

# **Assessment of *Ceratonova shasta* in the Clackamas River Upstream of Clackamas Hatchery**

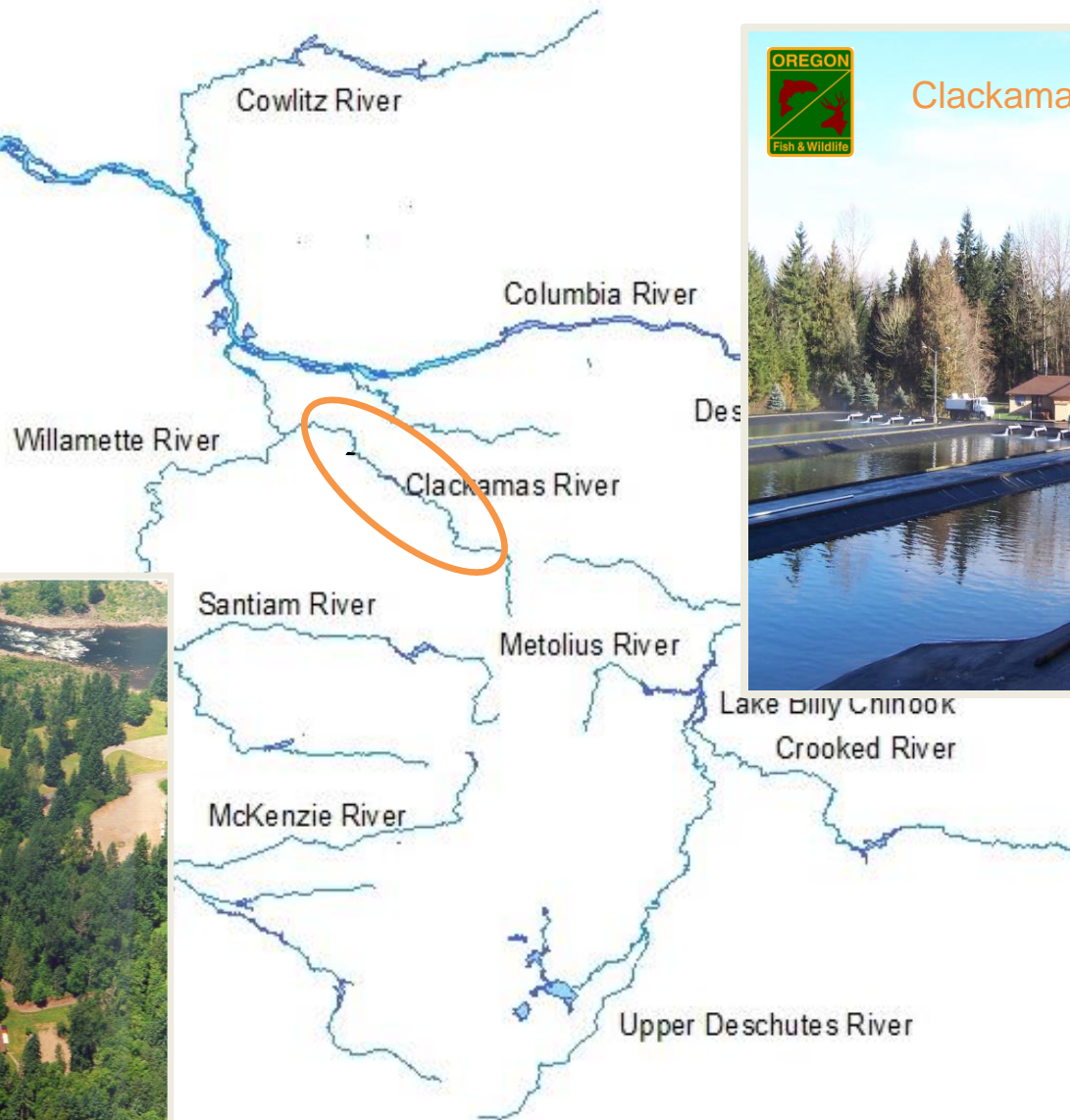
Sarah Bjork

ODFW Fish Health Services

NWFCC 2015

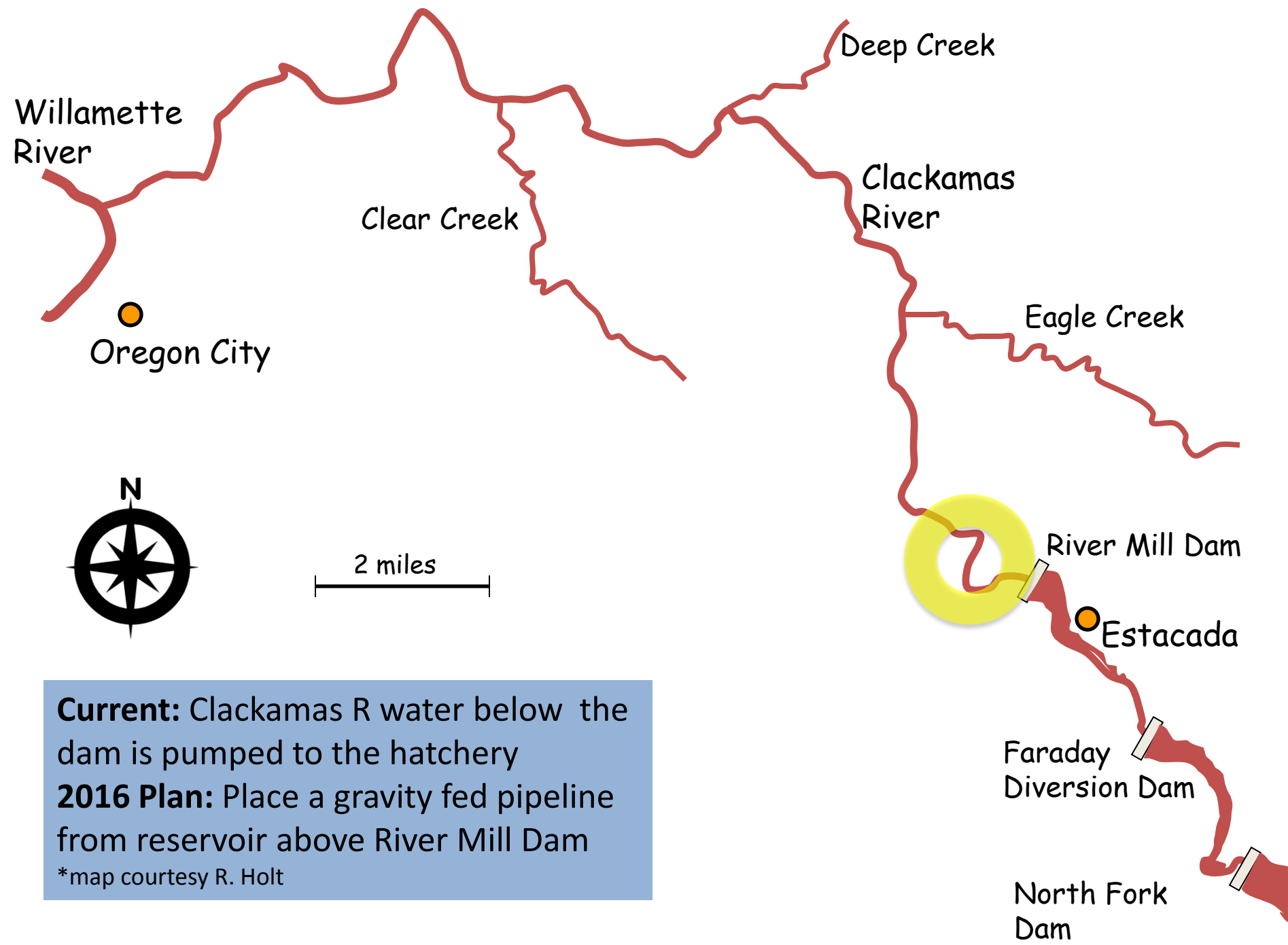


# Columbia Basin



Clackamas Fish Hatchery





**Current:** Clackamas R water below the dam is pumped to the hatchery

**2016 Plan:** Place a gravity fed pipeline from reservoir above River Mill Dam

\*map courtesy R. Holt

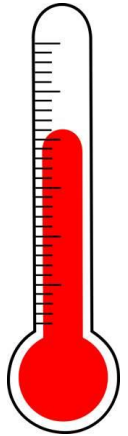
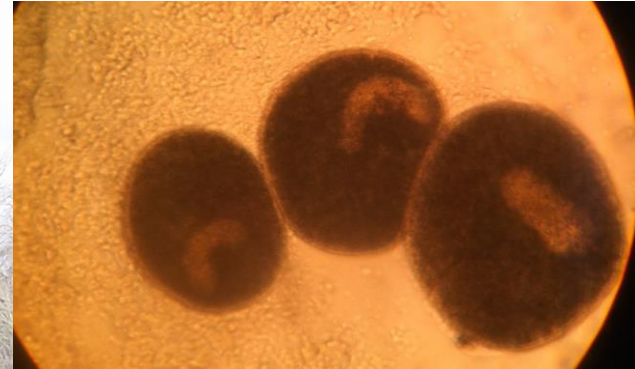
# Current Rearing Program

