Ceratonova shasta in the Deschutes River: Waterborne Abundance and Gravel Augmentation Studies

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Ceratonova shasta lifecycle is complex

- Native FW cnidarian parasite
- Complex lifecycle
  - 2 waterborne spore stages
  - Obligate hosts
- Temperature mediated
  - Abundance
  - Infection severity
- Lethal depending on species and severity of infection
  - Juvenile Klamath River fall Chinook salmon = 10 spores/L
  - Deschutes River rainbow trout = 1 spore/L

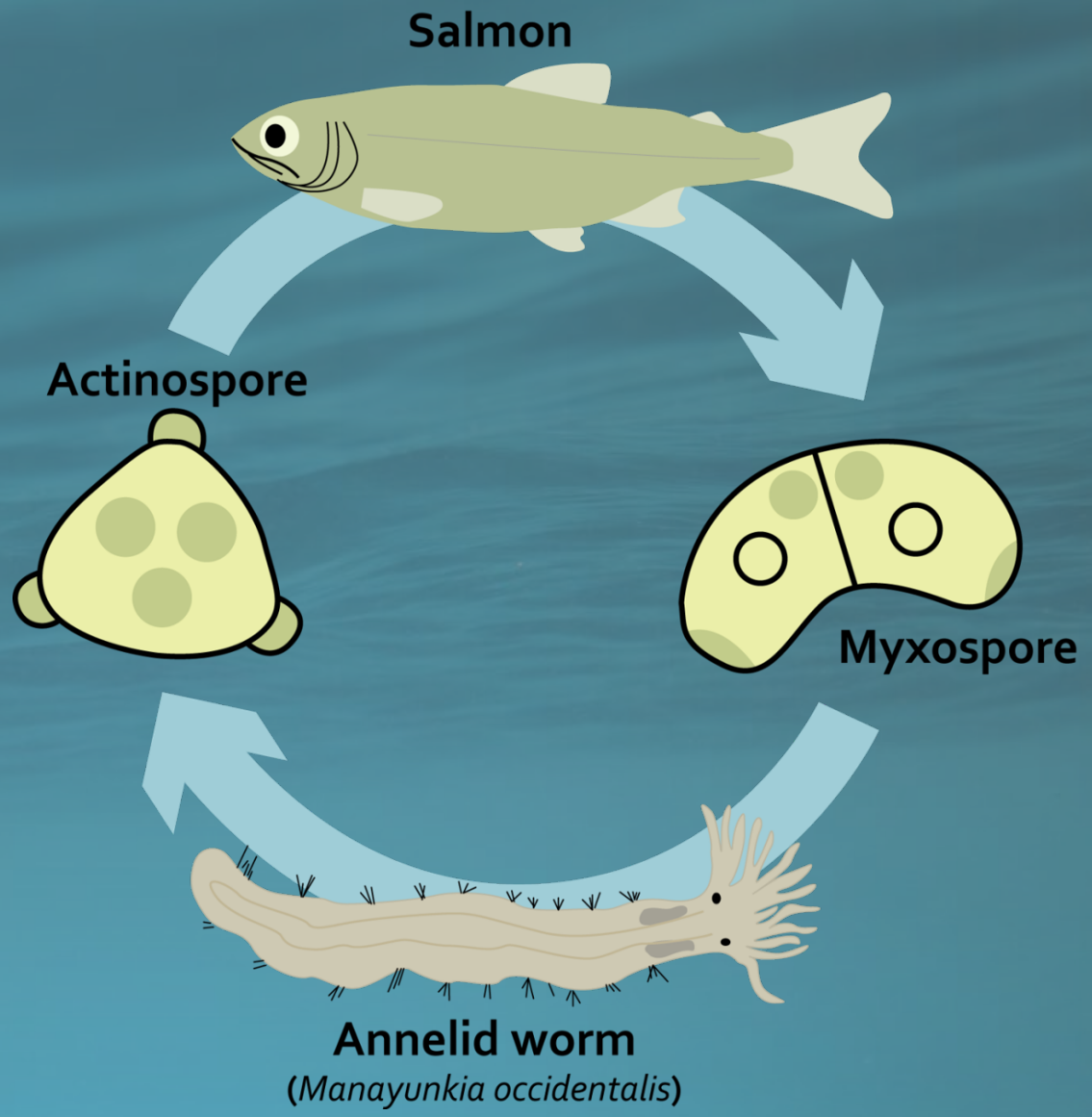


Illustration by Alex Schwartz

Juvenile and adult pre-spawn mortality has been observed in the Deschutes River

1965 — Conrad & Decew observed myxospores in fish below Pelton Reregulation Dam

2015 — Initiation of sentinel fish exposures, temporal and spatial water sampling

2018 — First annelid host sampling started at PGE gravel study sites

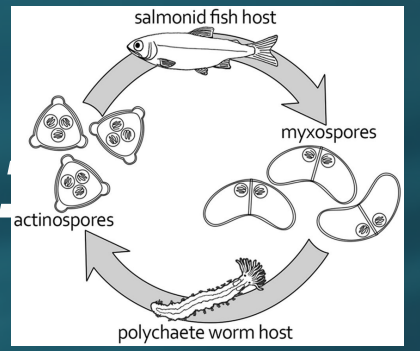
Deschutes River Alliance, 2015

Annelid sampling, 2018

Ceratomyxosis in a hatchery summer steelhead smolt (left) and spring Chinook smolt (right) mortalities collected at the Selective Water Withdrawal Fish Transfer Facility at the Round Butte Dam

