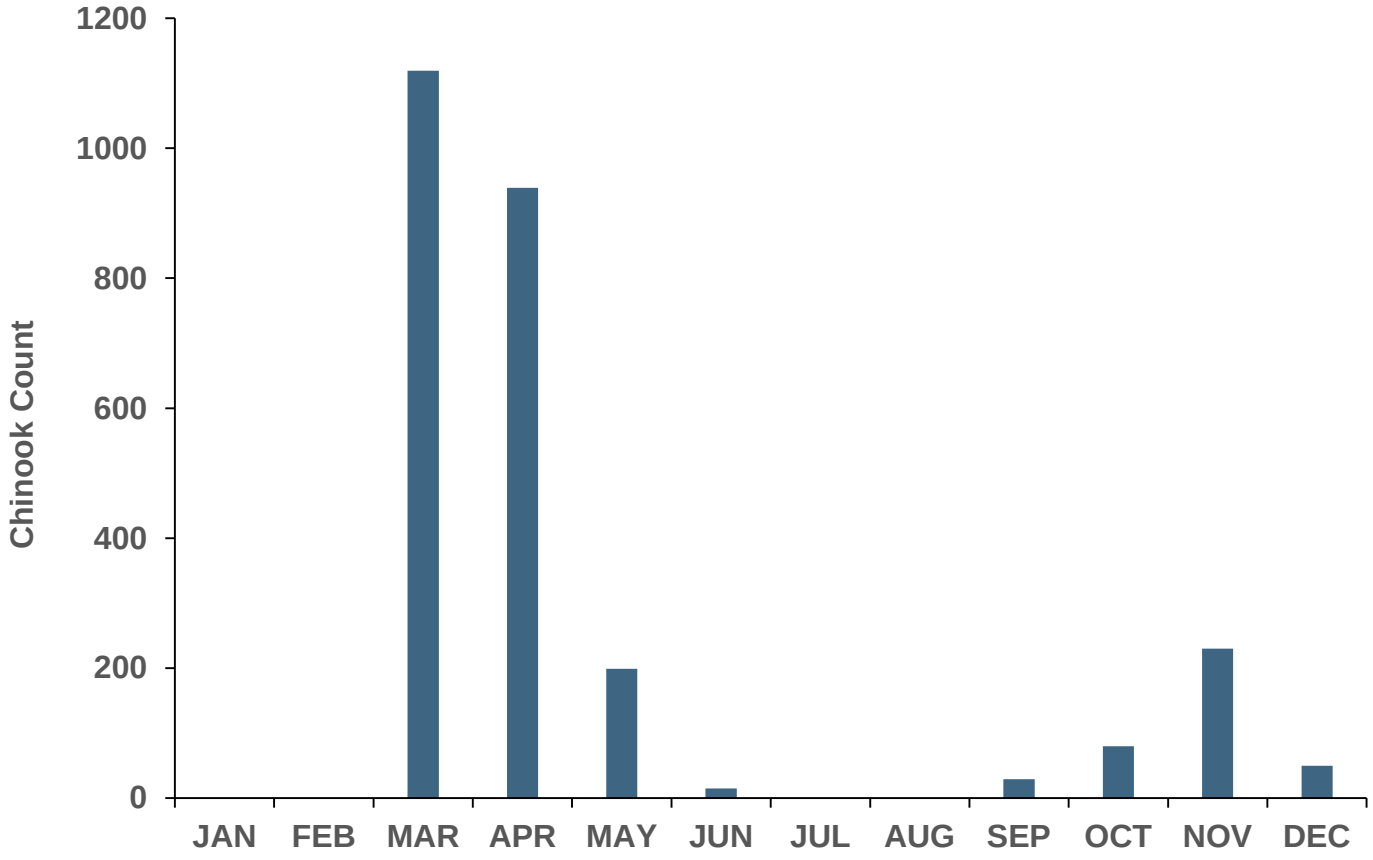
Total Chinook catch (n = 2,661)

High proportion of fry

Peaked in spring and winter

Collection tapers off in early summer
- Very warm epilimnion
- Fish are deep
- Large presence of bass (n >30)

14.6% of total catch in fall/ winter



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TRANSITION INTO 2016

Goal- maximize catch

How do we accomplish goal?
- Remove USGS equipment
- Maximum inflow (attraction pumps)
- Keep trap close to WTC tower