- **Spring Chinook**- spawned but eggs hatch at Bonneville and juveniles transfer back in the fall. Juvenile rearing: November-March
- **Coho** juveniles: June-October
- **Winter Steelhead**- spawned but eggs hatch at Bonneville and juveniles transfer back in the winter/spring. 4 week acclimation spring release.



# Why all the fish moving?

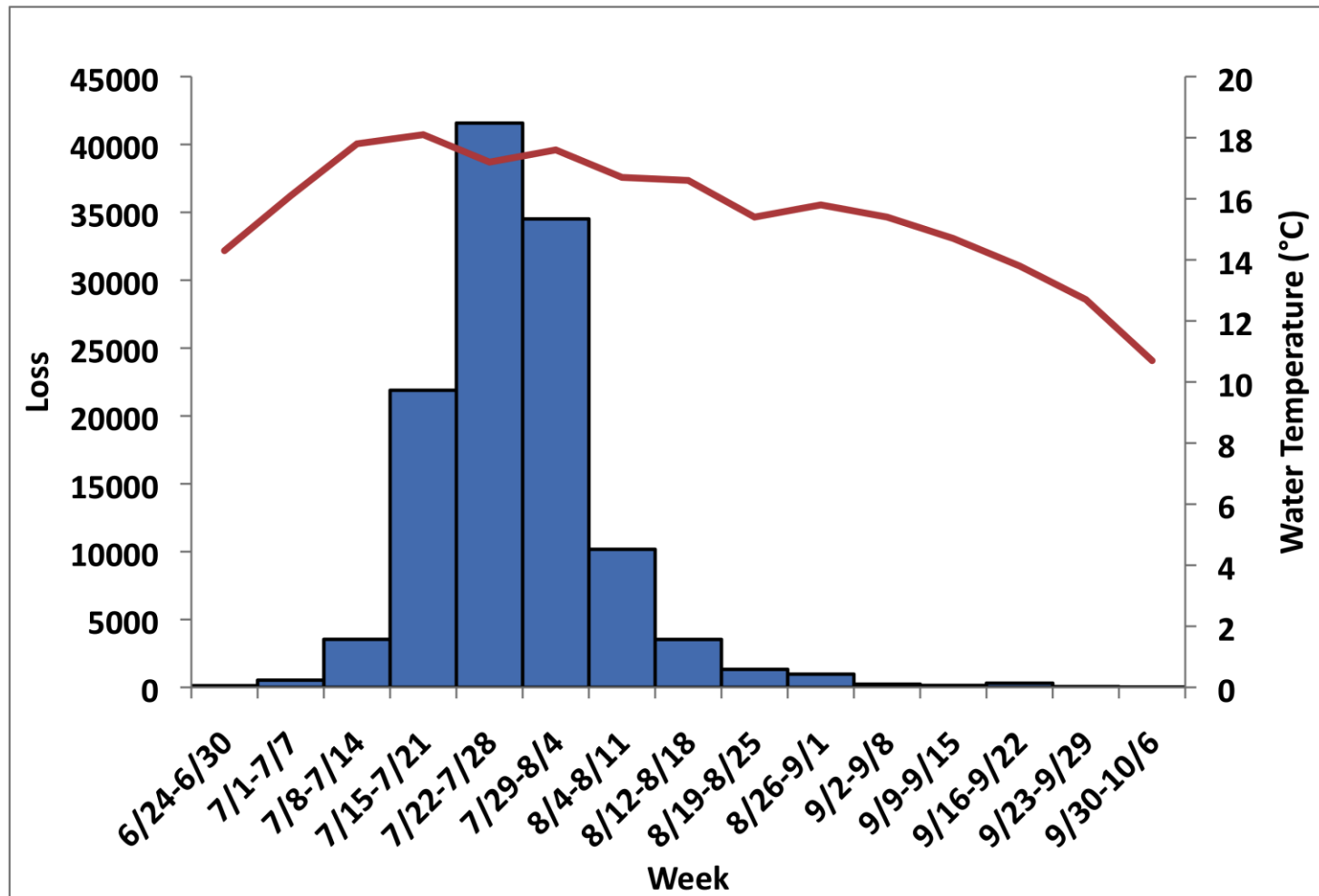
- Clackamas River has high summer temperatures ( $>65^{\circ}\text{F}$ )
- History of Ich, Columnaris and *C. shasta*
- Large ponds prevent formalin treatment against Ich
- Coho most refractile to Ich and Columnaris during the summer



