

What Moves You? Clear Creek Juvenile Salmon 24-hour Passage Timing Studies 2012- 2013



U.S. Fish and Wildlife Service, Red Bluff FWO



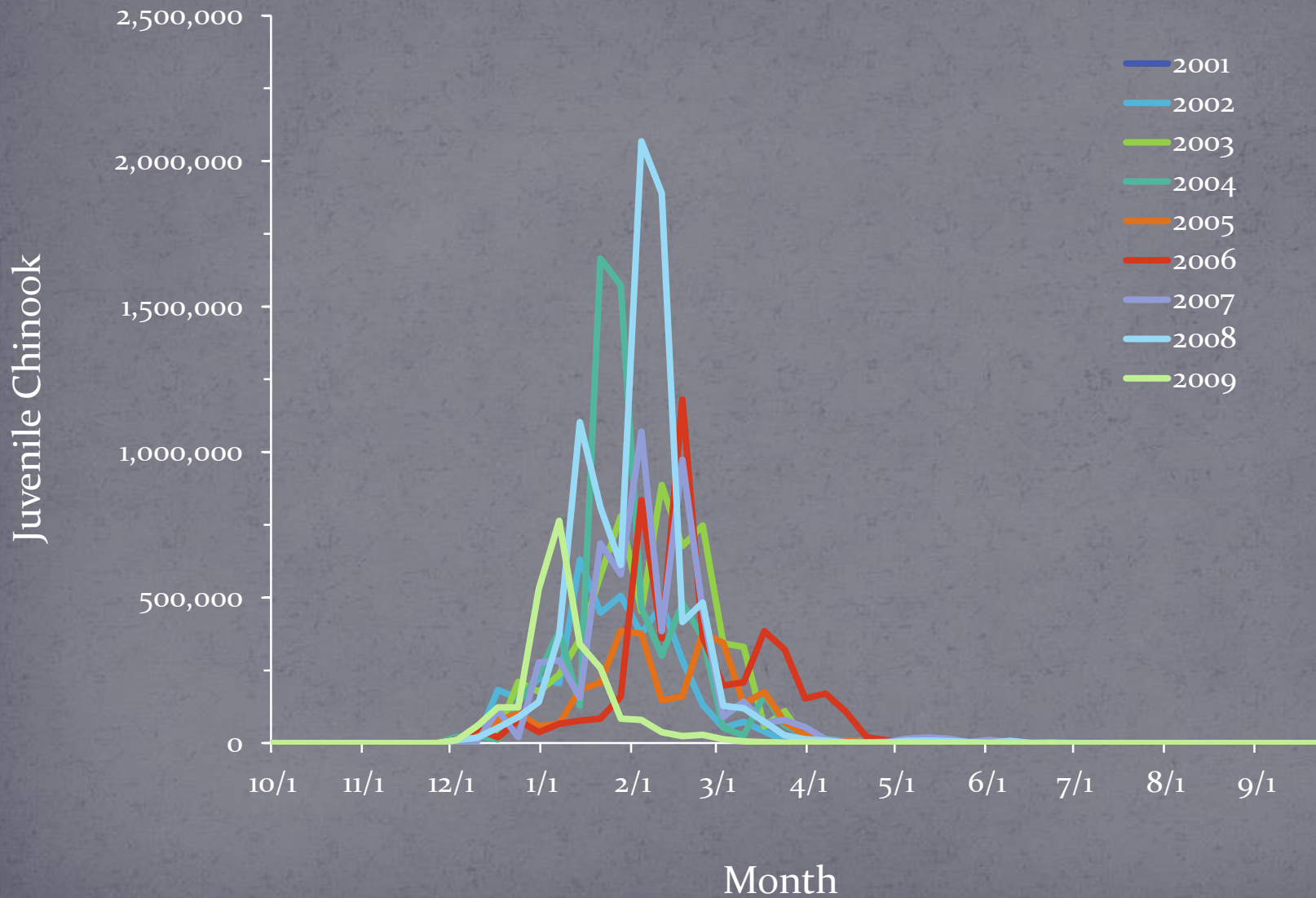
Objectives

- Identify daily temporal passage
- Identify if particular environmental variables contribute to fish passage
- Determine if fish passage is proportionate to flow increases
- Utilize data to assist with passage interpolation when traps aren't fished;

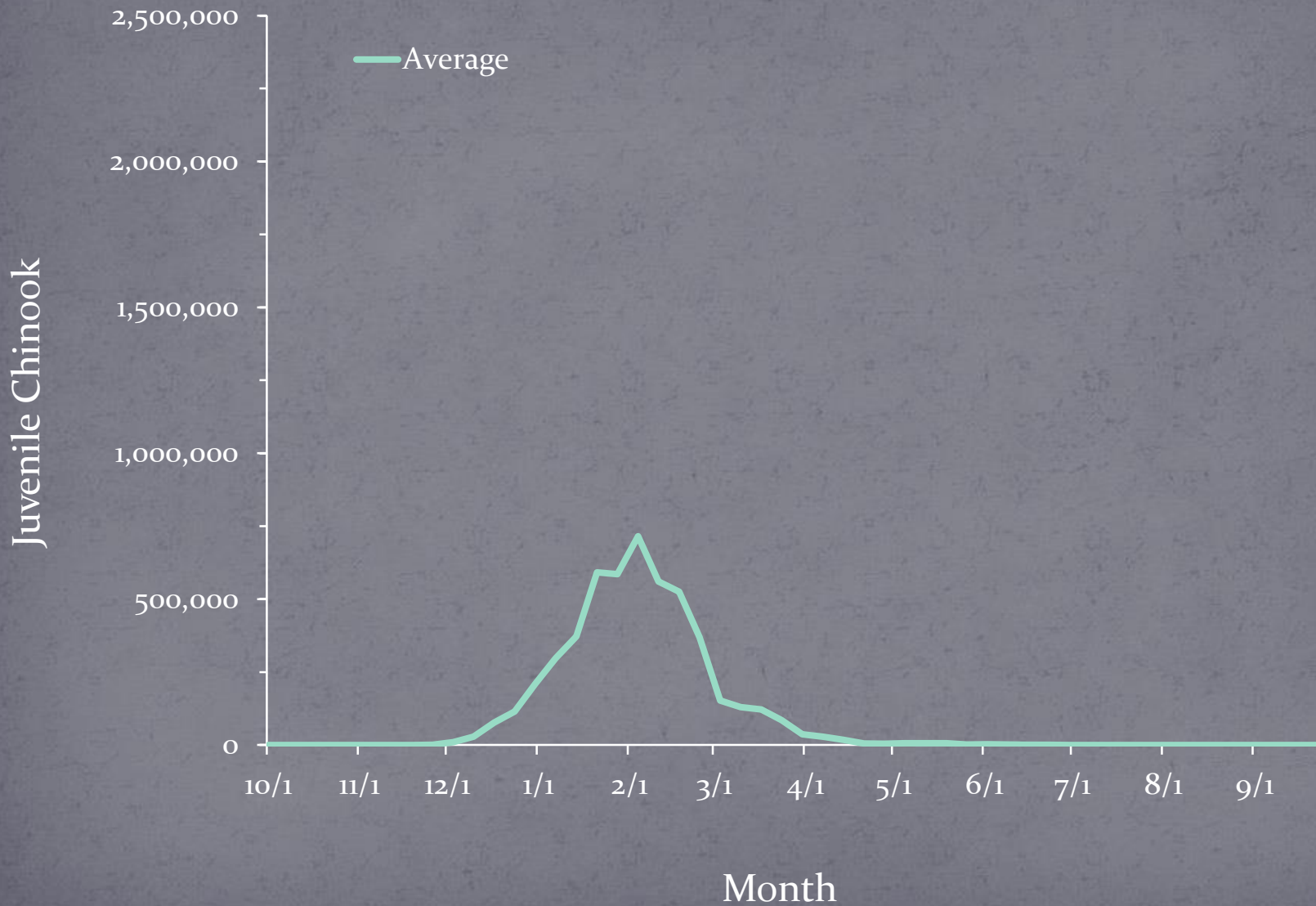
Methods

- Sample RST every hour for 24-hour period, every two weeks (where possible) during fall Chinook outmigration
- Measure environmental data at each sampling (i.e. flow, turbidity, barometric pressure, lunar phase, etc.)
- Year 1 - Sample 24-hours
- Year 2 and 3- Target peak passage times to confirm timing and possible migration cues and compare to spring Chinook emigration

