

Prevalence of Bacterial Kidney Disease in Natural vs. Hatchery-Reared Adult Chinook Salmon Spawned in a Hatchery and in Nature

Timothy L. Hoffnagle, Sally Gee,
Glenda O'Connor, and Richard W. Carmichael

Oregon Department of Fish and Wildlife

Bacterial Kidney Disease

- Caused by *Renibacterium salmoninarum*
 - Slow growing bacterium
 - Causes chronic, systemic infection
 - Transmitted both horizontally and vertically
- Can be a major health problem in hatcheries, particularly captive broodstock programs
- Antibiotics are used to prevent and treat BKD outbreaks
- ELISA is the standard diagnostic method and is commonly used to cull fish to reduce vertical transmission
- **Concern that hatchery salmon may spread disease to natural salmon**

Objectives

Examine Chinook salmon for bacterial kidney disease and compare results among:

- **Origins**

- Hatchery vs. Natural

- **Spawning locations**

- Hatchery vs. Streams

- **Hatchery Programs**

- Captive vs. Conventional
Broodstock

- **Management**

- Wilderness vs. Supplemented
streams

- **Populations**

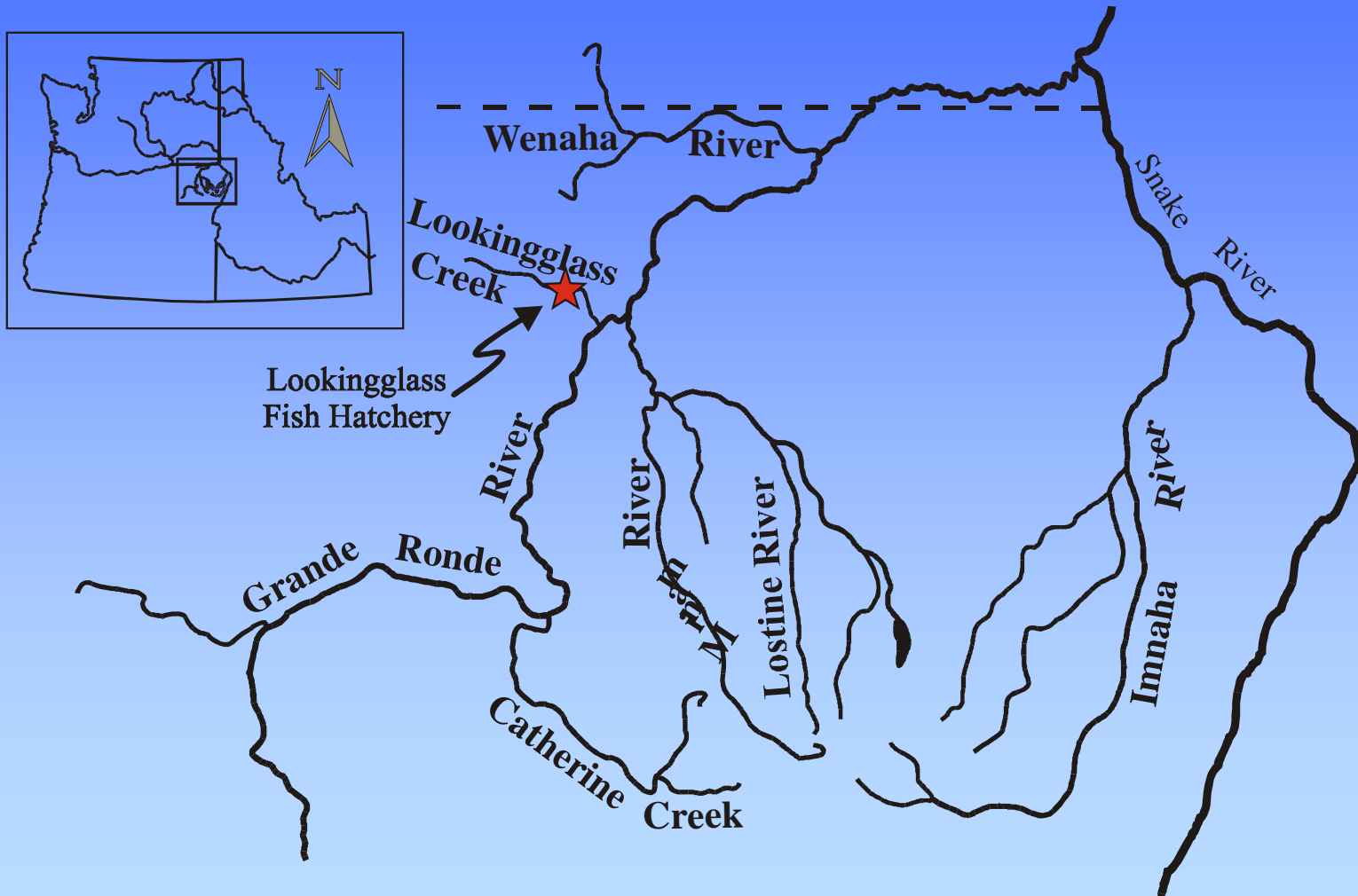
- Catherine Creek
- Grande Ronde River
- Imnaha River
- Lookingglass Creek
- Lostine River
- Minam River
- Wenaha River