# Current fish diseases

- Columnaris occurs annually but can be treated with Oxytetracycline
- Ich- coho not too bothered, if ChS in raceways can use formalin
- *C. shasta* no treatments, best to avoid but fish can recover if low dose

# First *C. shasta* detected at Clackamas Hatchery 2007



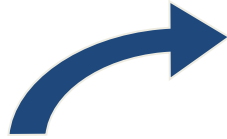
# *C. shasta* at Clackamas Hatchery 2015

- Infections annually in coho, low level loss
- 2015 hatch and rear spring Chinook- severe loss from Columnaris and *C. shasta* lost >60% of population
- Rainbow trout for whirling disease testing- 50% mortality by termination in May

Genotype	Species
0	Steelhead non-lethal
I	Chinook
II	Coho & rainbow trout
III	Multiple species/mixed infections



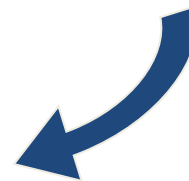
# *C. shasta* - lifecycle



myxospore



polychaete



actinospore



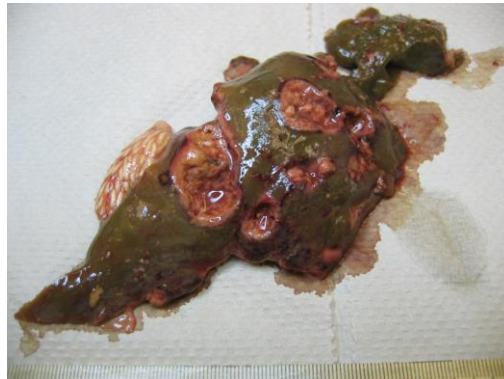
salmonid

# *C. shasta* and Ceratomyxosis

- Enters via gills, initially in blood
- Primarily invades intestinal tract but can affect any tissue- kidney, liver, eyes
- Epithelial lining necrotises, fragments, ultimately sloughs



\*photos courtesy C. Banner and R. Holt



# \$64,000 question is



Will reservoir water have a  
lower pathogen load?

# OSU 2009 study

- Sentinel fish exposures in July demonstrated *C. shasta* infection
  - Hatchery intake (77.5%), at River Mill Dam fish ladder (72%) and at the upper Clackamas River (4%).
- Water samples for the parasite revealed:
  - *C. shasta* DNA levels equivalent to 1-10 spore/L at 5 sentinel sites in July
  - On August 25, all 37 sites had low levels of less than 1 spore/L



# What we know now

- OSU results: upstream levels should be lower
- But in last 10 years the parasite went from undetected to established and causing epizootics at the hatchery

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# Water sample monitoring

- Replicate 1 L water samples collected at Hatchery and 30 ft depth at Dam (new pipeline)
- Water filtered and DNA extracted
- Quantitative PCR to compare relative parasite abundance