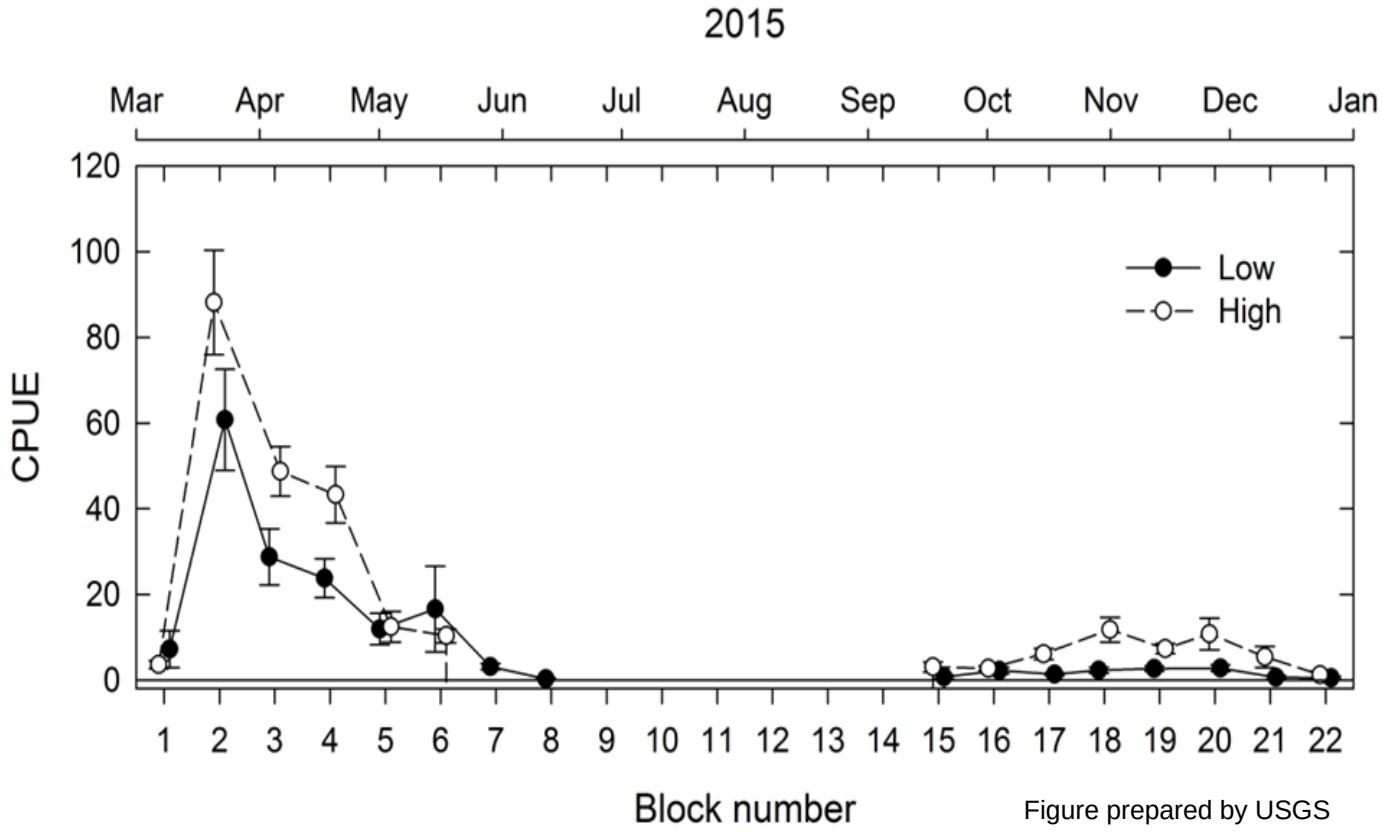

Figure prepared by USGS

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SEASON 3 (2016)

Jan. 14 – Mar. 1*; Apr. 20 - Dec. 31

*Drawdown (WTCT Repair)
- Trap off
- Missed March- April

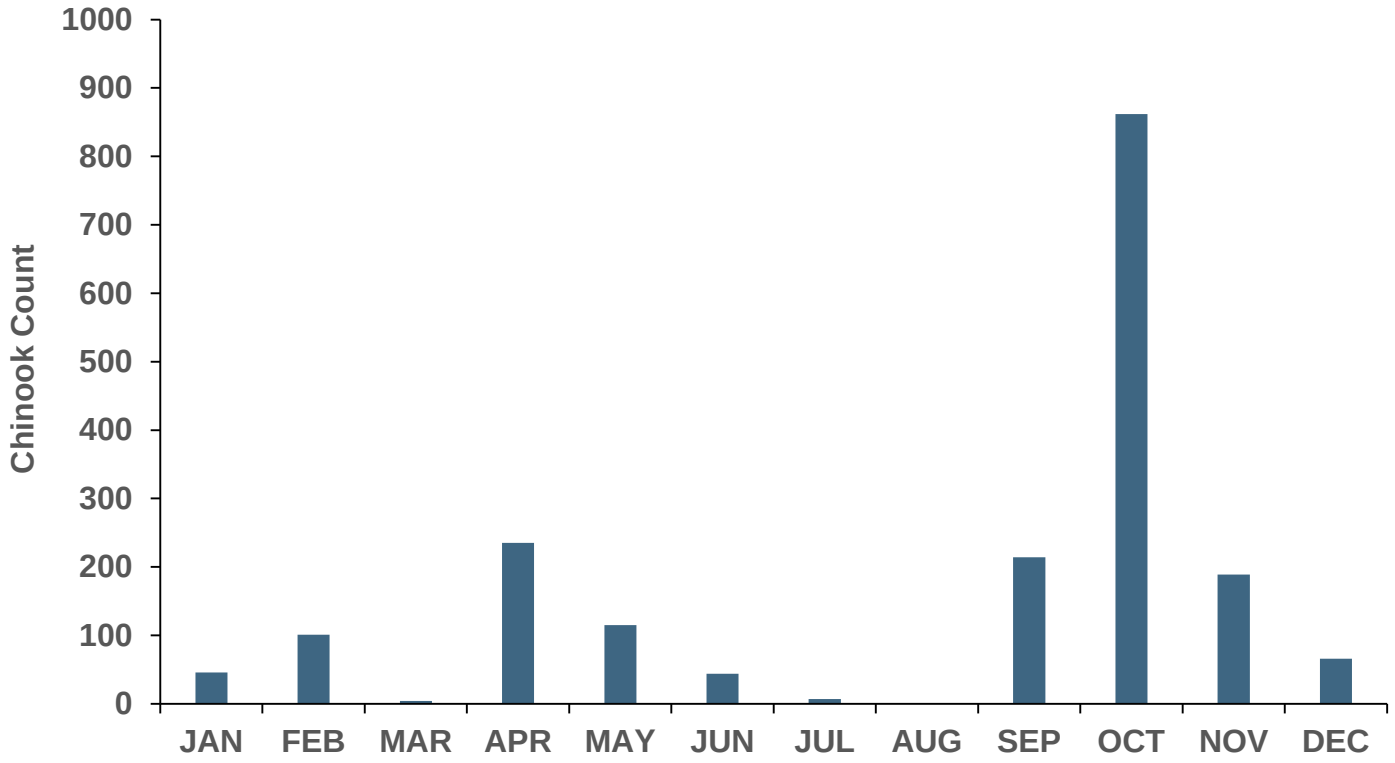
Peaks in spring and winter

Collection tapers off in early summer
- Fish are deep

70.7% of total catch in fall/ winter

Total Chinook catch (n = 1,883)

Why the high catch in October?