C. shasta risk can be assessed by:

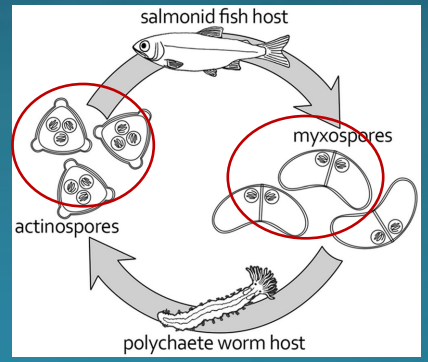
- Wild fish
  - Lethal diagnostic sampling
- Sentinel fish
  - Caged hatchery fish
- Water sampling
  - Spatial or temporal
- Annelid host sampling

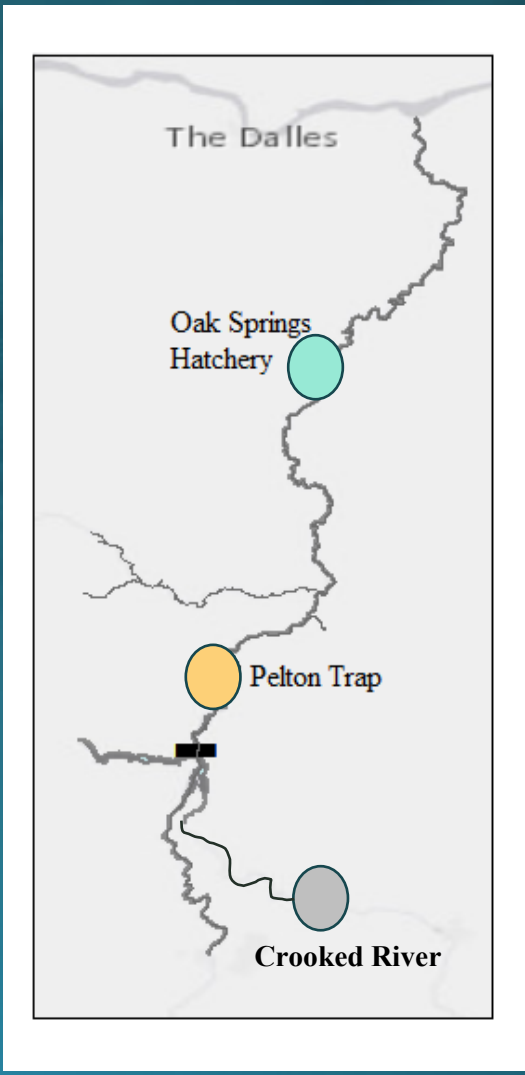


Temporal water sampling conducted at Oak Springs Hatchery, the Pelton Trap, Crooked River