# Pipeline site



Photos courtesy of Dan Straw

# Sampling water at depth



Photos courtesy of Dan Straw



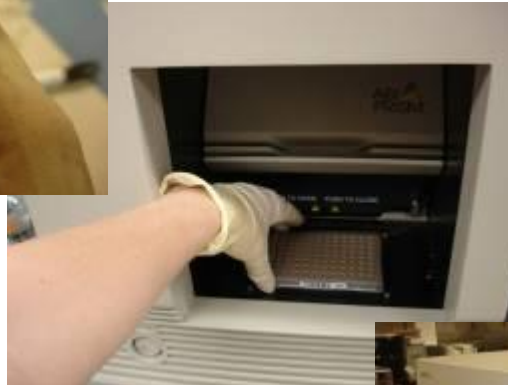
# Water collection and filtration



Photos courtesy of Dan Straw

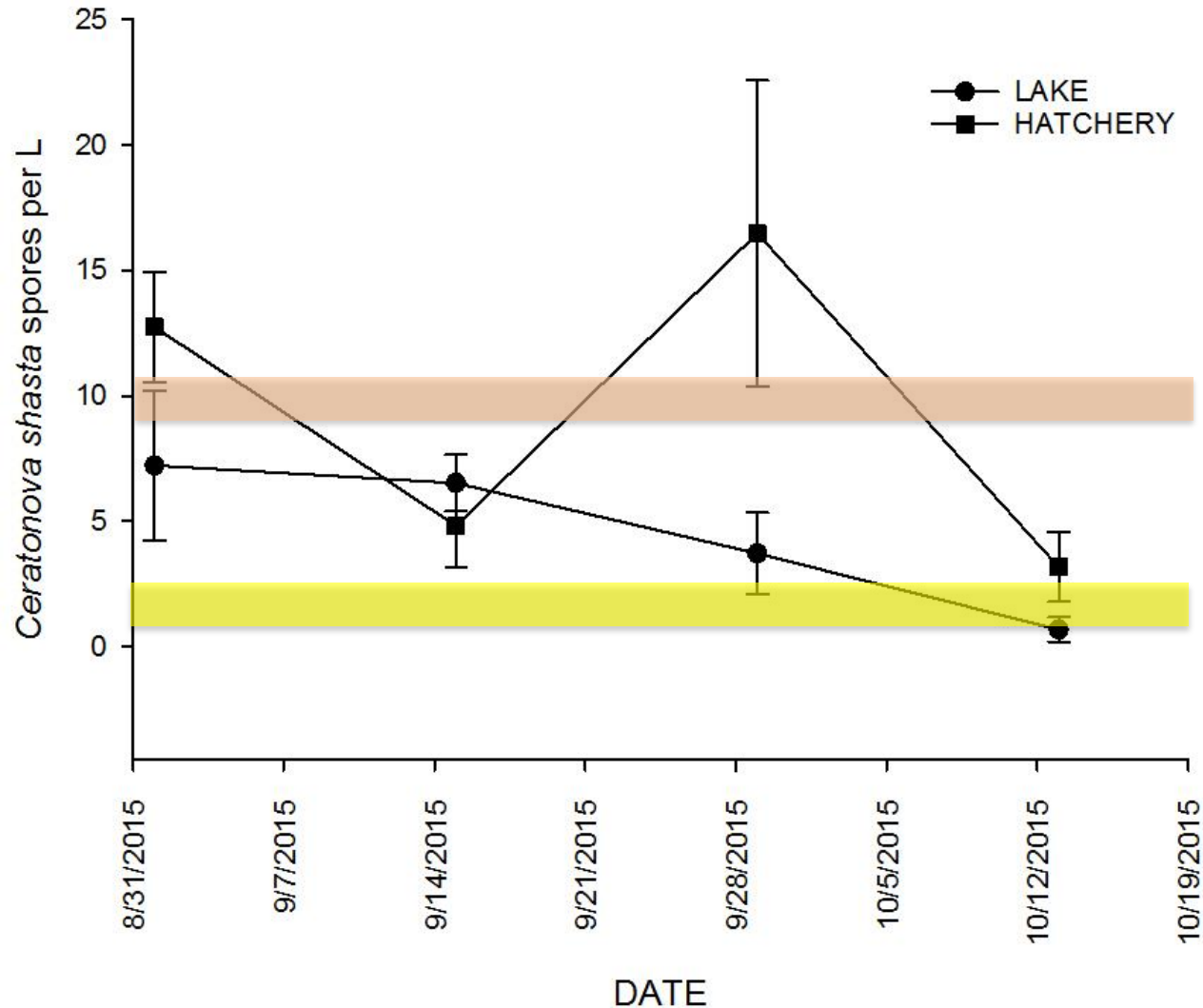
# DNA extraction and qPCR

- qPCR run by Bartholomew lab OSU





# Preliminary Results



10 spore/L lethal  
to resistant Chinook  
\*Bartholomew data  
Klamath R

1 spore/L lethal  
to susceptible Rbt

# Next steps

- Continue monitoring through spring and summer
- Genotype samples to determine which species would do best at hatchery
- Special thanks to Derek Gibbs (ODFW Fish Heath), Clackamas Hatchery crew and Bartholomew lab staff especially Rich Holt, Julie Alexander, Damien Barrett