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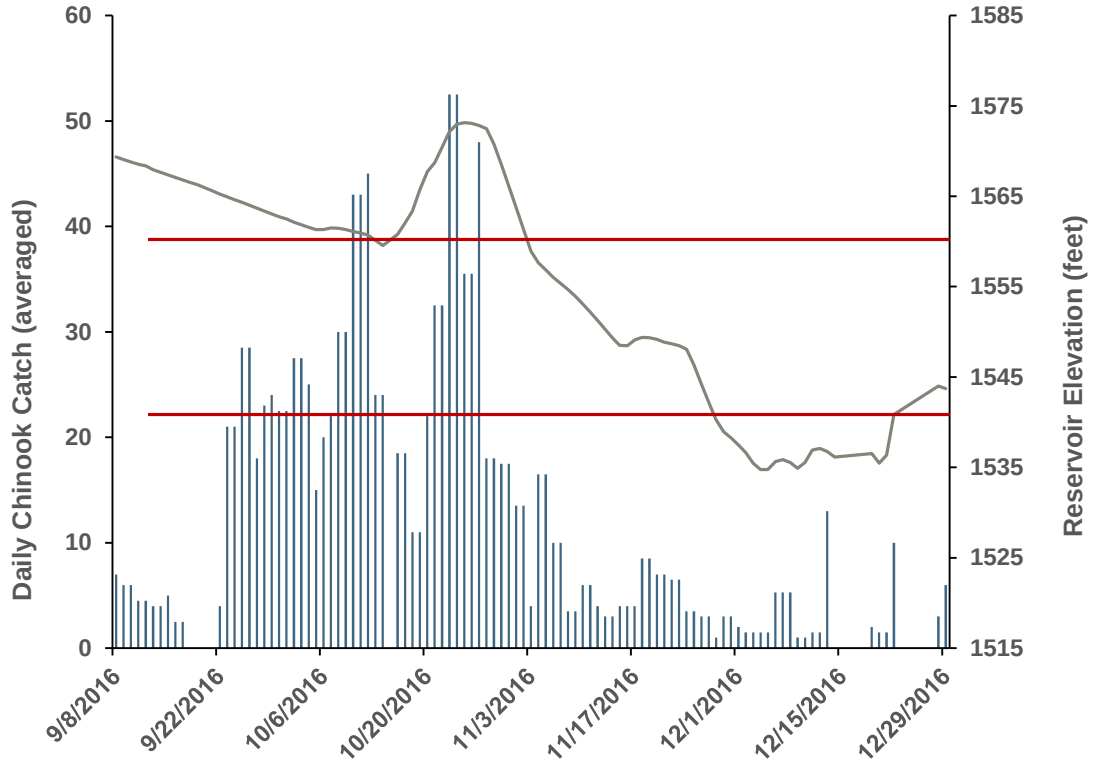
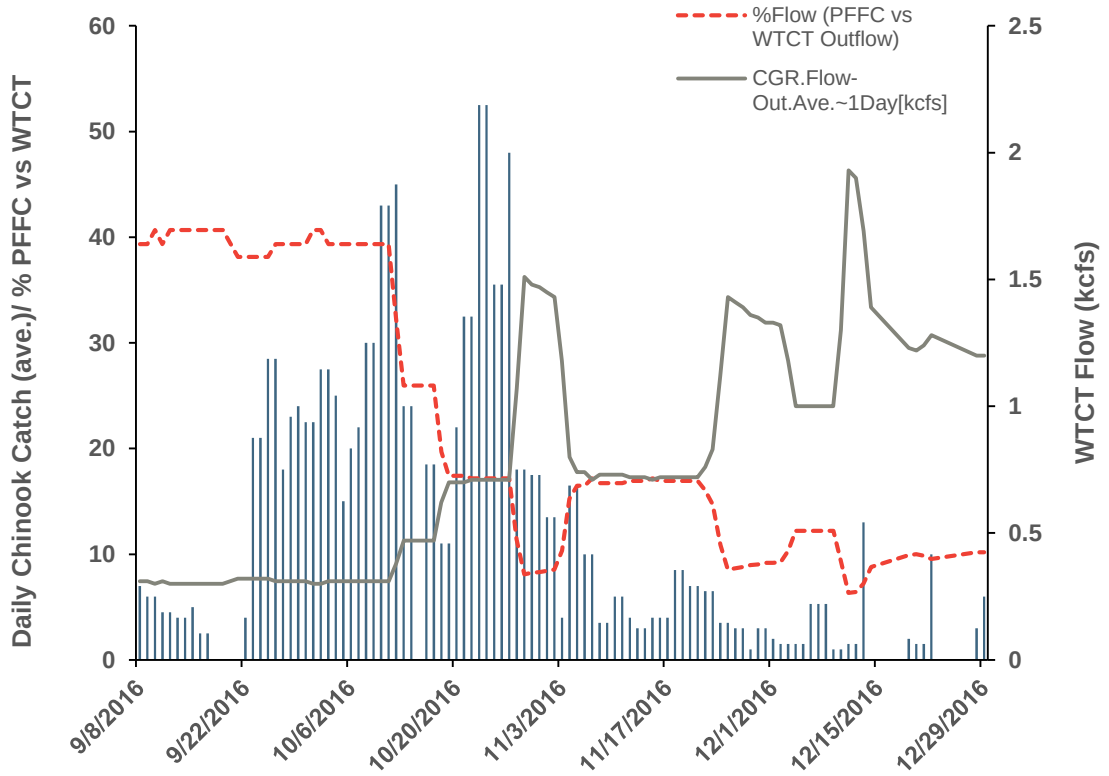
VARIABLES INFLUENCING PFFC COLLECTION- 2016