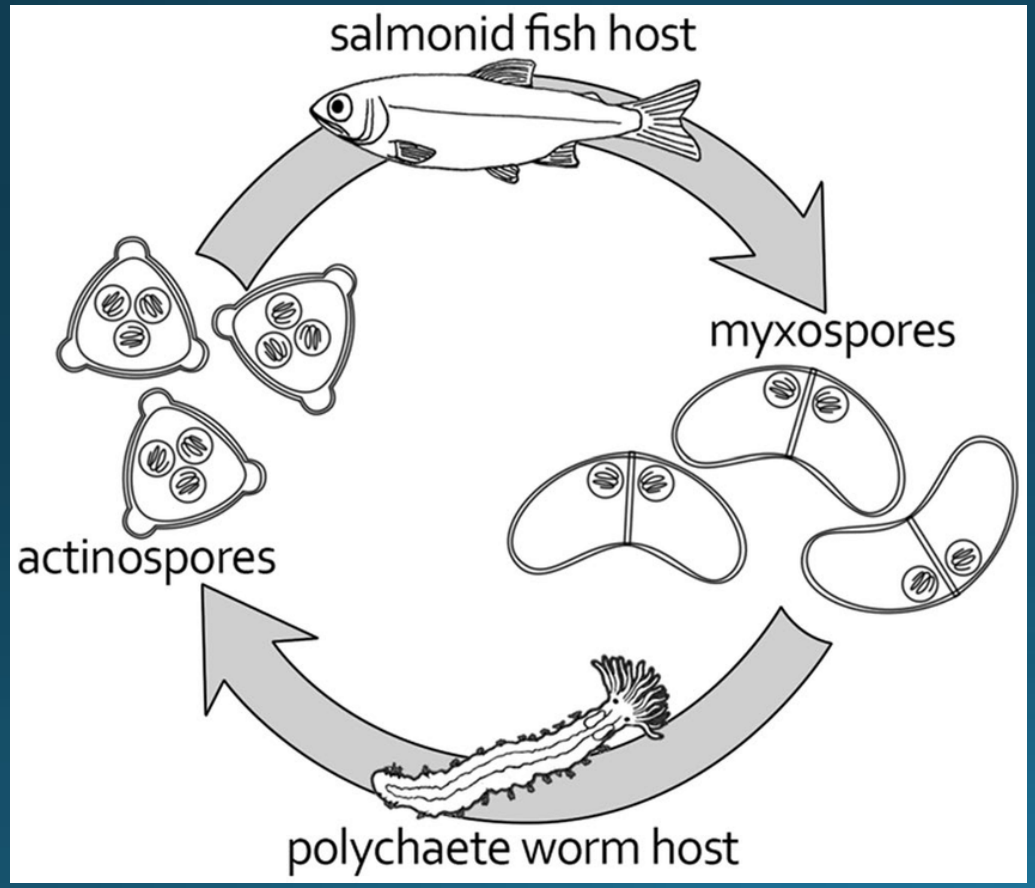
- 24 hr composite samples
- biweekly

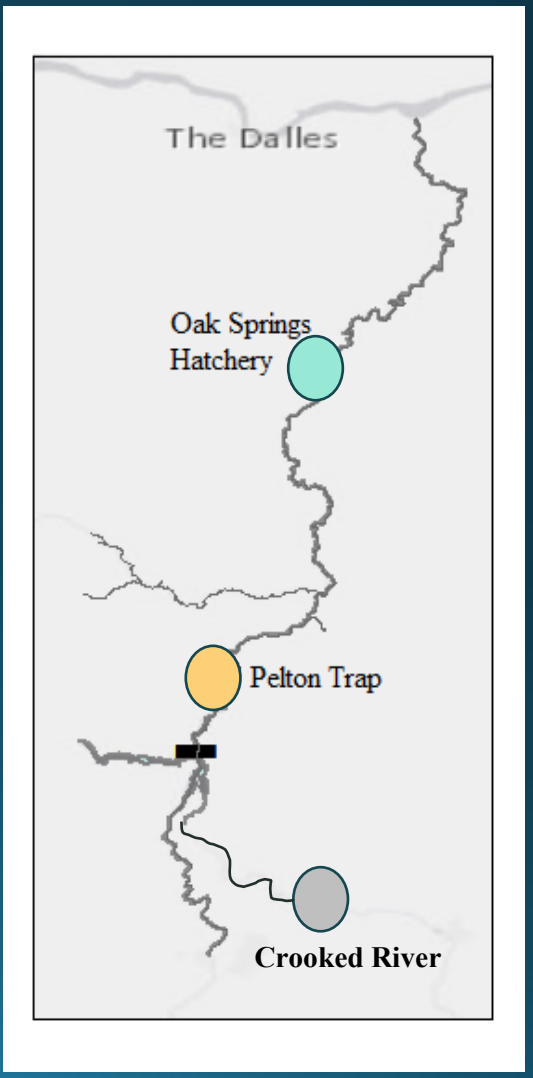
- Water sampling (and qPCR) does not distinguish between actinospores and myxospores