Objectives

Look for trends that may indicate a change in BKD prevalence:

- **Populations**
 - Catherine Creek
 - Grande Ronde River
 - Imnaha River
 - Lookingglass Creek
 - Lostine River
 - Minam River - hatchery strays
 - Wenaha River - hatchery strays

Northeast Oregon Streams



Methods

Hatchery Sampling

- Samples collected from freshly killed salmon immediately after being spawned.
- Samples kept cool until being frozen at the end of the day.



Methods

Spawning Ground Survey Sampling

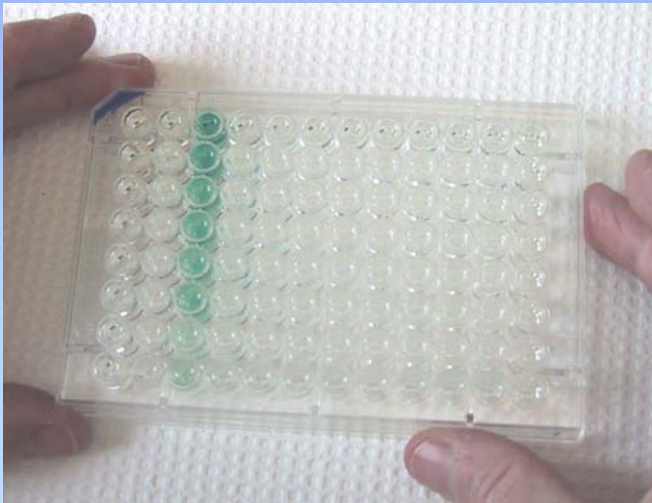
- Samples collected from intact carcasses.
- Samples stored in backpack until end of survey, kept on ice for transport until frozen.