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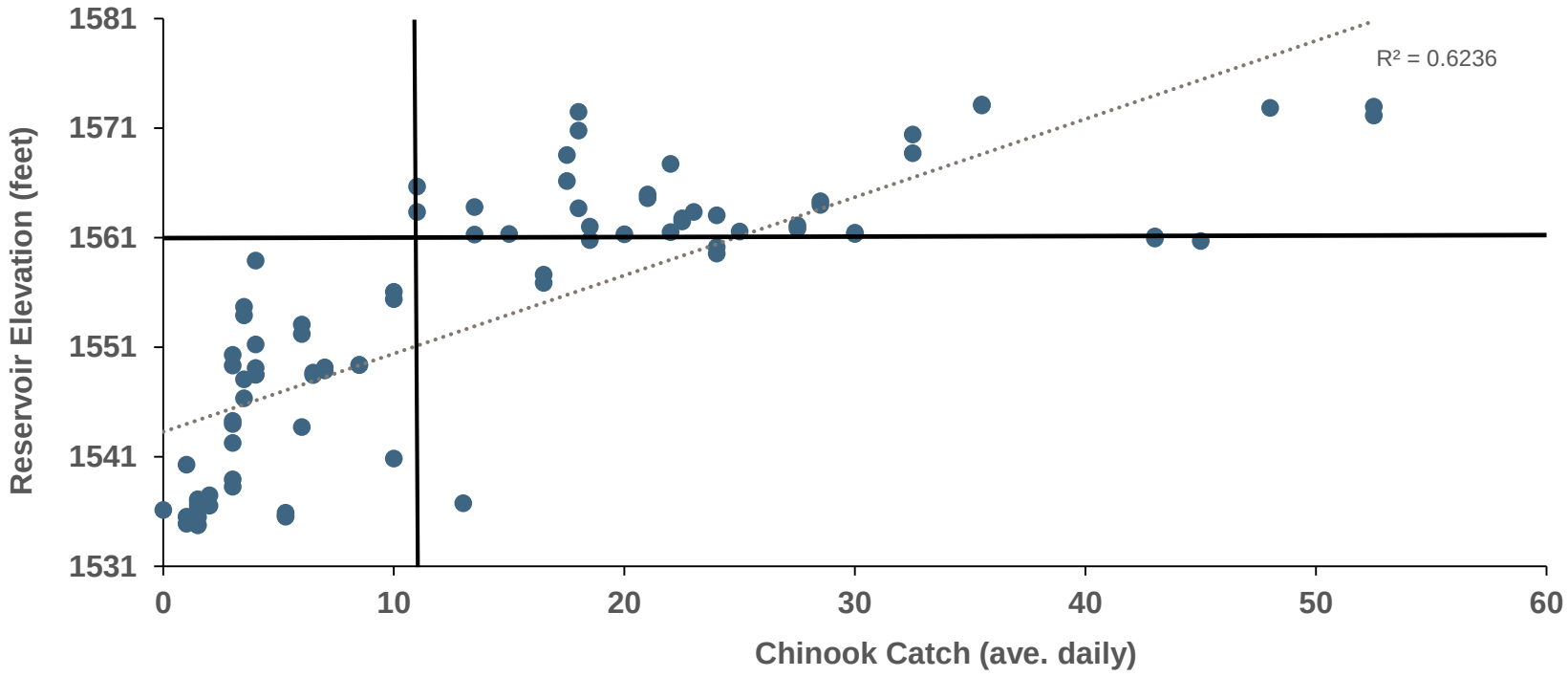
PFFC CATCH RELATED TO RESERVOIR ELEVATION- FALL/ WINTER 2016



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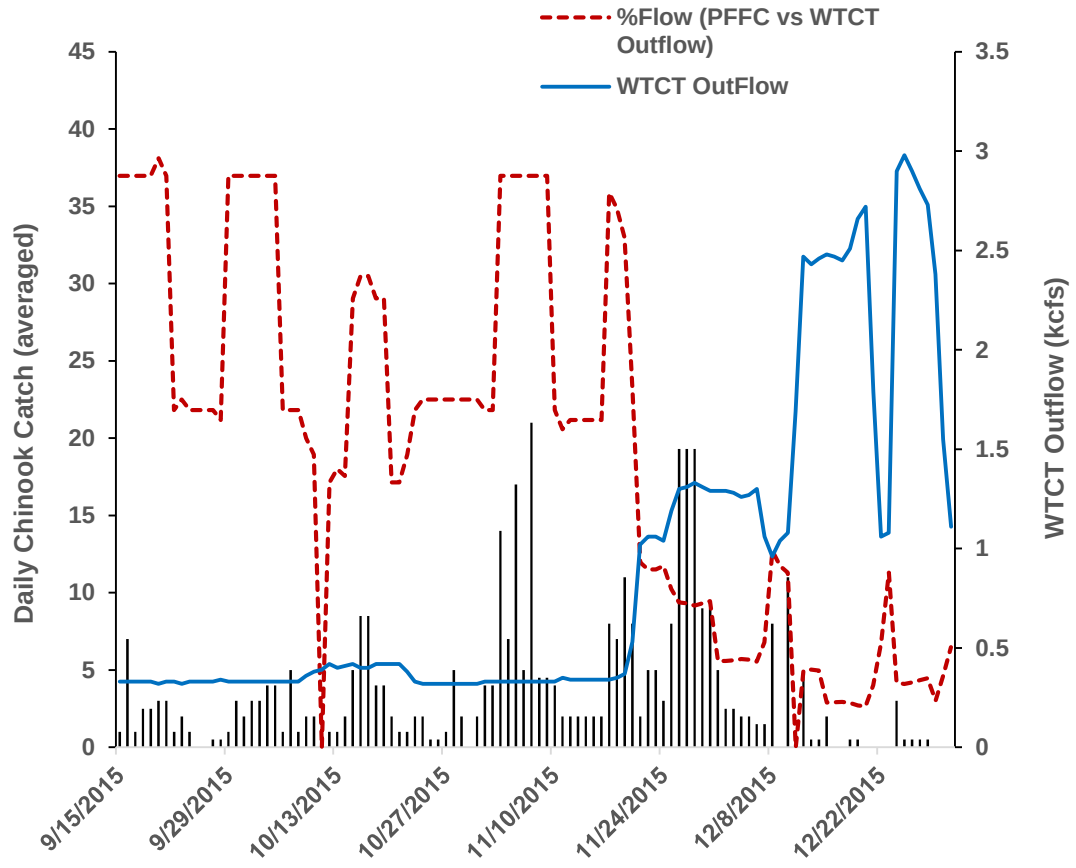
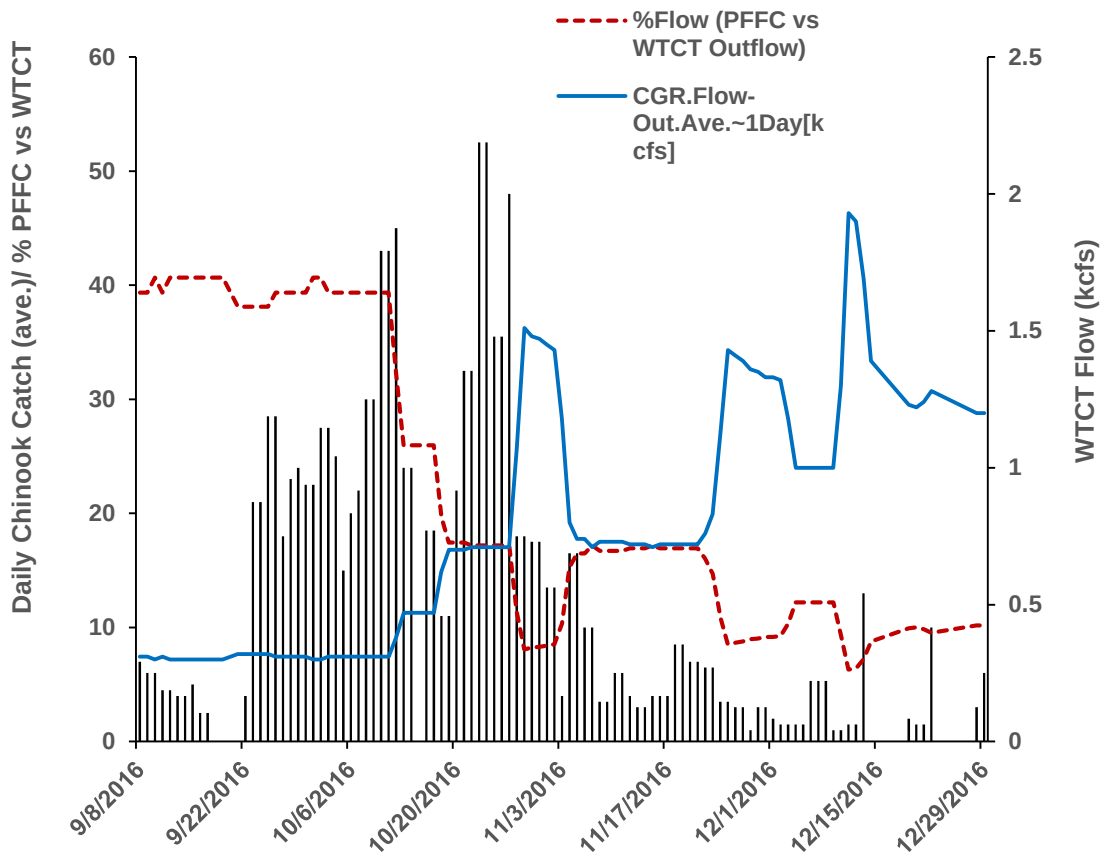
FALL/ WINTER 2015 VS 2016