Annual Weekly FCS Passage BY 2001-2009

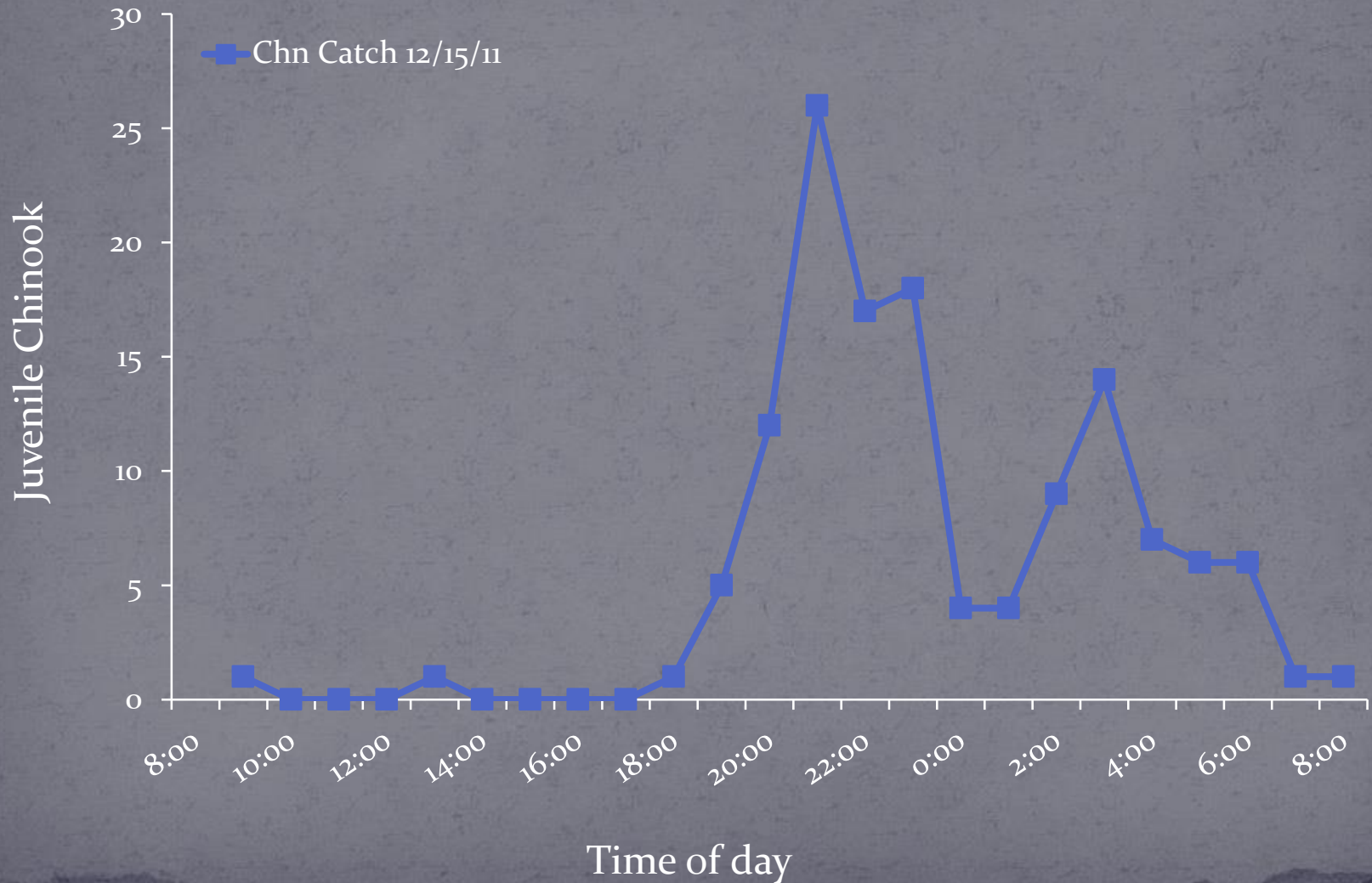


Average Weekly FCS Passage BY 2001-2009



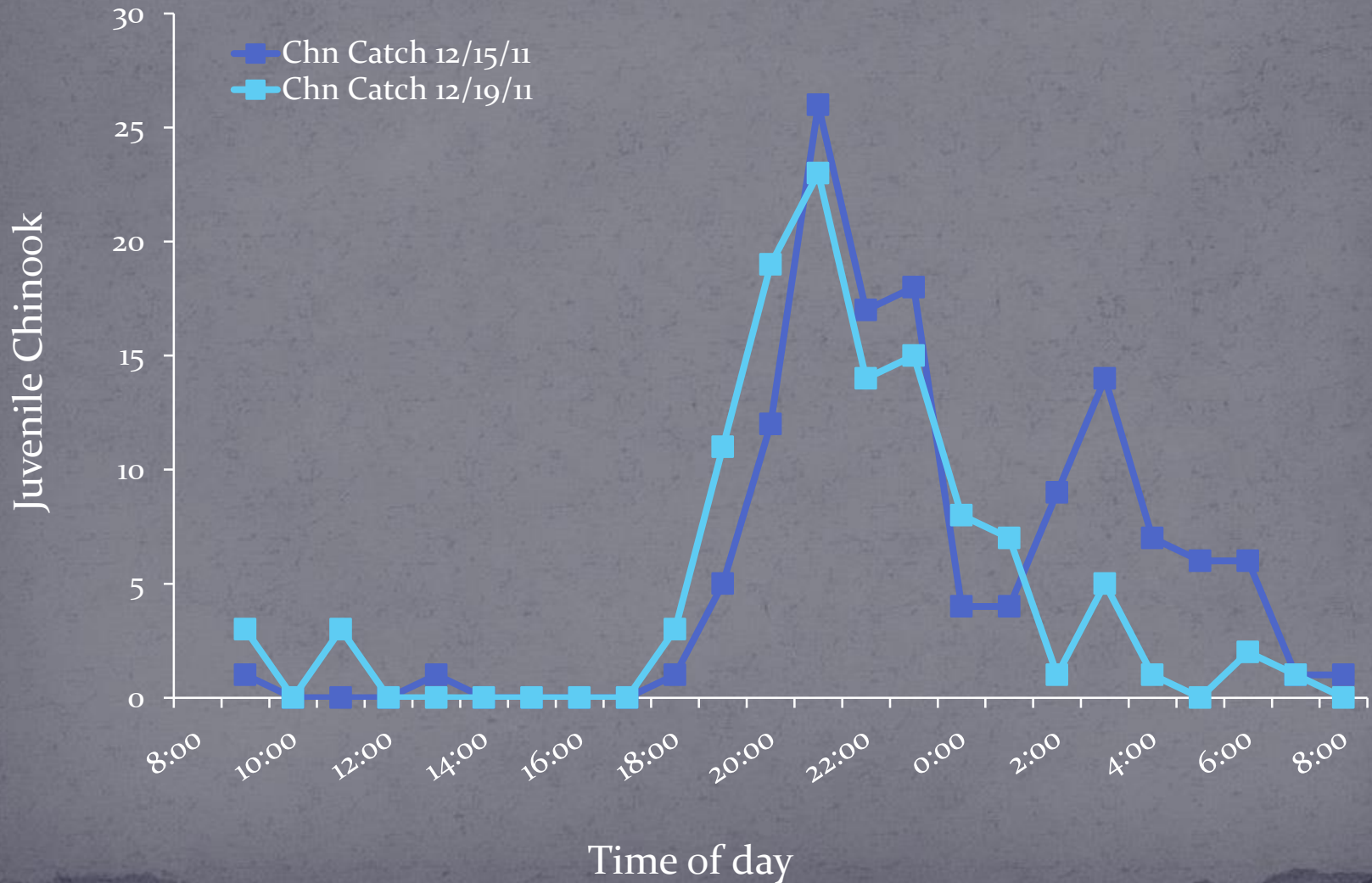
Lower Clear Creek RST 2011-2012

Chinook Daily Distribution Dec 2011 - March 2012