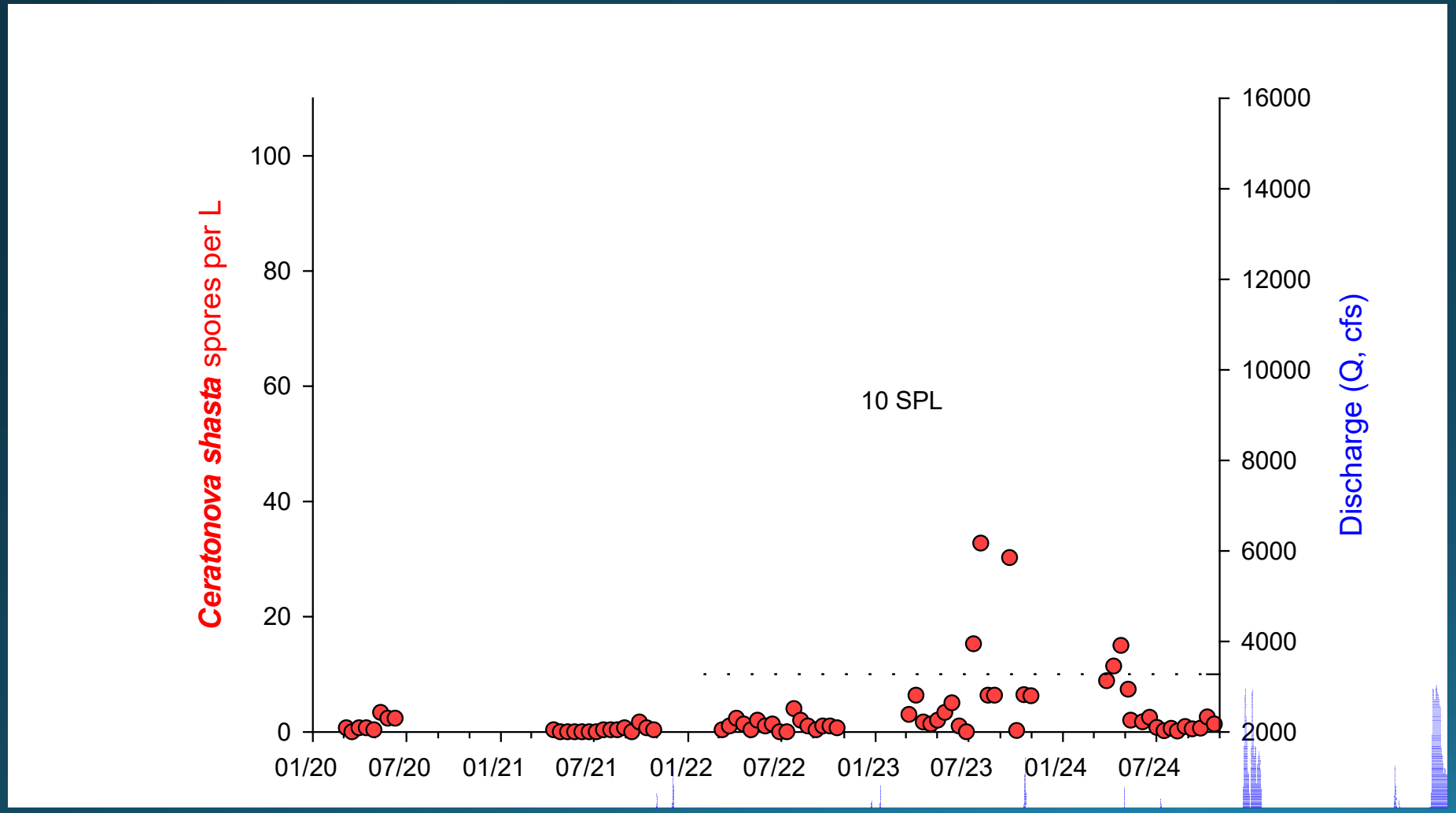


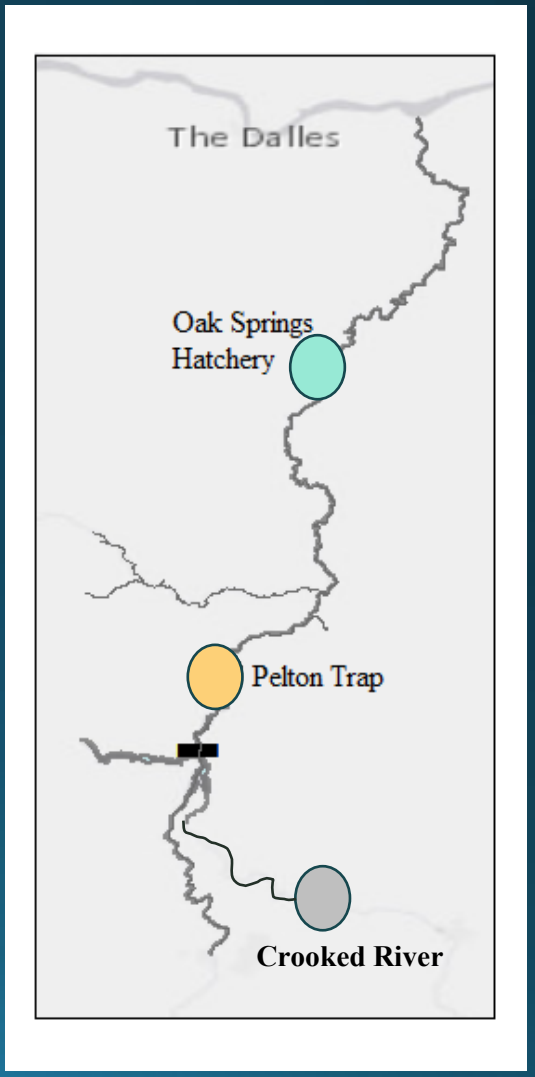
No Cs detected at the Crooked River site(s)