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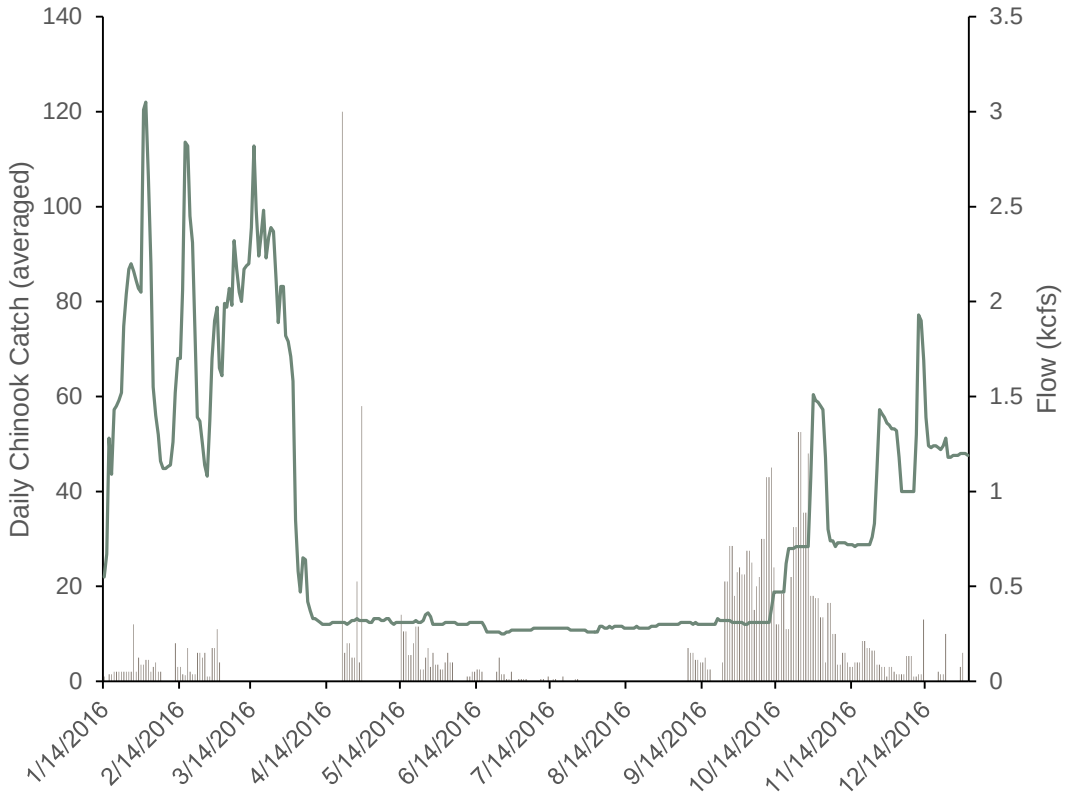
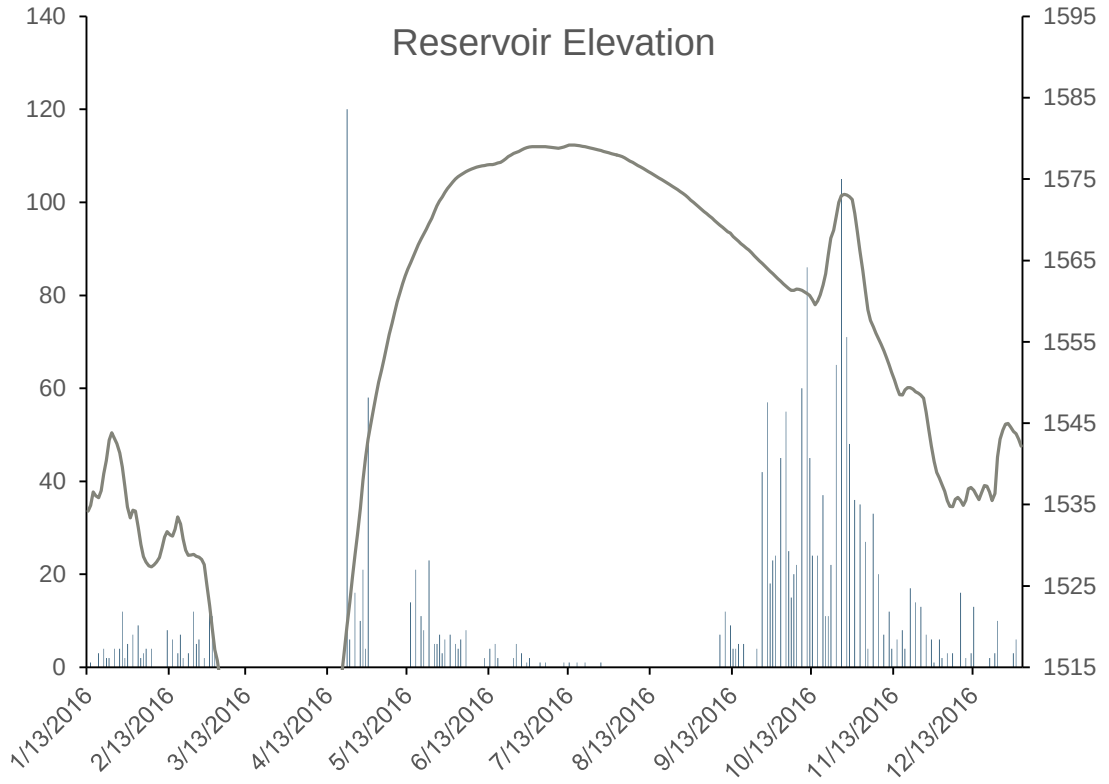
FLOW INTO WTC TOWER AND RESERVOIR ELEVATION- 2016