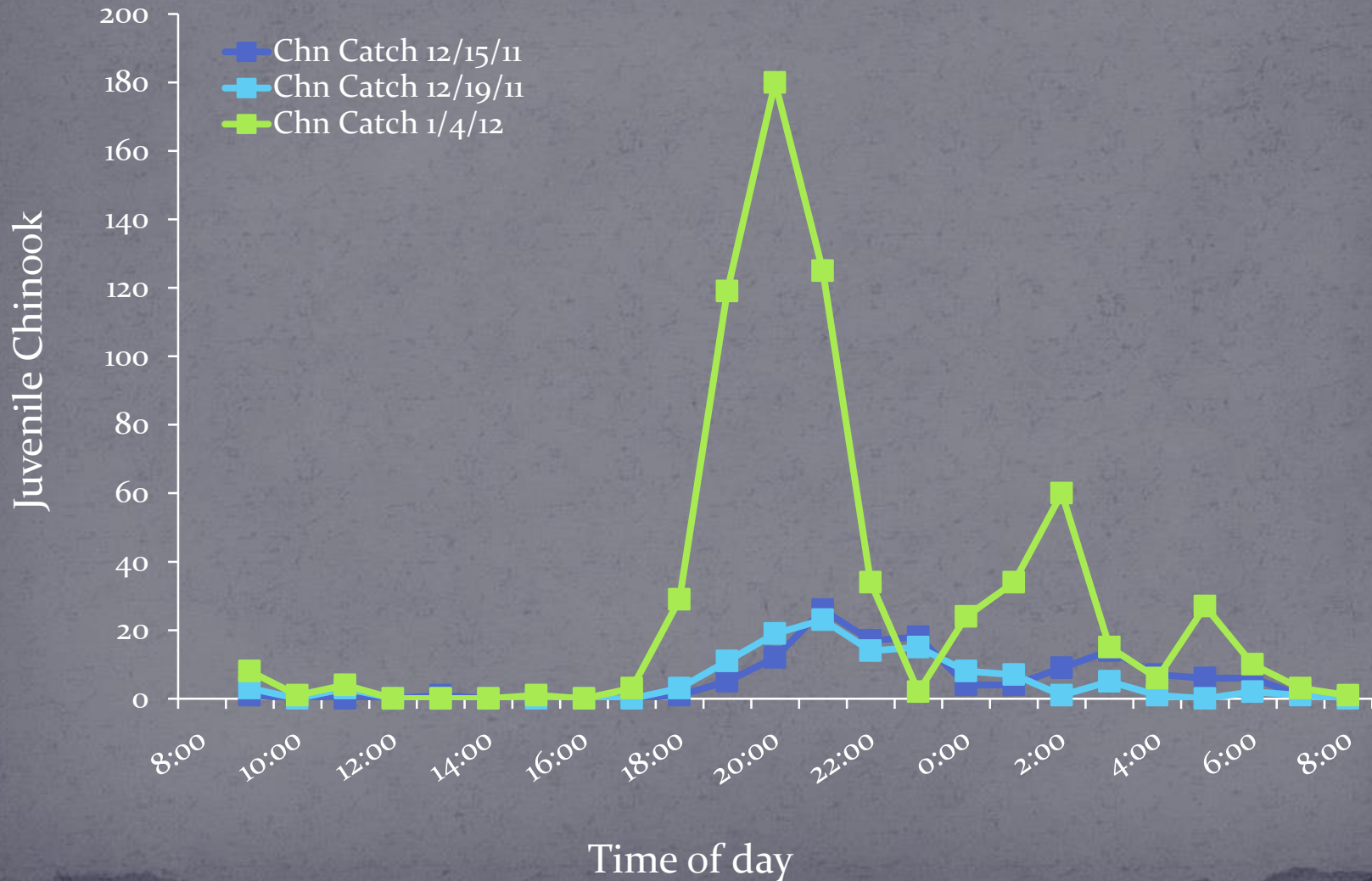
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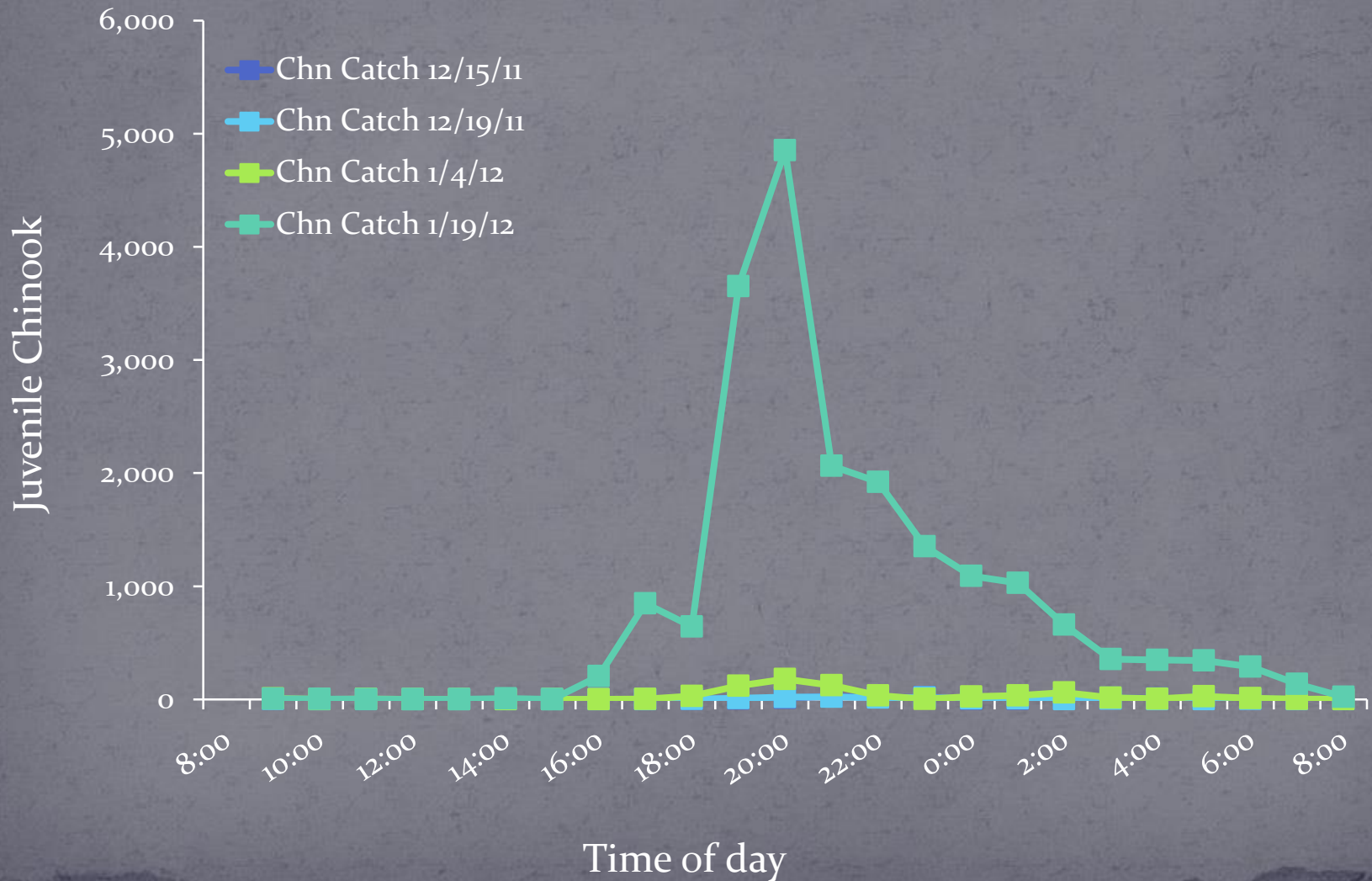
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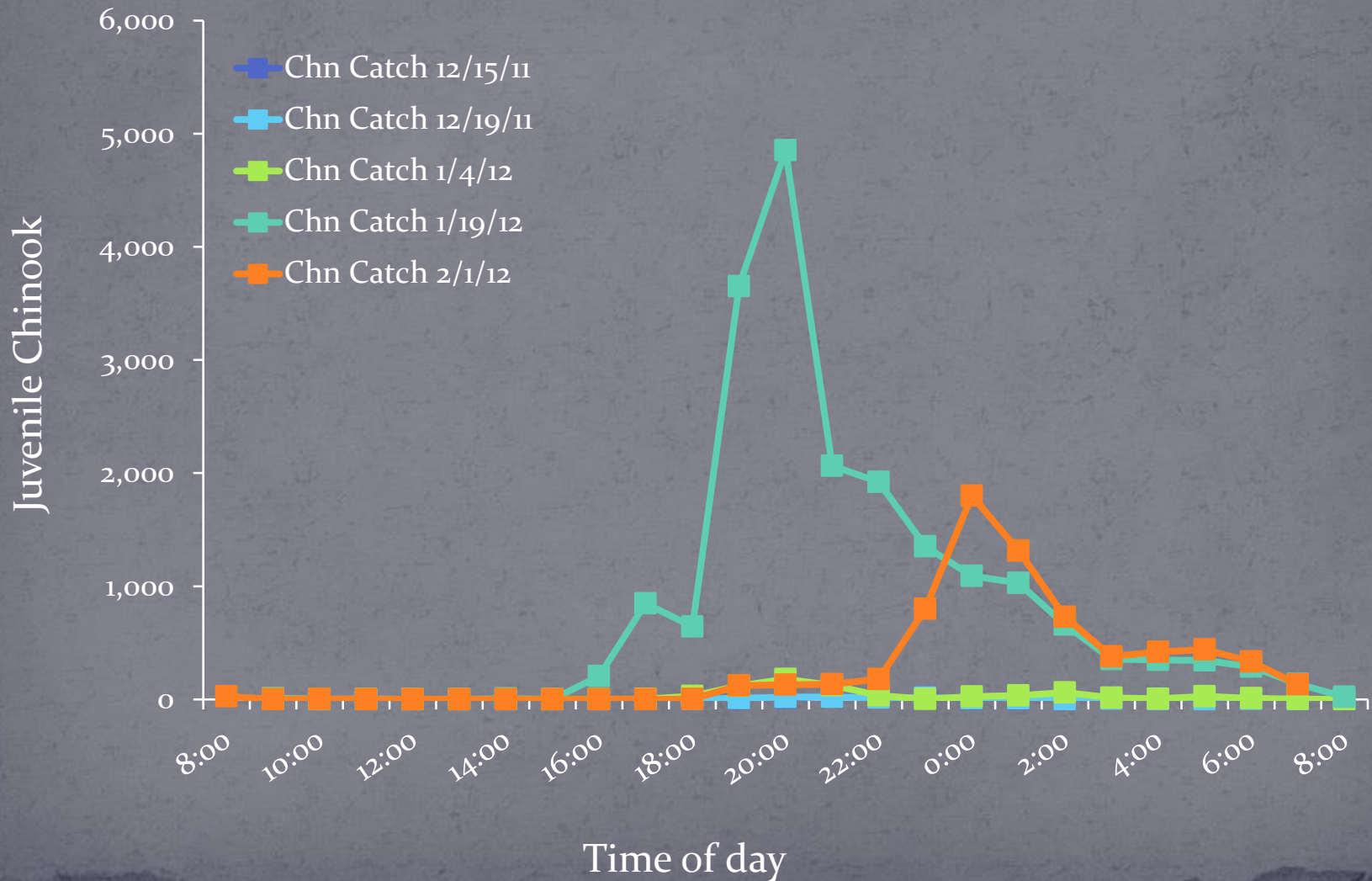
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