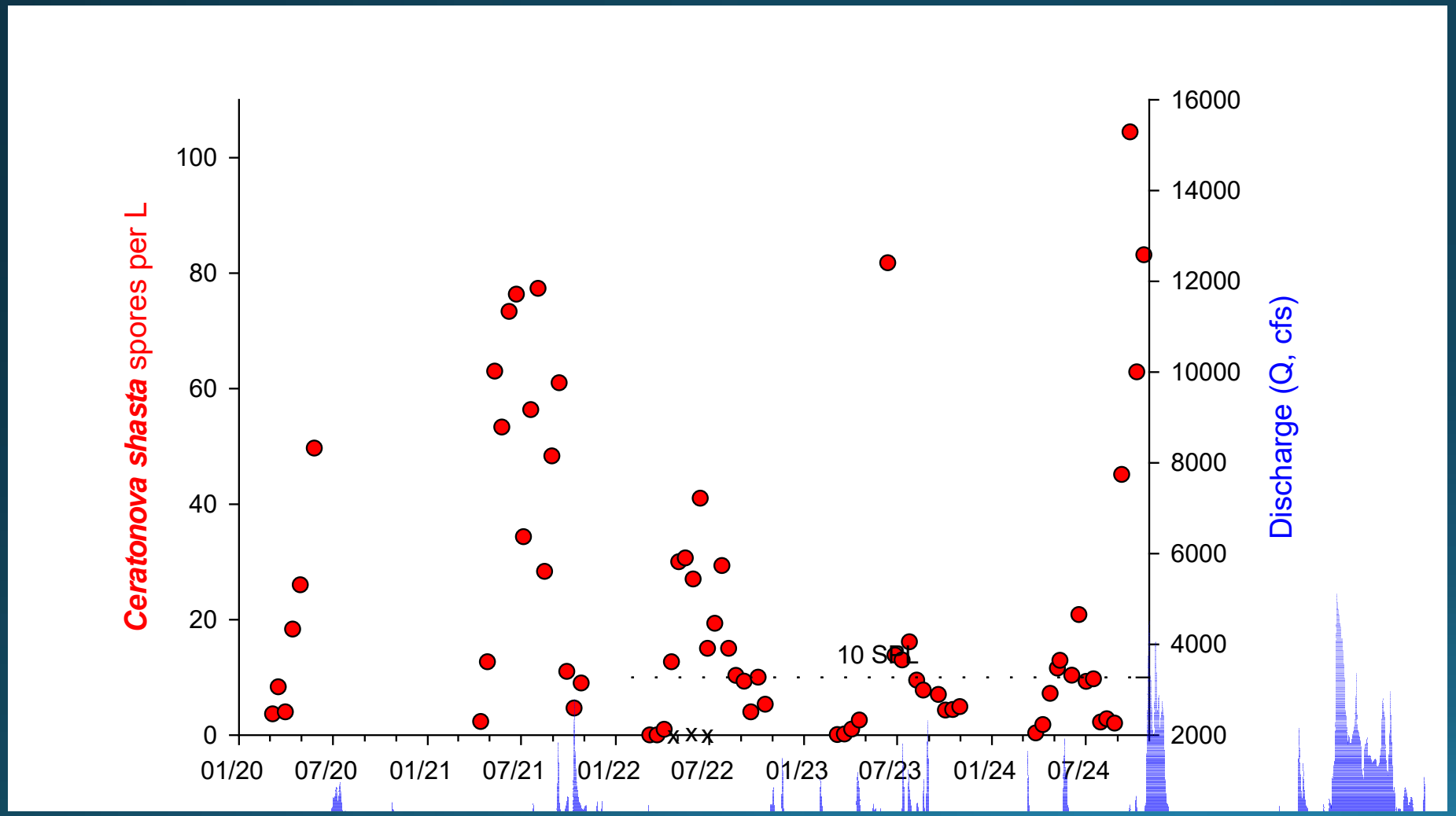


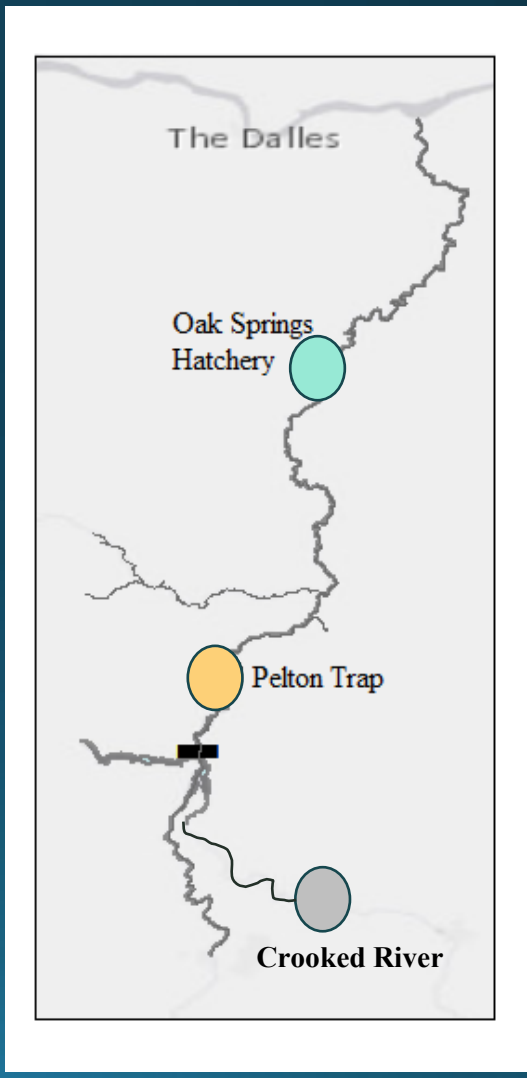
Cs densities generally low at Pelton Trap; trending higher in recent years





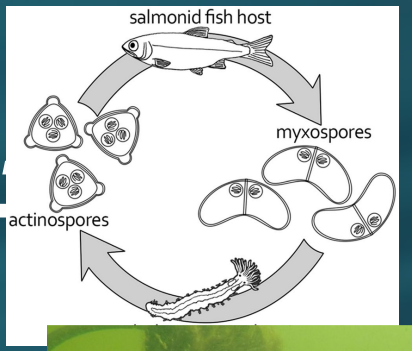
Cs densities are highest and vary broadly at the Oak Springs Hatchery site