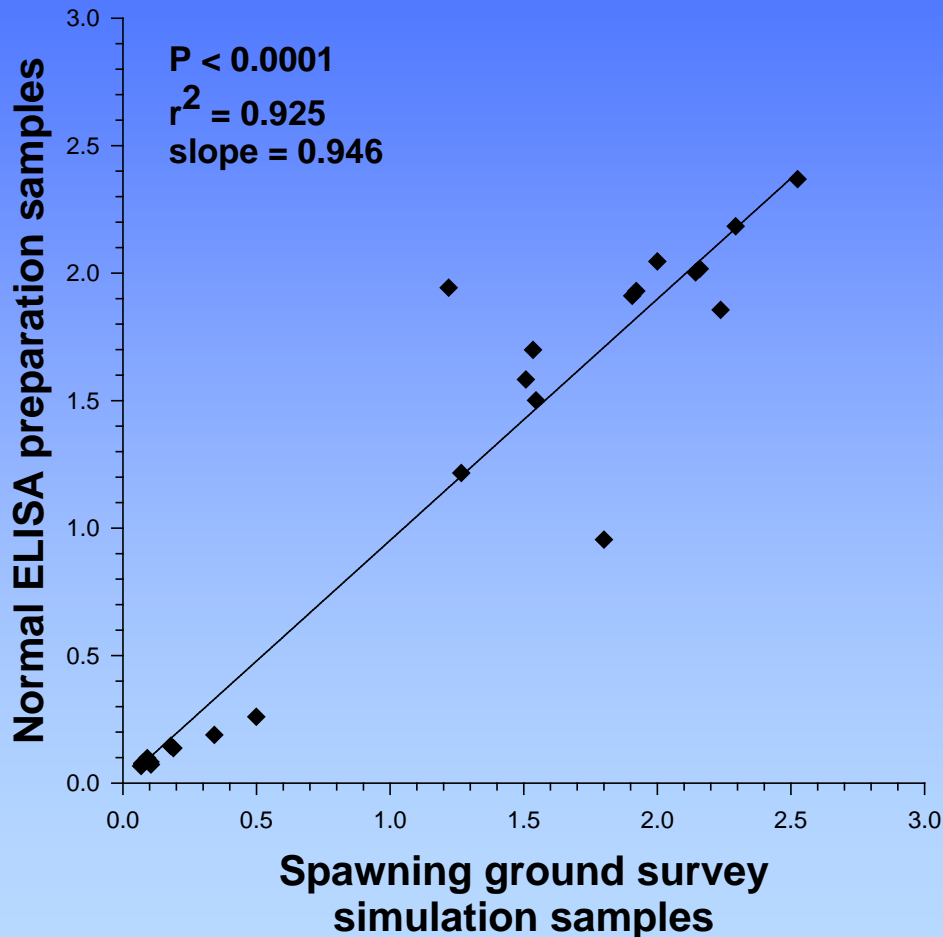
Methods

Enzyme-linked Immunosorbent Assay (ELISA)

- Measures amount of *R. salmoninarum* antigen in the sample.
- Indicates present or past infection by *R. salmoninarum*.