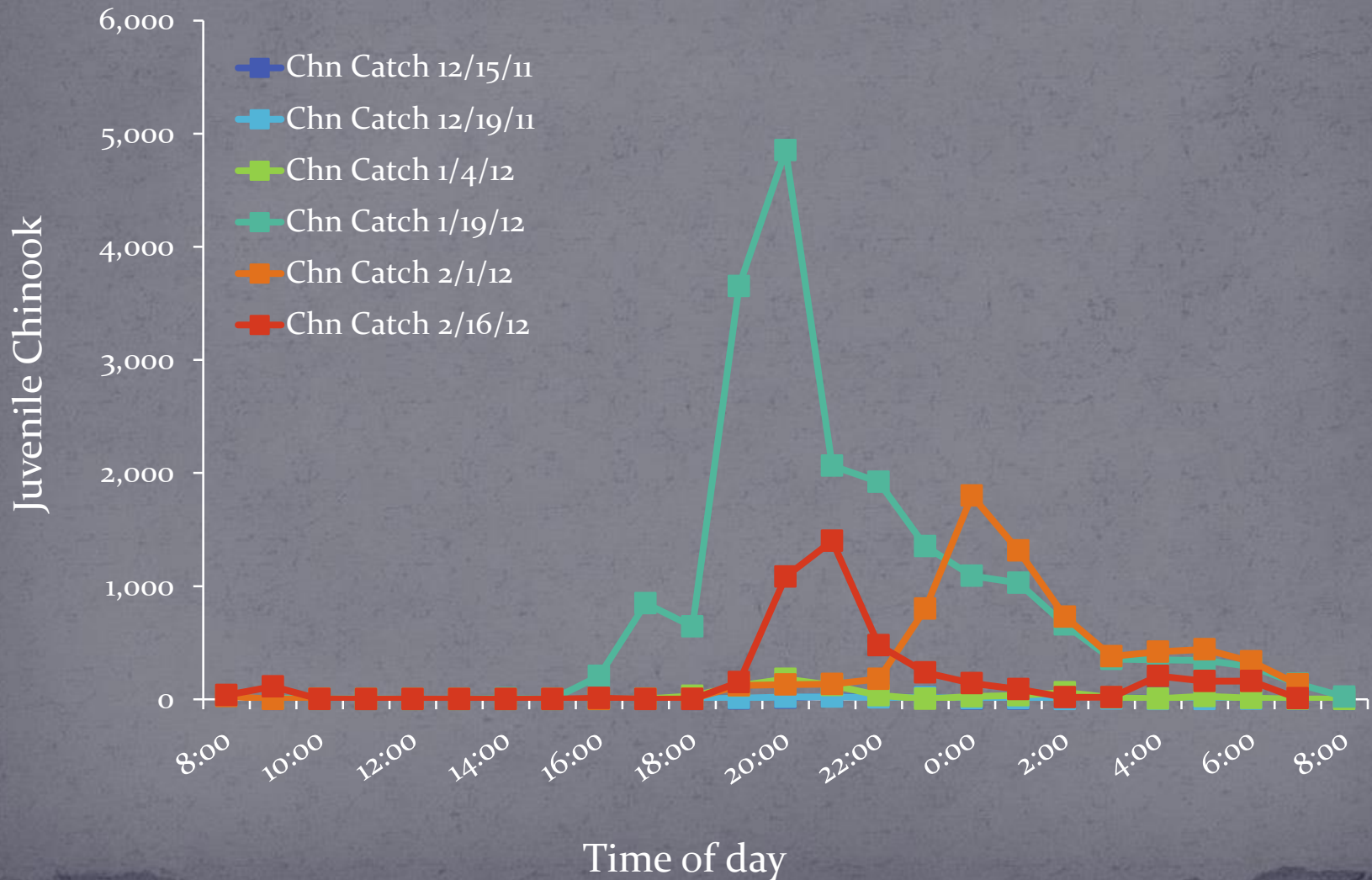
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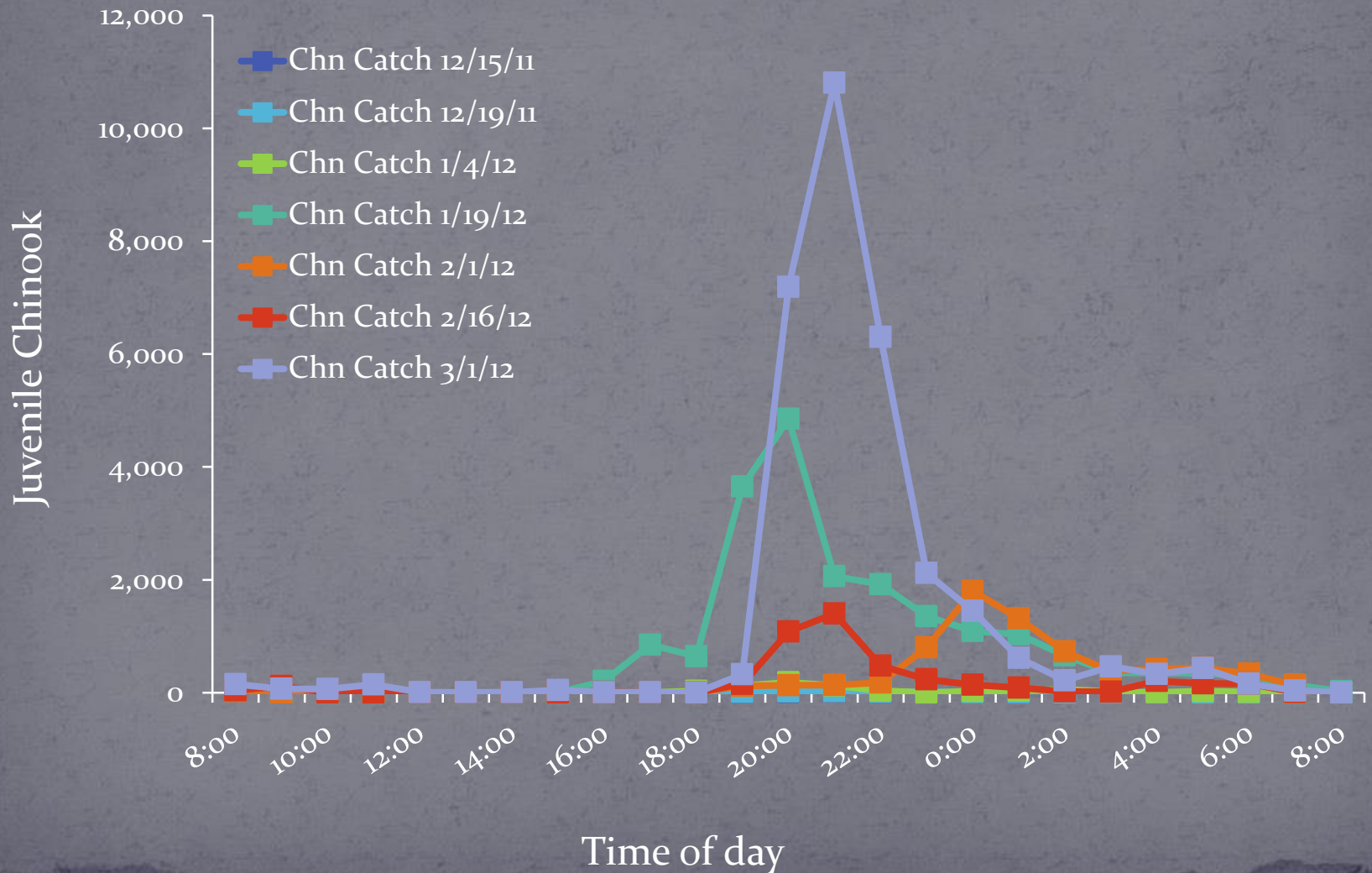
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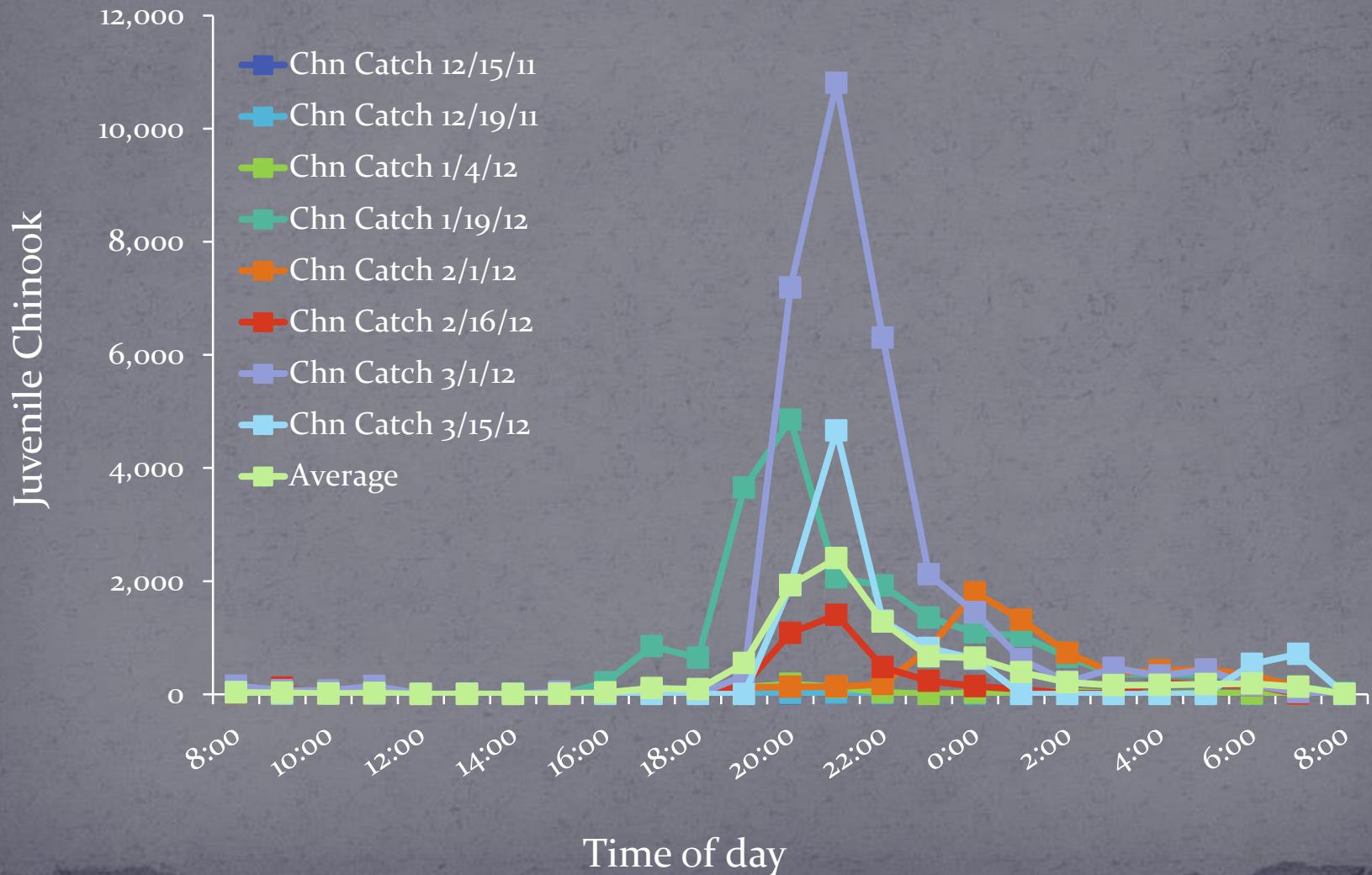
Lower Clear Creek RST 2011-2012