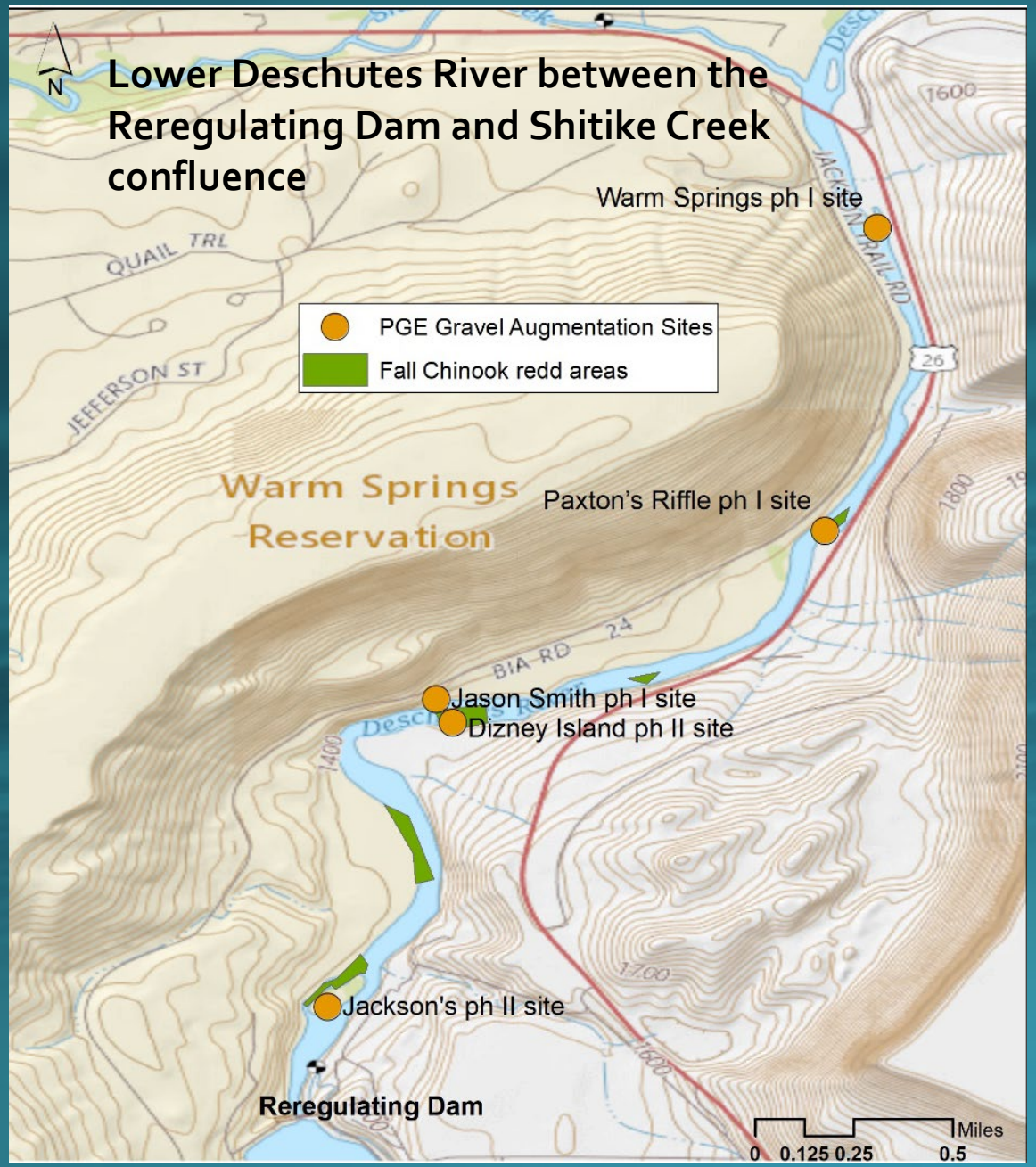




C. shasta risk can be assessed by:

- Wild fish
  Lethal diagnostic samp
- Sentinel fish
  Caged hatchery fish
- Water sampling
  Spatial or temporal
- **Annelid host sampling**



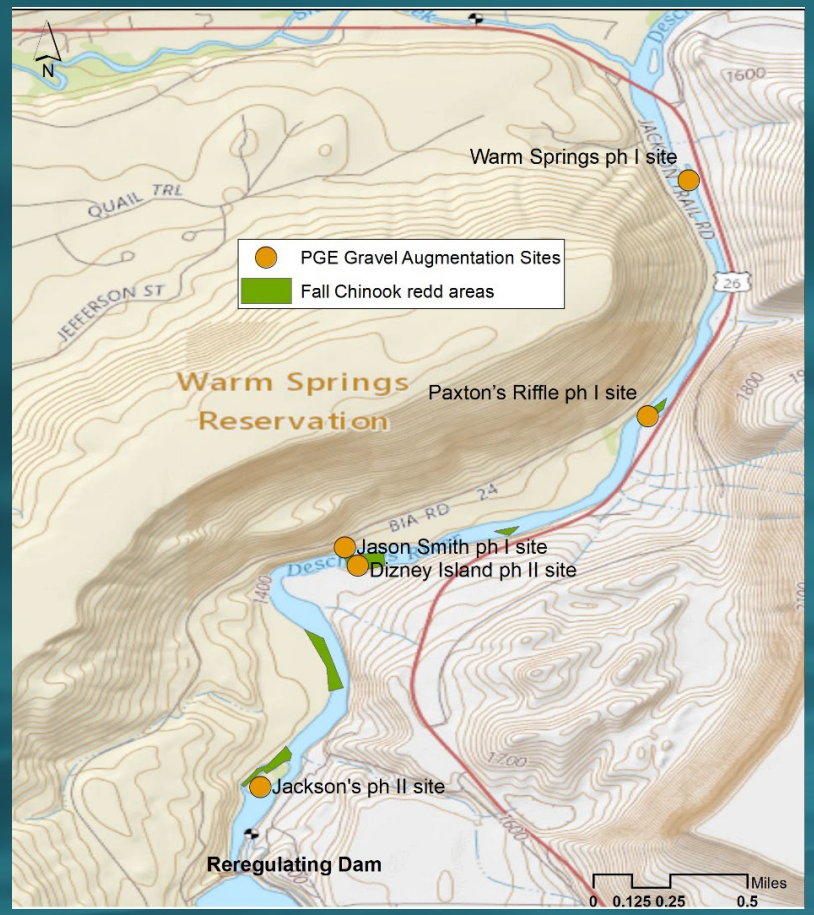


PGE Gravel augmentation sites:

- Phase I (2008) – Jason Smith, Paxton's Riffle and Warm Springs
- Phase II (2018) – Zane Jackson's and Dizney Island