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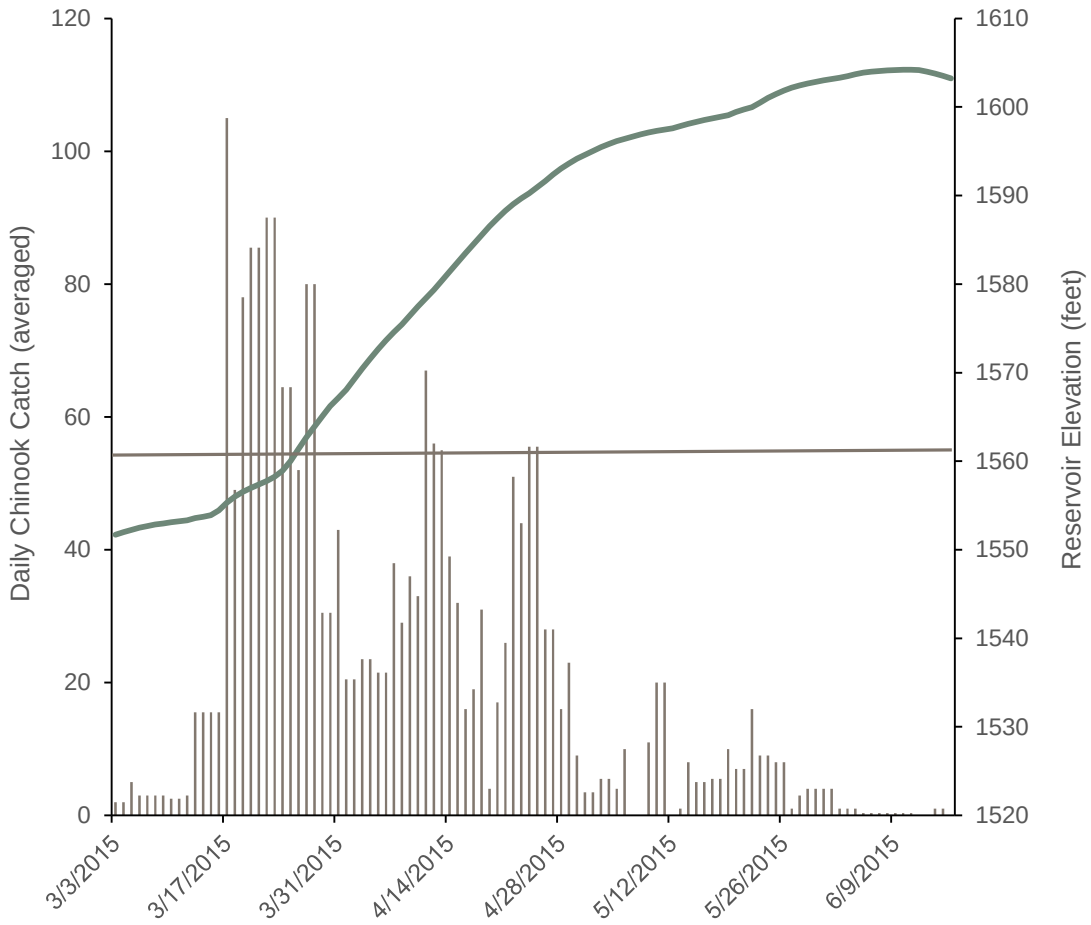
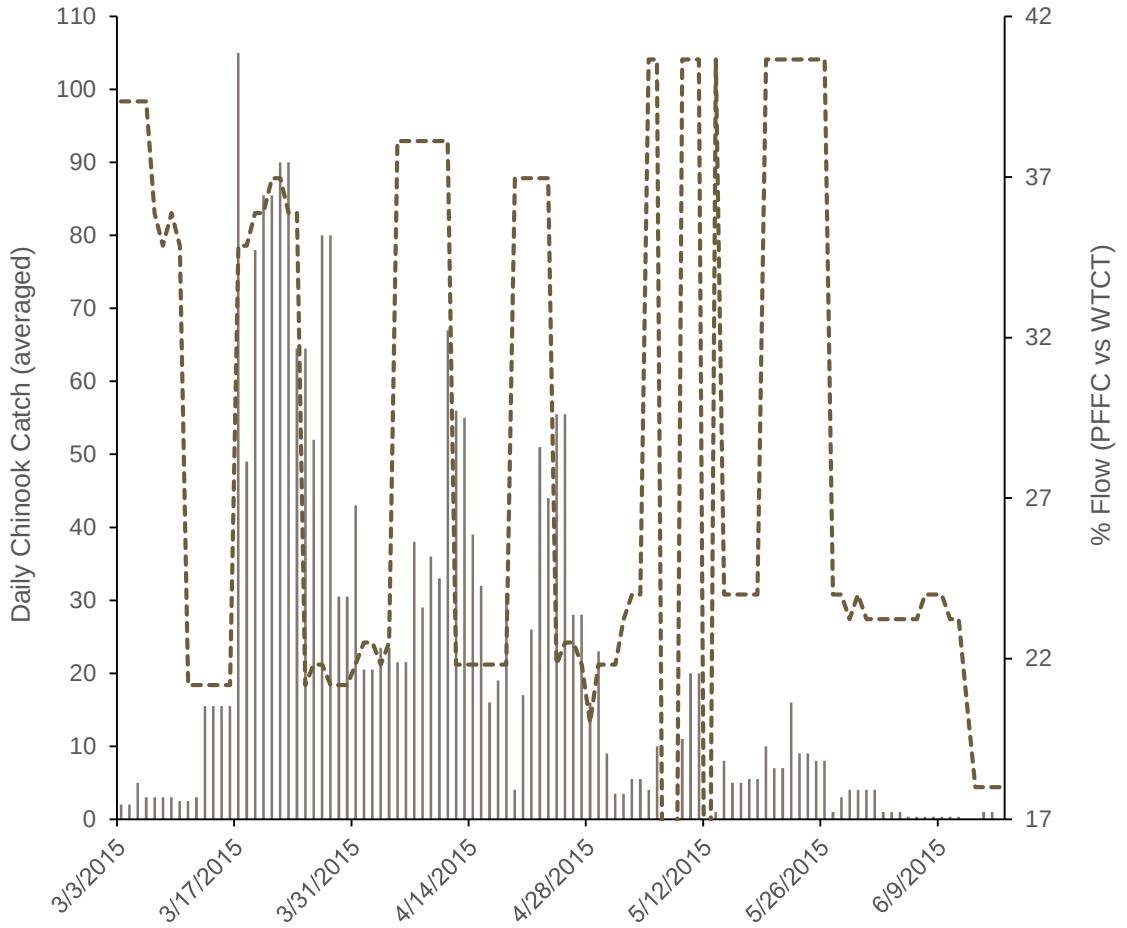
SPRING 2015 FACTORS