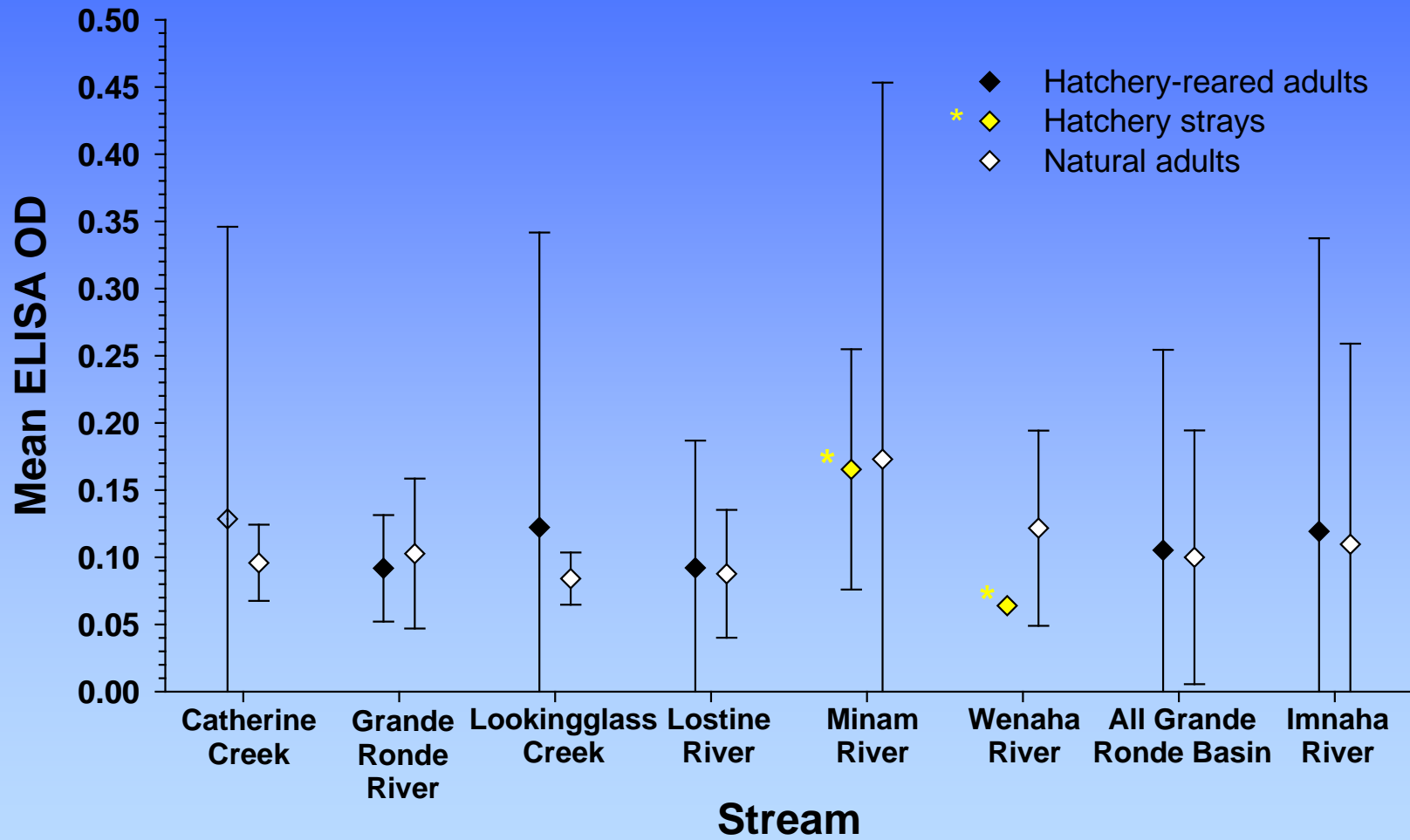


Can Samples Collected on Spawning Ground Surveys be Analyzed?