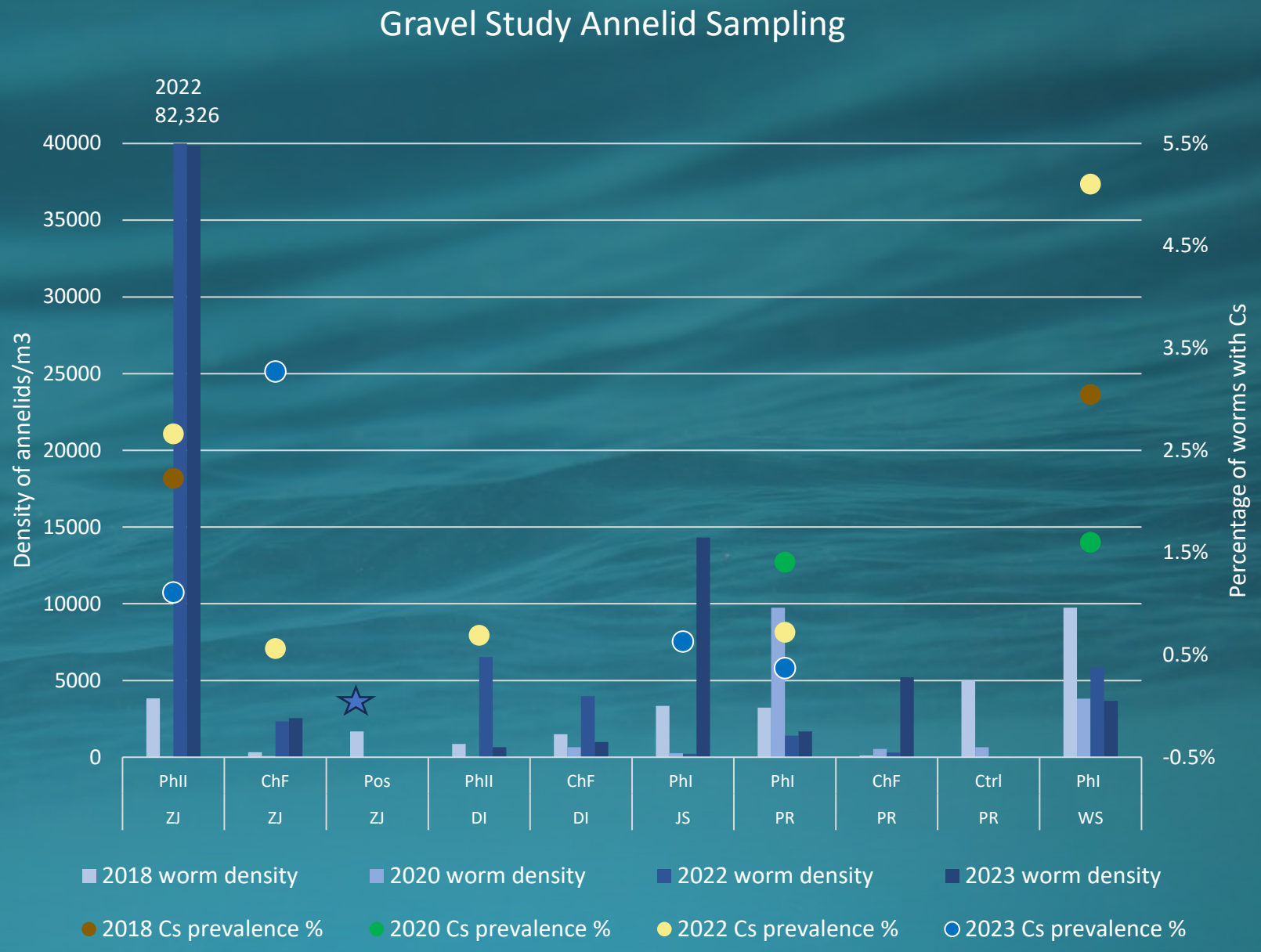
Worm sampling

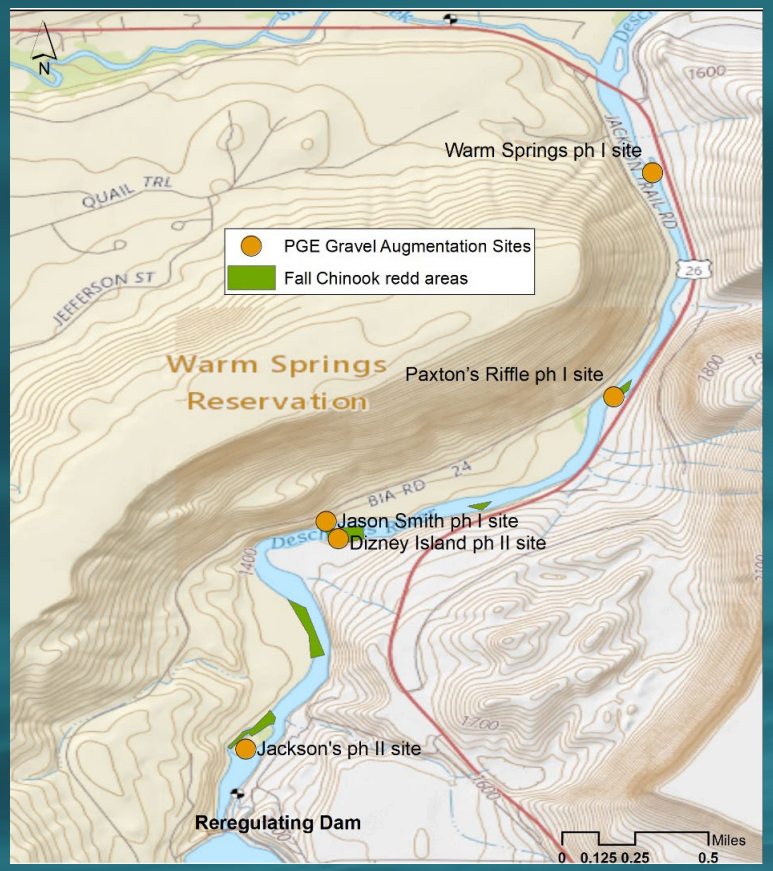
Manayunkia occidentalis, the size of an eyelash encased in a tube