Chinook Daily Distribution Dec 2011 - March 2012



Lower Clear Creek RST 2011-2012

Chinook Daily Distribution Dec 2011 - March 2012



Lower Clear Creek RST 2012-2013

Chinook Hourly Distribution Jan 2013 - Mar 2013



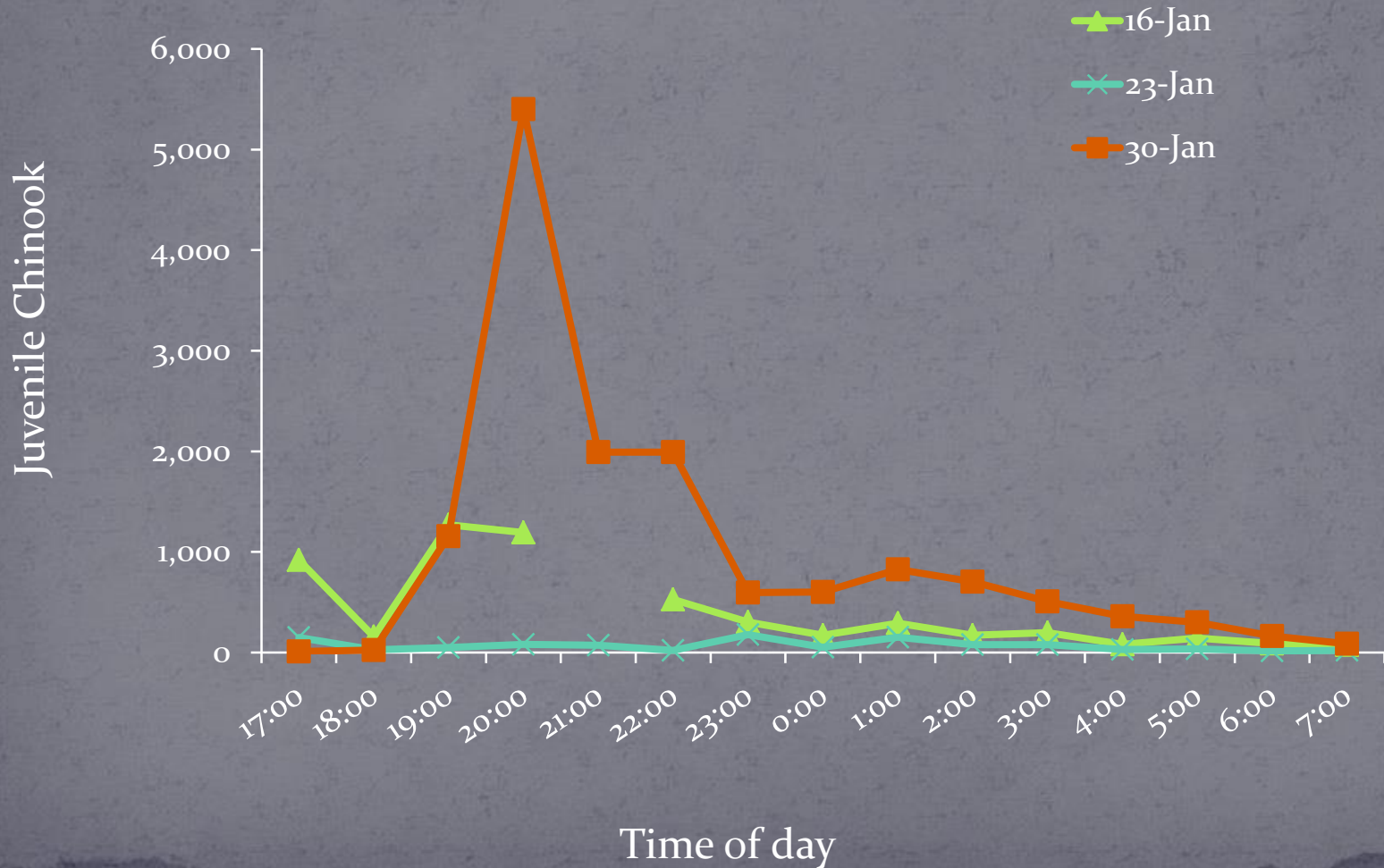
Lower Clear Creek RST 2012-2013

Chinook Hourly Distribution Jan 2013 - Mar 2013



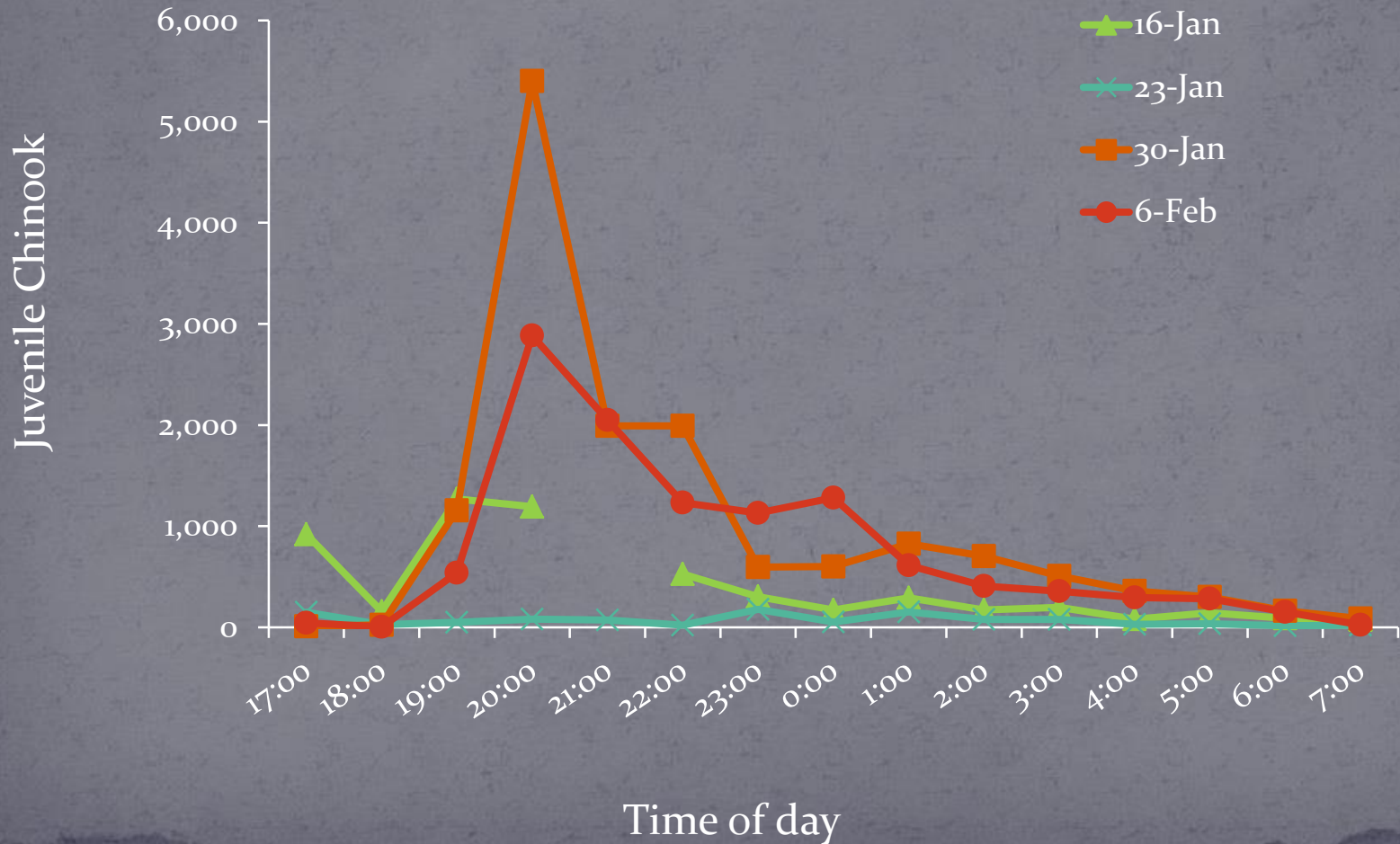
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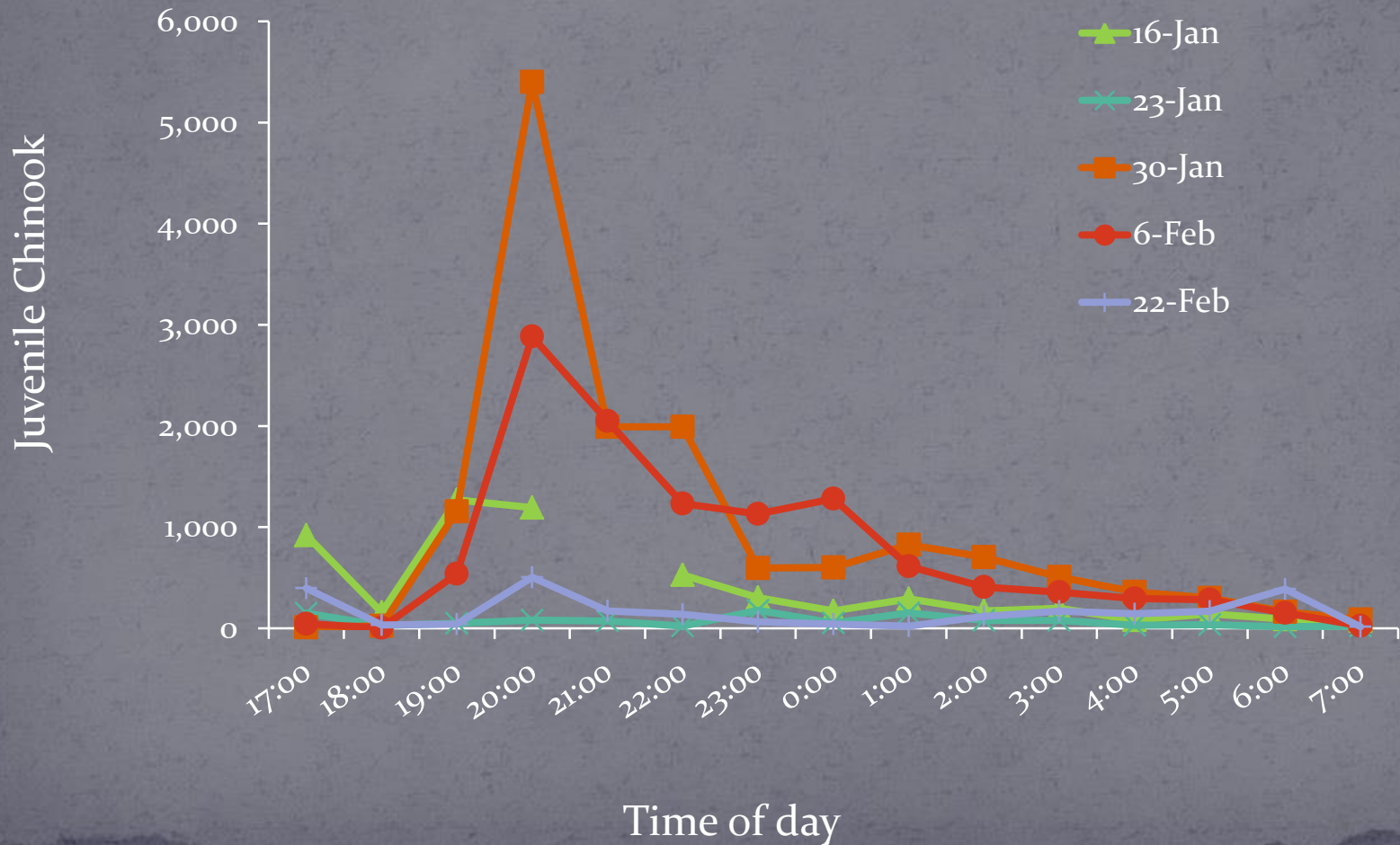
Lower Clear Creek RST 2012-2013