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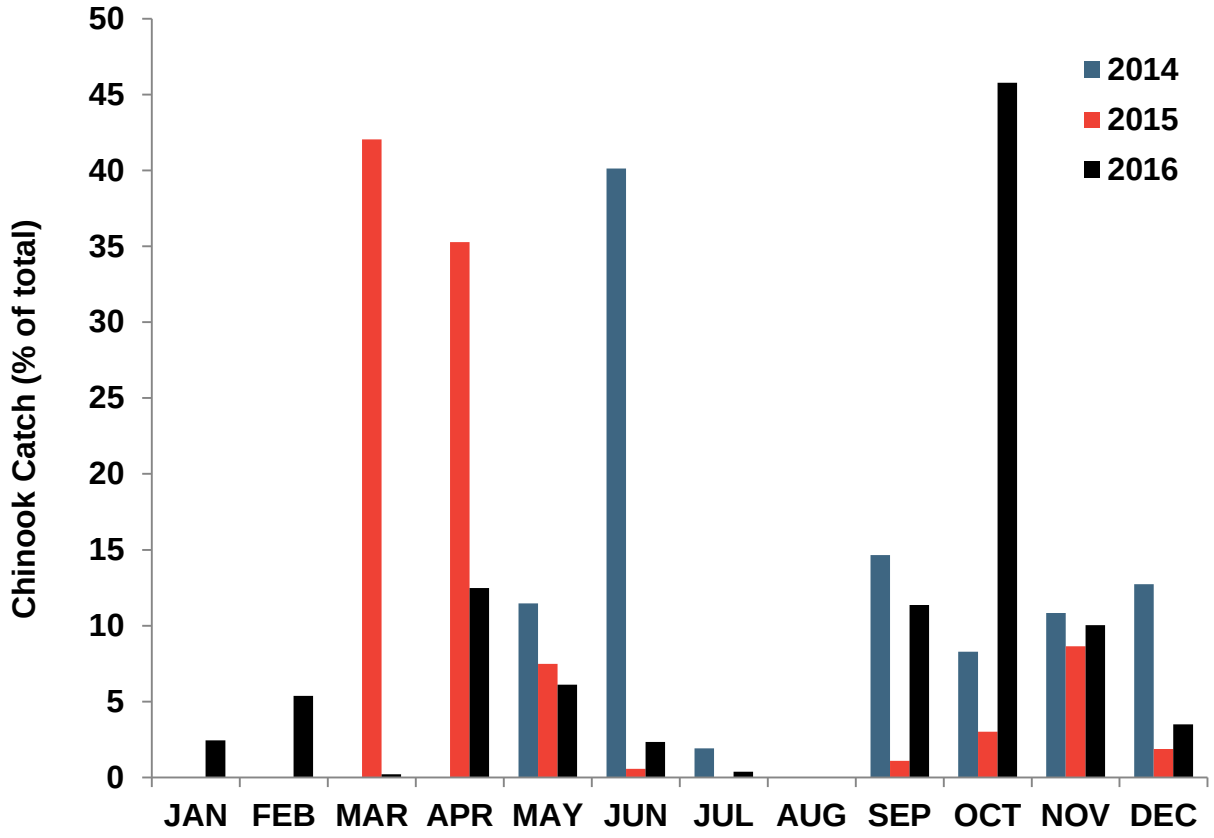
SUMMARY 2014-16

Year 1, 2014 (May 27 - Dec. 16)
- Chinook salmon = **157**
- Mostly fry-size (spring)
- 46.5% of season catch in fall/ winter

Year 2, 2015 (March 2 - Dec. 31)
- Chinook salmon = **2,661**
- Mostly fry-size (spring)
- 14.6% of season catch in fall/ winter

Year 3, 2016 (Jan. 14 – Mar. 1; Apr. 20 - Dec. 31)
- Chinook salmon = **1,883**
- Mostly reservoir-reared subyearlings
- 70.7% of season catch in fall/ winter