Site type: ChF: fall Chinook redd, Pos: positive for annelids, PhI: phase I gravel, PhII: phase II gravel, Ctrl: control, non-redd or gravel

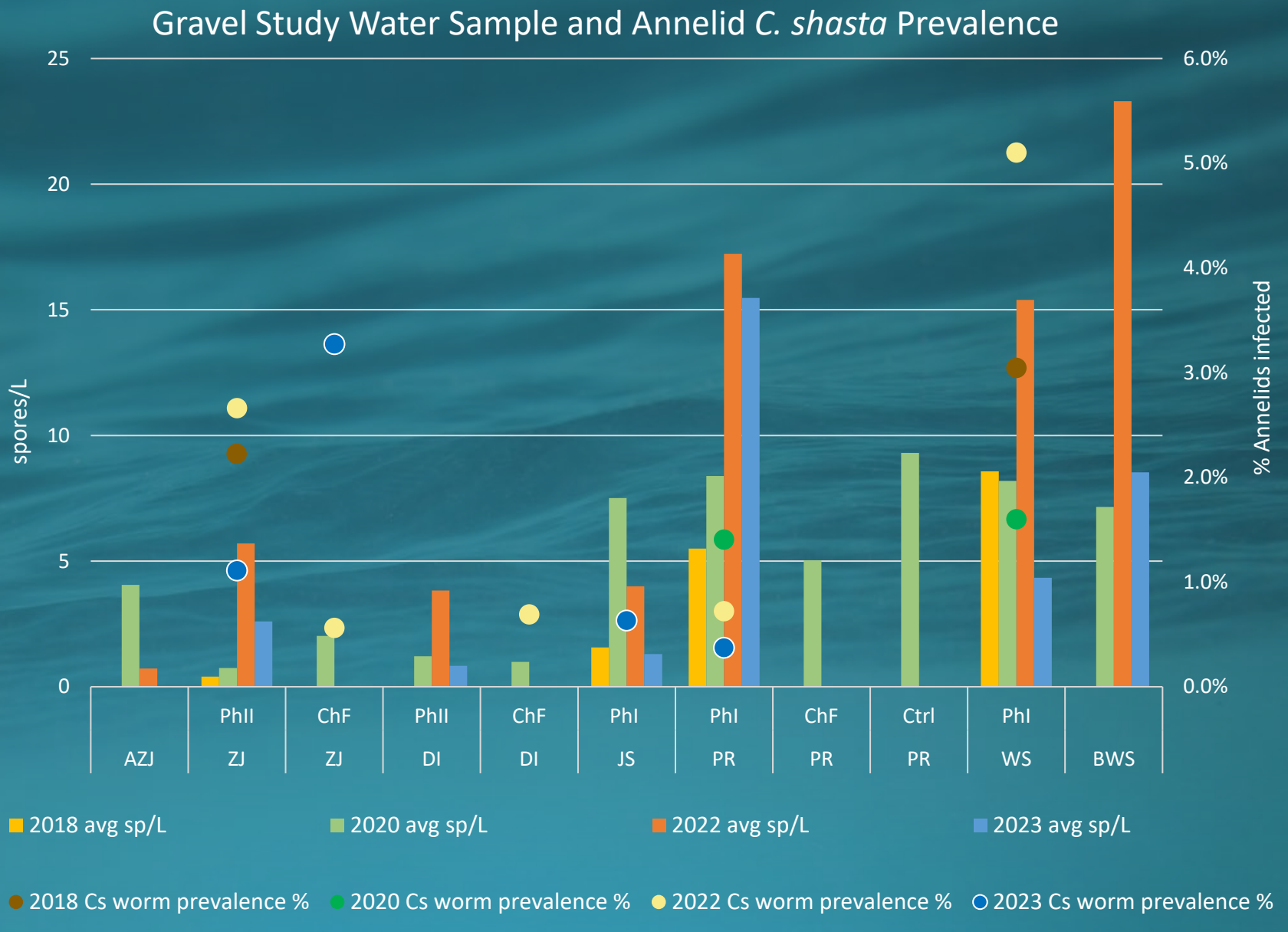
Site name: ZJ: Zane Jackson's, DI: Dizney Island, JS: Jason Smith's, PR: Paxton's Riffle, WS: Warm Springs boat ramp





Site type: ChF: fall Chinook redd, PhI: phase I gravel, PhII: phase II gravel, Ctrl: control, non-redd or gravel

Site name: AZJ: Above ZJ, ZJ: Zane Jackson's, DI: Dizney Island, JS: Jason Smith's, PR: Paxton's Riffle, WS: Warm Springs boat ramp, BWS: below WS



Conclusions

- Highest densities of *Cs* in lower basin
- Peak Cs densities in summer
- Interannual variation in waterborne densities
- Relatively low magnitude peak flows have occurred since 2020 (flushed in 2017/2019)
- Gravel augmentation annelid POI is high compared to other systems
- More data on annelids in DR would be helpful

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Questions?

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- Julie.Alexander@oregonstate.edu

Acknowledgements

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- Annelid study: funding provided by PGE, annelid sample processing- OSU PHIn lab students and technicians 2018-2023