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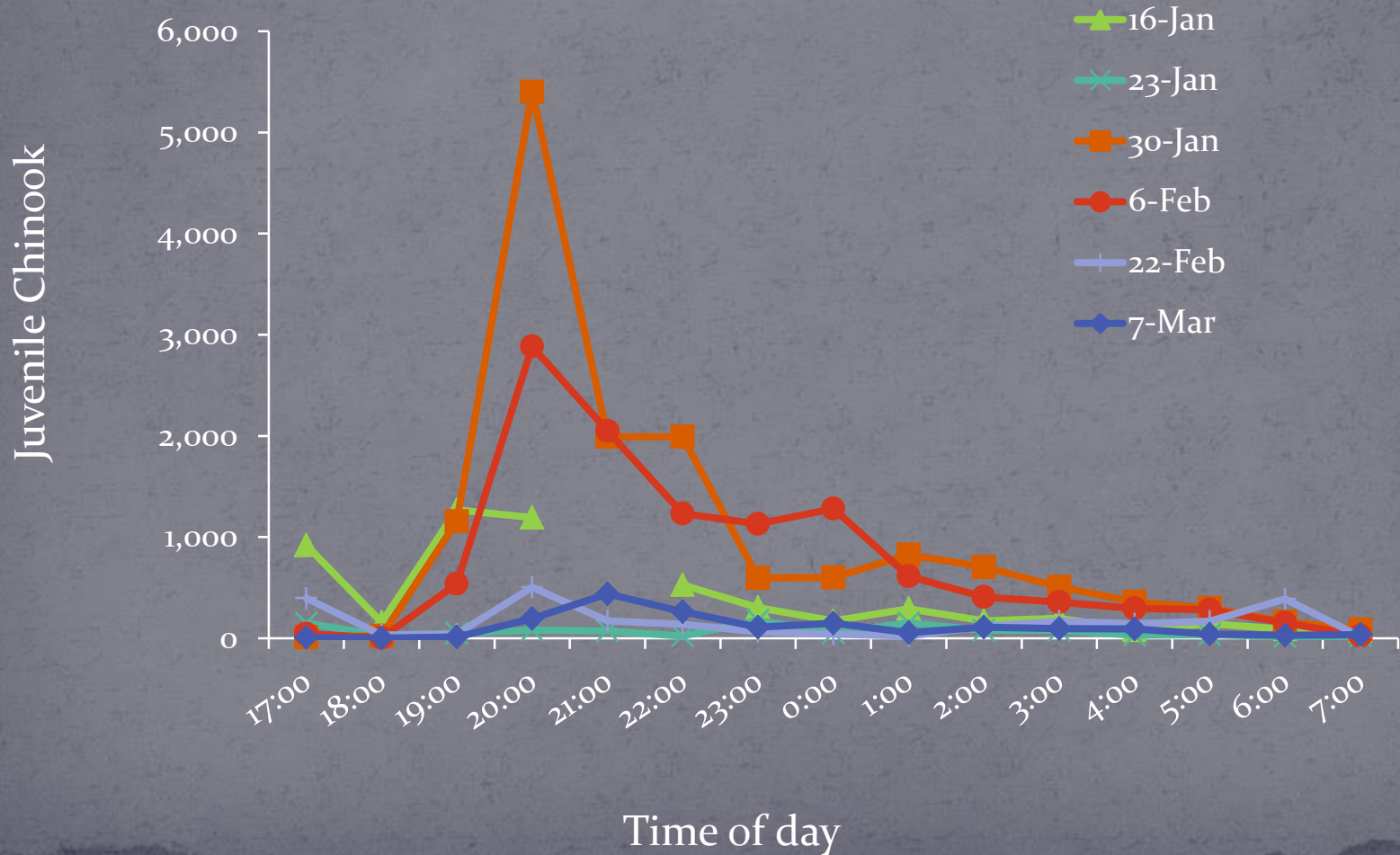
Lower Clear Creek RST 2012-2013

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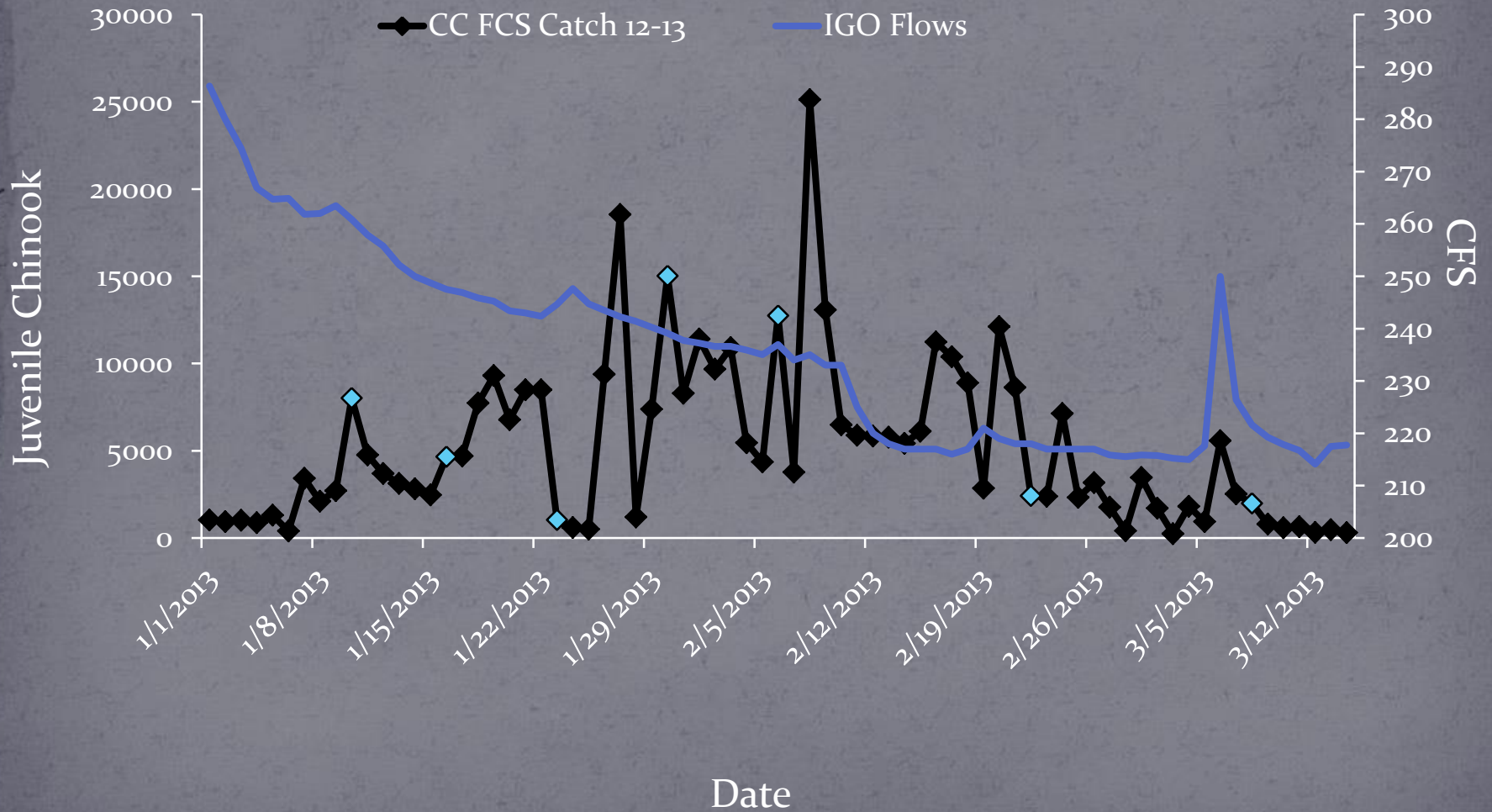