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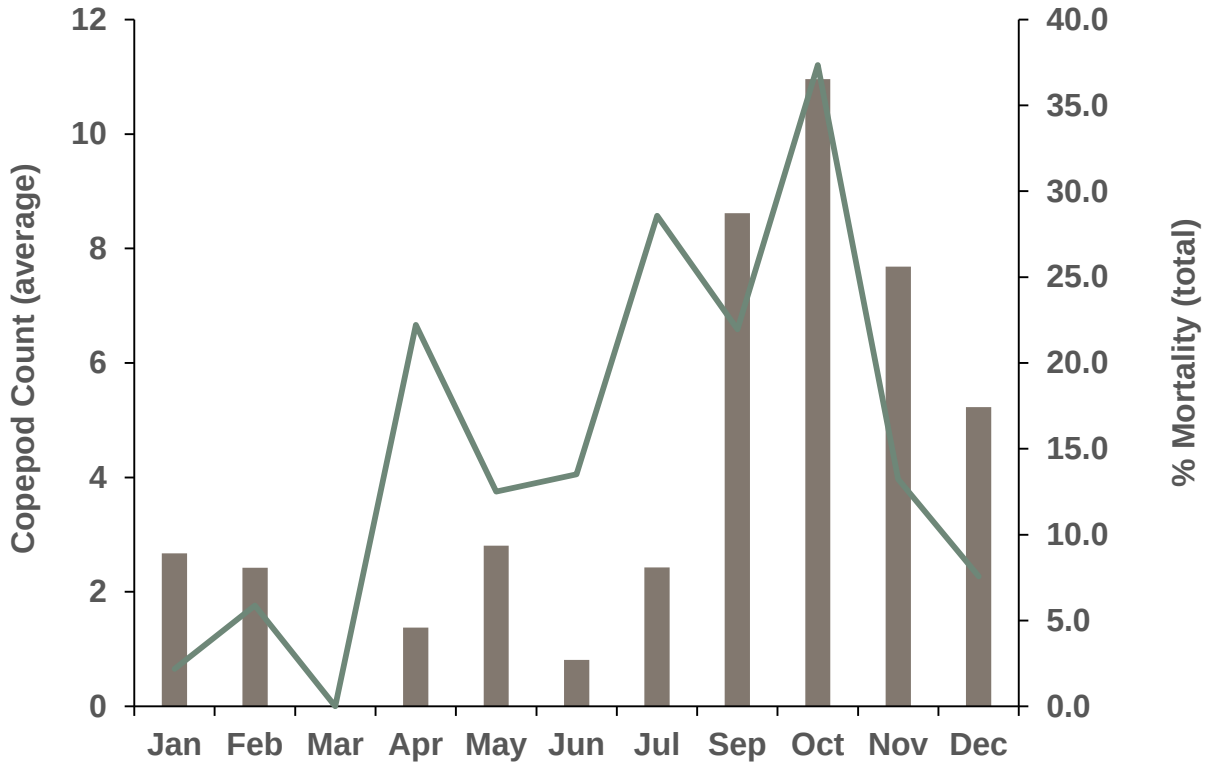
FISH MORTALITY RELATED TO COPEPODS

Does not affect fry

Affects yearlings and subyearlings

Fall seems to be most stressful
- warm handling conditions
- highest copepod infestation (longest residence in reservoir)

2014- max. 29
2015- max. 32
2016- max. 43



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LESSONS LEARNED/ FUTURE APPLICATIONS

Debris management #1 priority

Trap and haul- high effort; large crew, crew access (weather affected)

Flow competition (PFFC vs WTCT)

WTCT configuration- Utilize diversion tunnel (if or as necessary)

Adjustability in ballast (trap height) and intake screens (fine tune inflows)

Staffing - all trades

High trap inflow catches more fish than low flow (pumps)

No catch in summer (trap maintenance period)

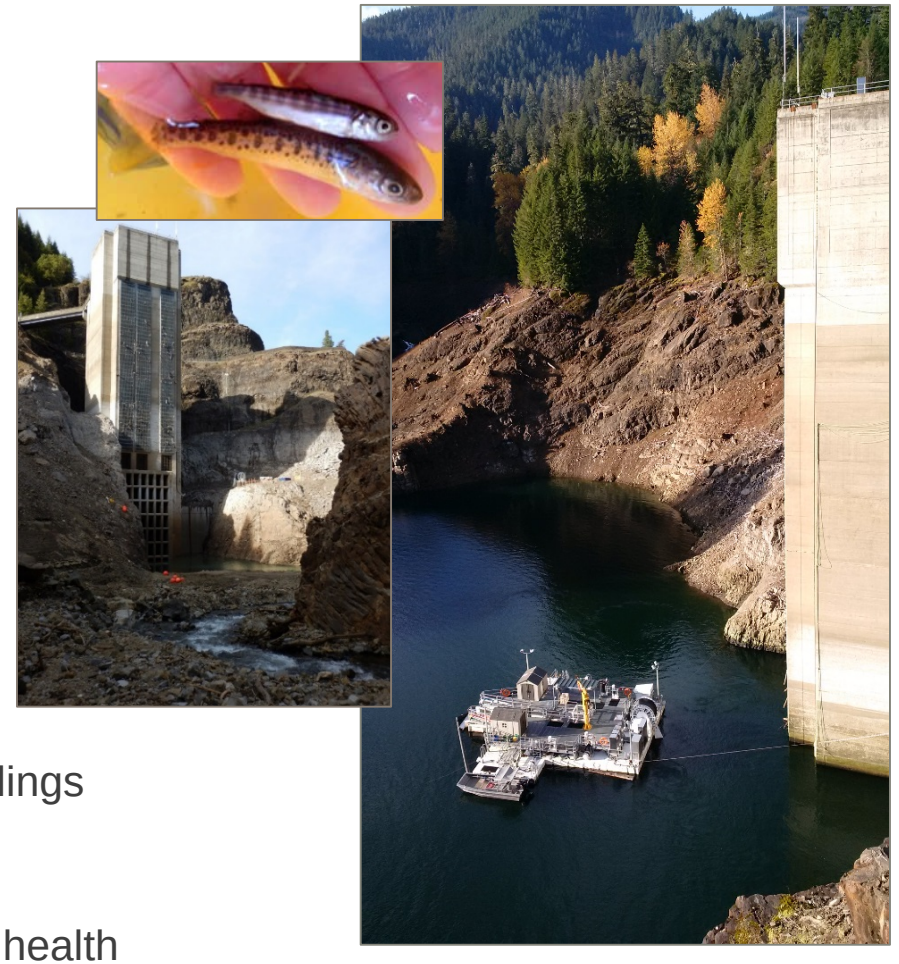
Peak catch in spring- fry; Peak catch in fall/winter- reservoir- reared subyearlings

Fish occupy pumped outflow (false attraction)

Mortality issues associated with handling and trap & haul; compromised fish health

Milling behavior

Predator occupancy



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QUESTIONS?

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