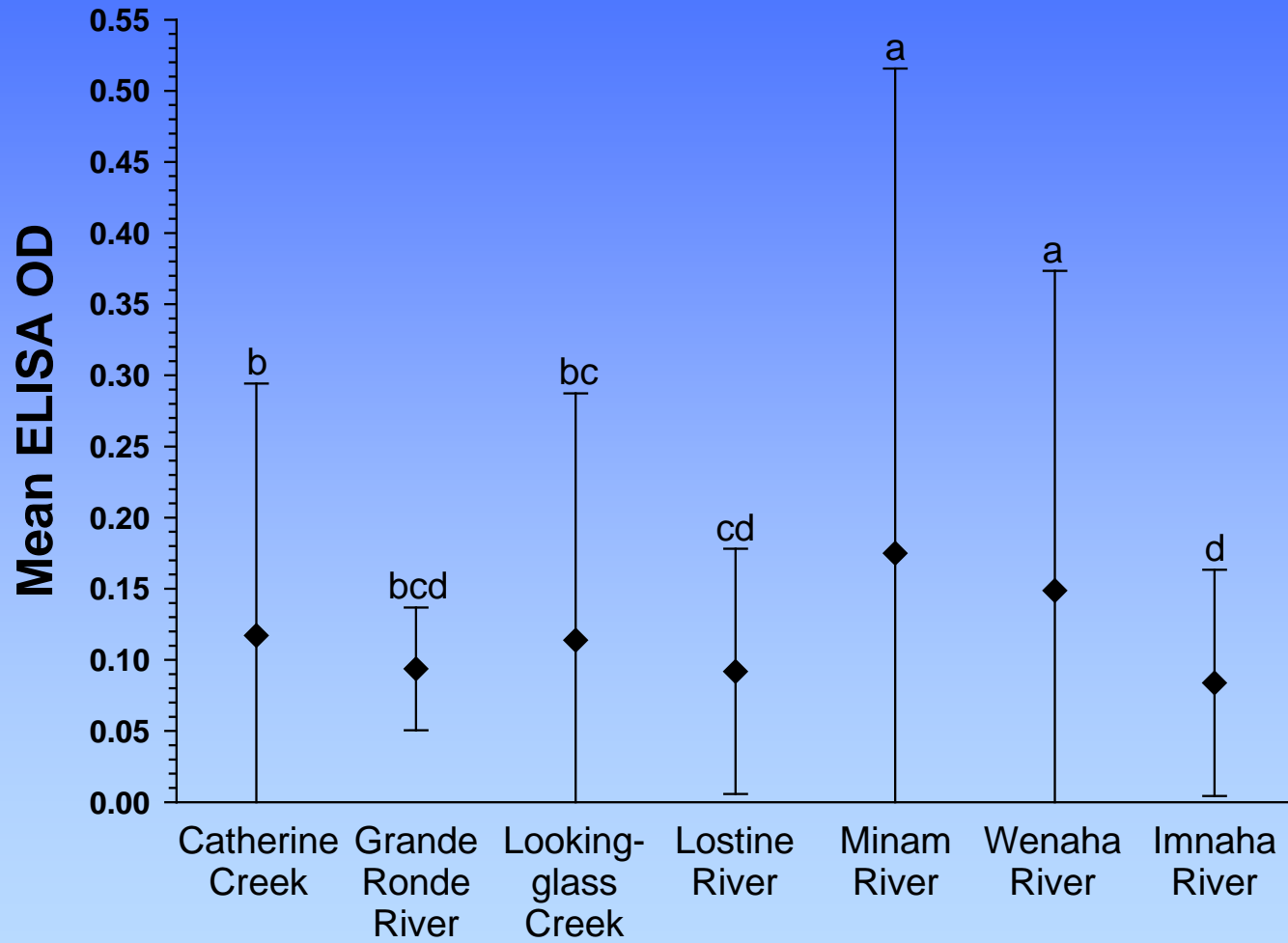


O'Connor, G. and T. L. Hoffnagle. 2007. Use of ELISA to monitor bacterial kidney disease in naturally spawning Chinook salmon. *Diseases Of Aquatic Organisms* 77:137-142.