Lower Clear Creek RST 2012-2013

Chinook Hourly Distribution Jan 2013 - Mar 2013

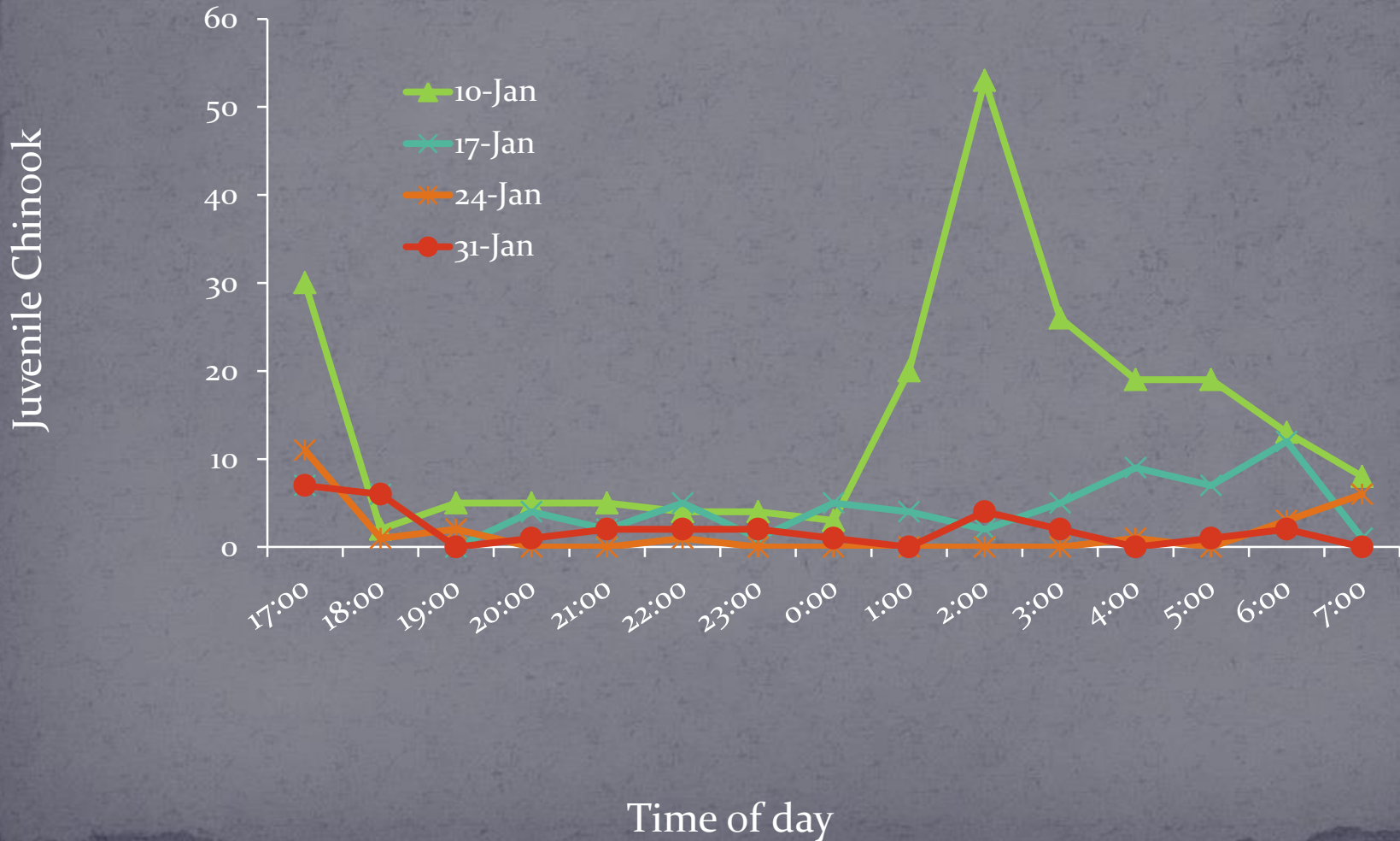


Lower Clear Creek RST 2012-2013

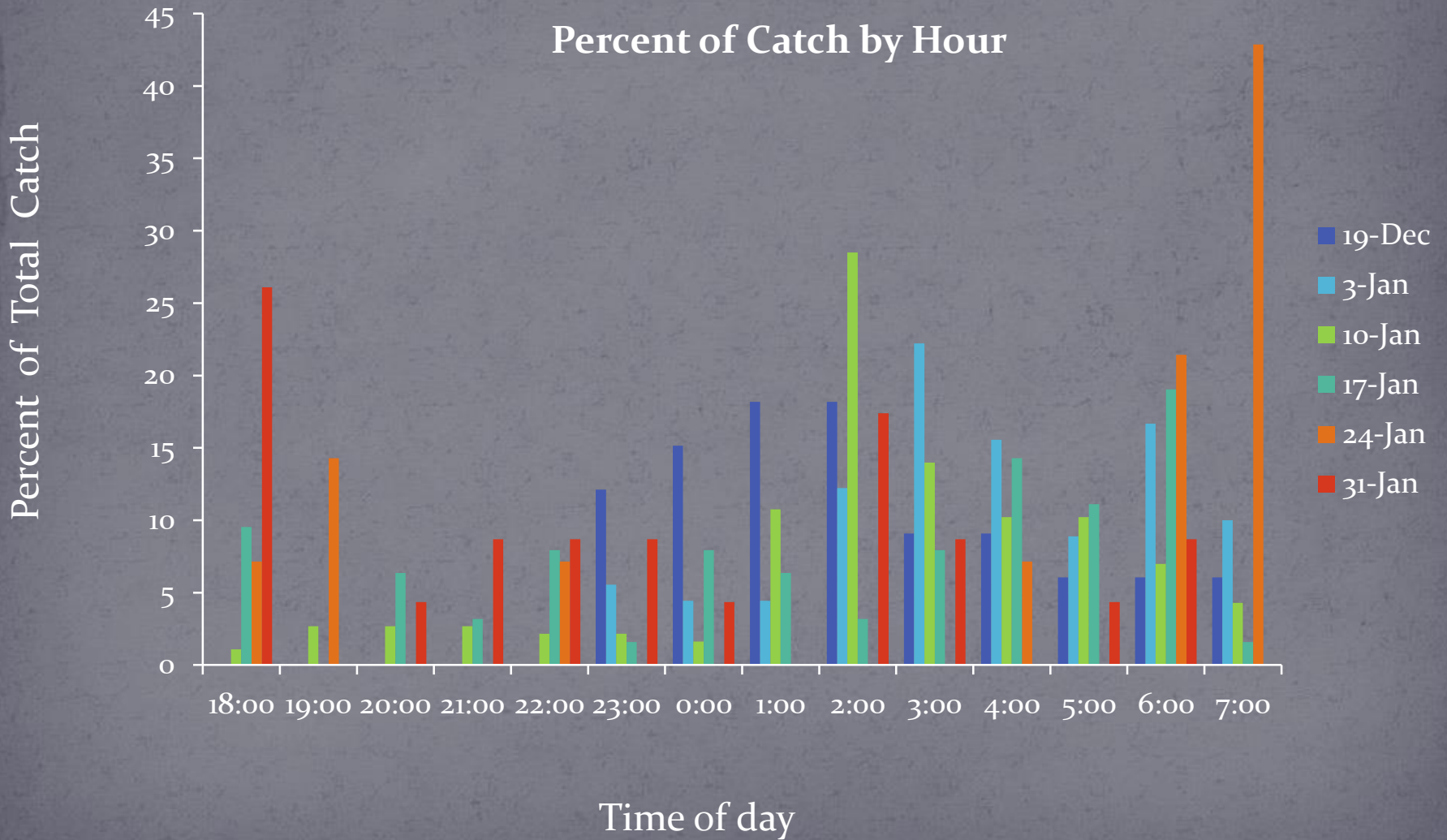


Upper Battle Creek RST 2012-2013

Chinook Hourly Distribution Jan 2013

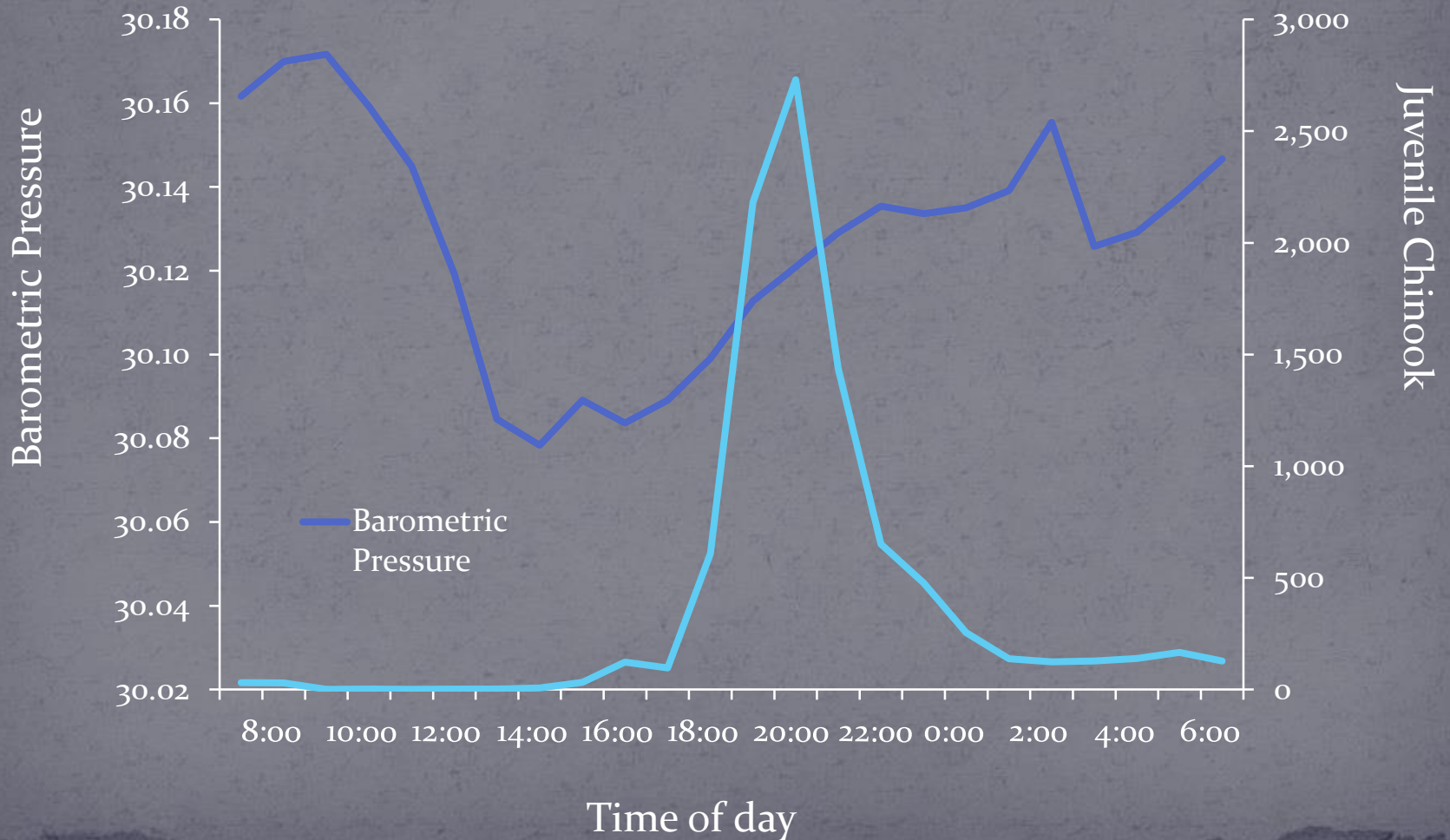


Upper Battle Creek RST 2012-2013



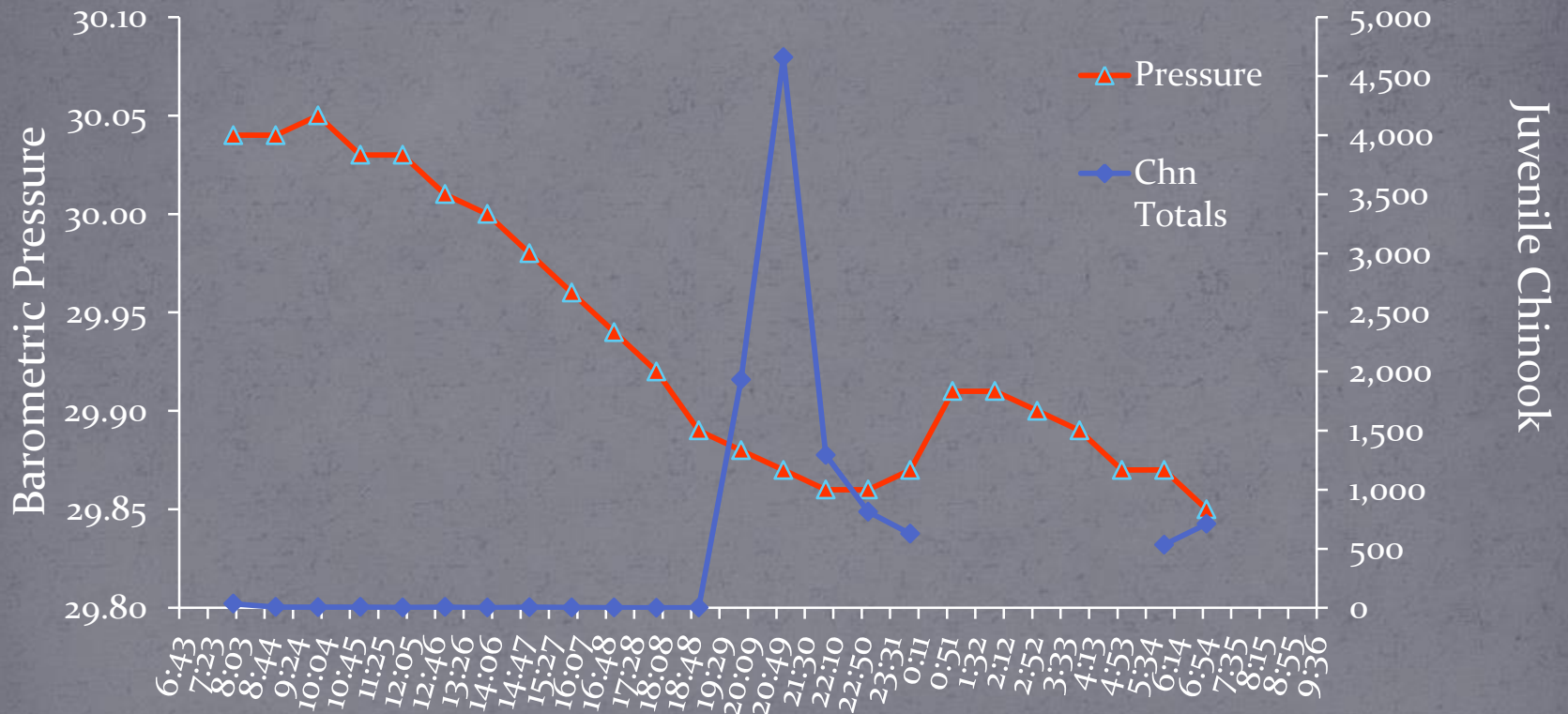
What did we observe?

Avg. Hourly Barometric Pressure and Chn Catch

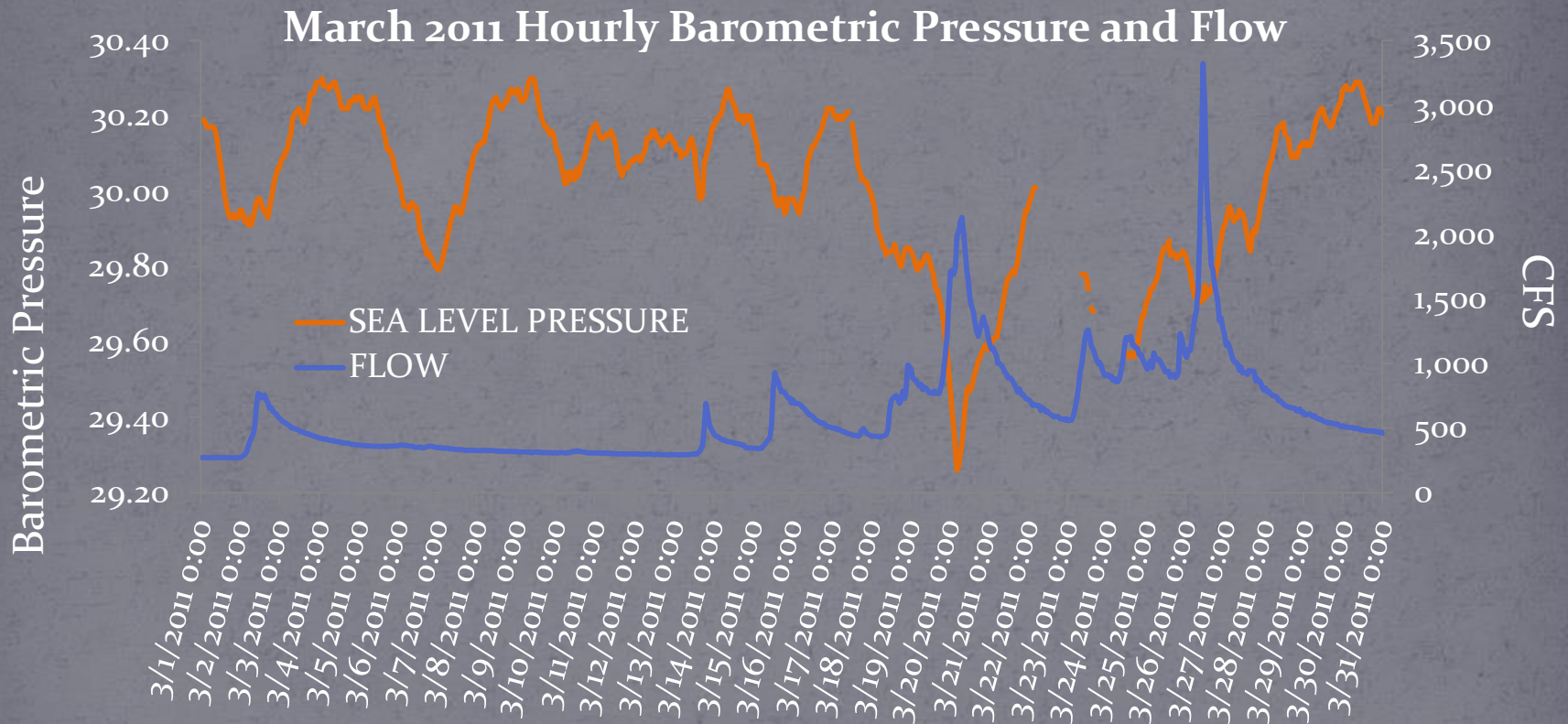


What did we observe?

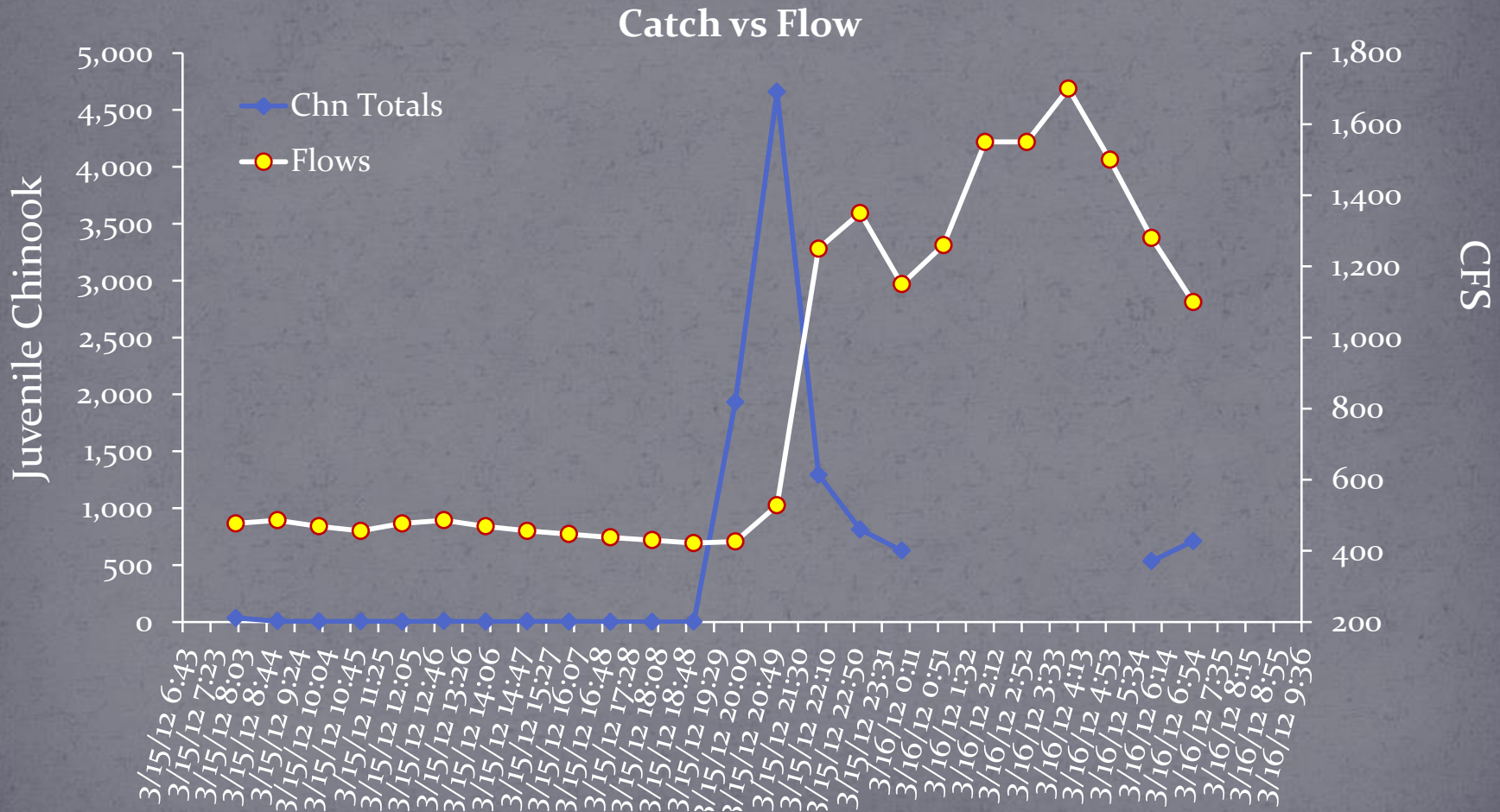
Catch vs Barometric Pressure



What did we observe?



What did we observe?



What did we learn in 2012?

- Passage peaks daily in a three hour period from 1900 – 2200.
- 85 % of salmon are passing between 1900 – 0000.
- Daily distribution during 24-hour interval sampling, did not change throughout the season.

What did we learn in 2013?

- Passage peaks daily in a three hour period from 1900 – 2200.
- 77 % of salmon are passing between 1900 – 0000.
- Average passage timing was an hour earlier than 2012.

What did we learn in 2013?

- Barometric Pressure and flow changes do not seem to affect general timing.
- Both Chinook and Steelhead responded better to natural flow events versus artificial pulse flows.

Where do we go from here?

- Continue evaluation of environmental variables.
- Gather more data from flow events and determine if fish are holding during moderate or high flow events.
- Build time step model to more accurately project fish passage timing when traps aren't fishing.

Questions?