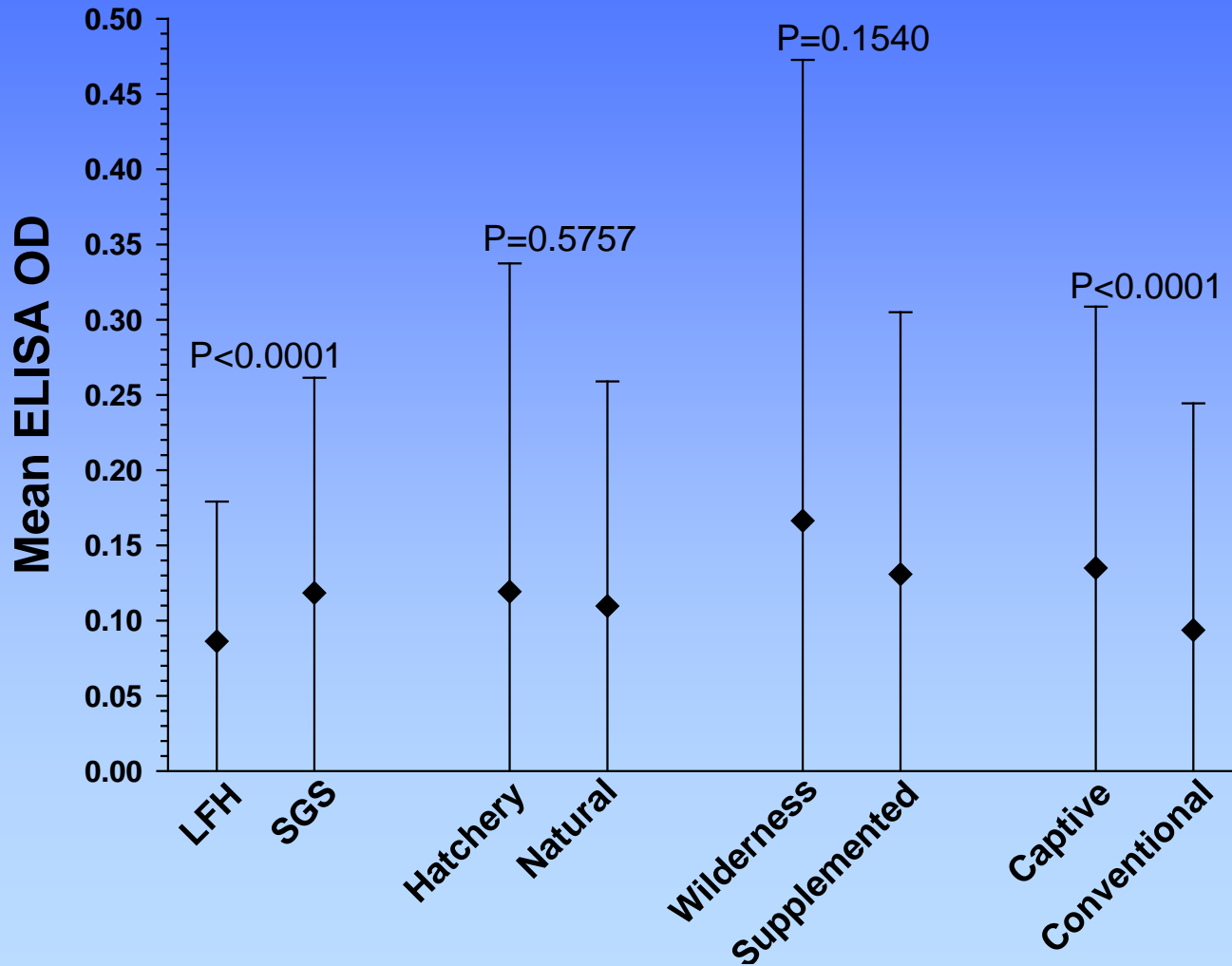
Hatchery vs. Natural Adults



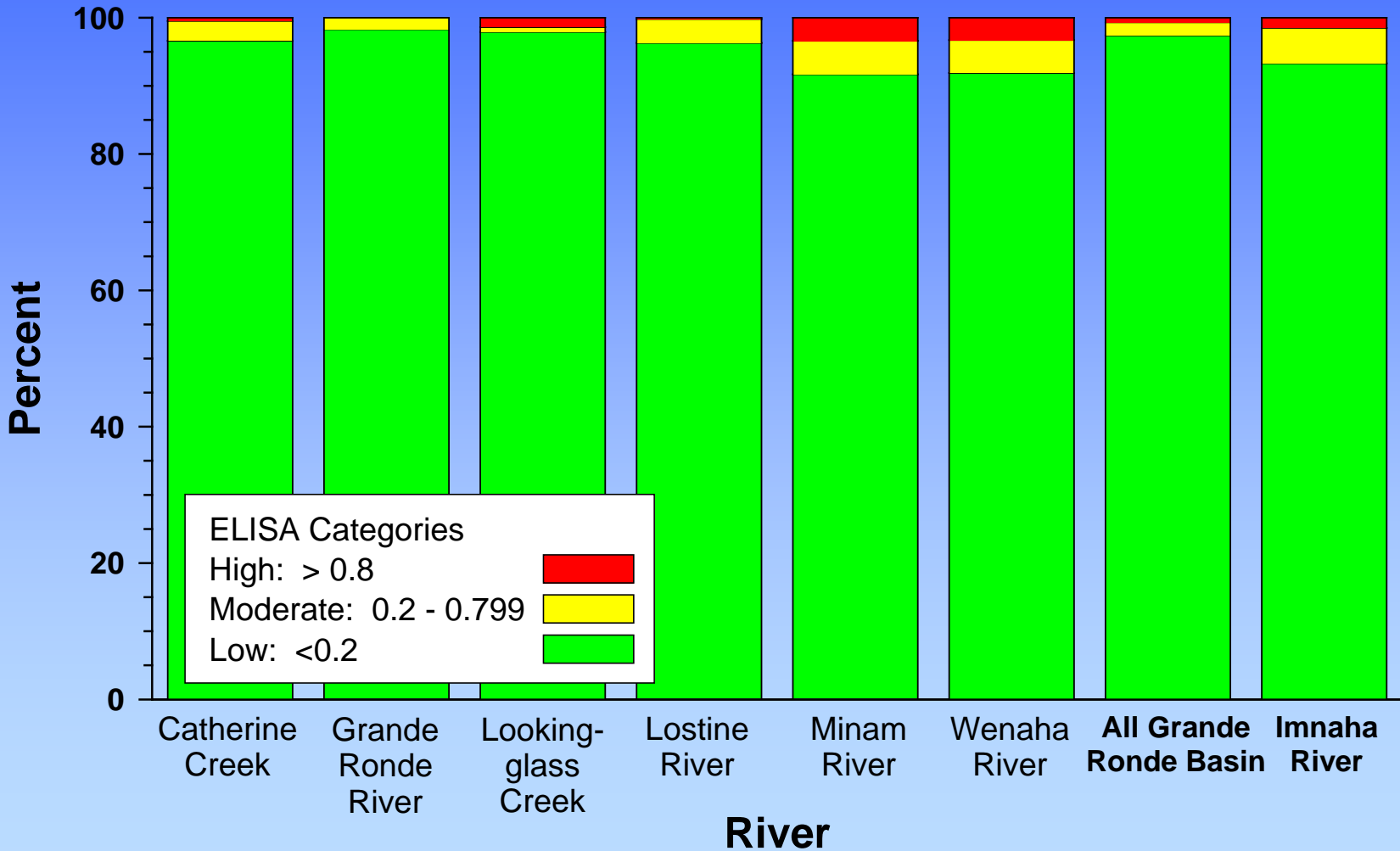
Mean ELISA OD, 2004-2008



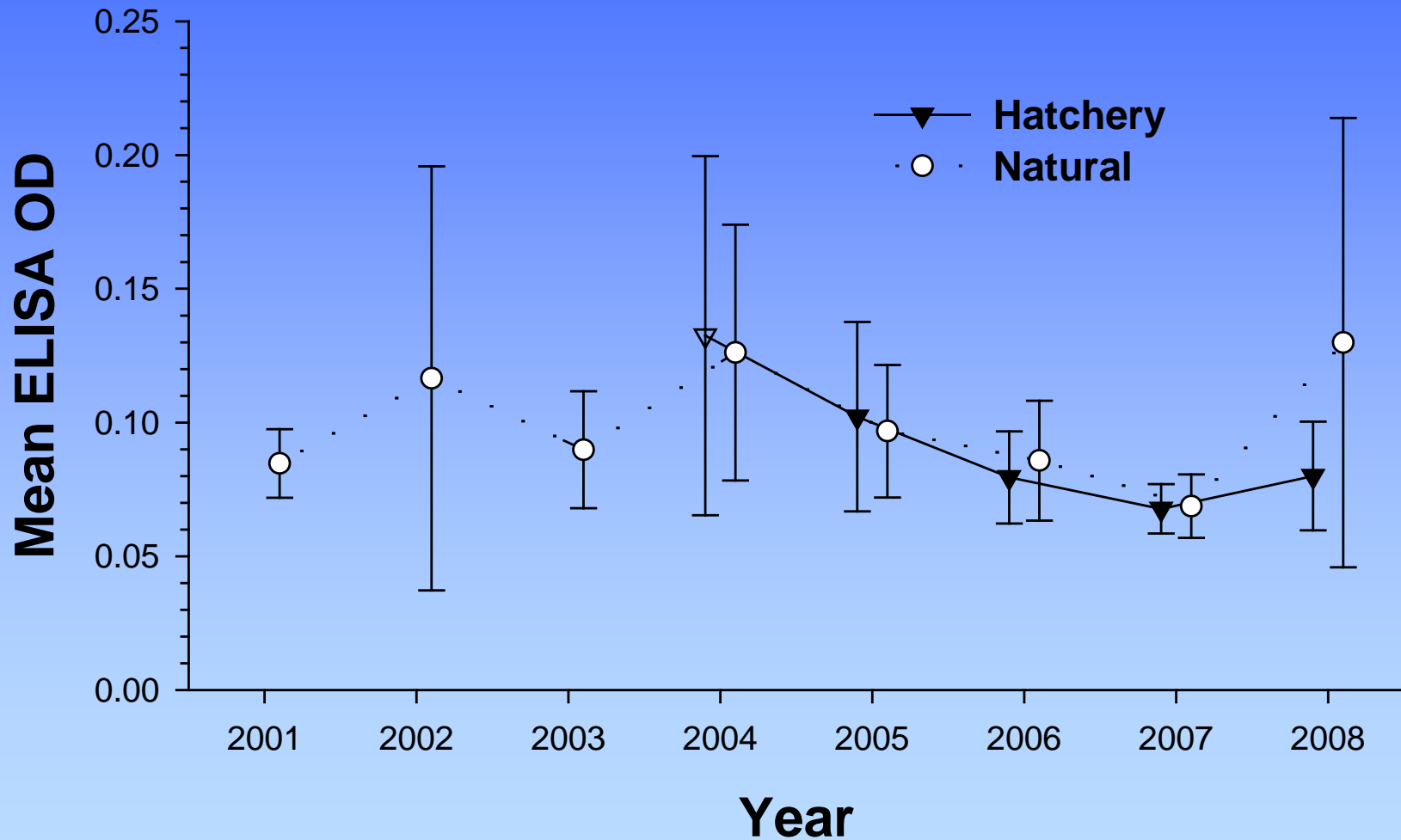
Mean ELISA OD Comparisons



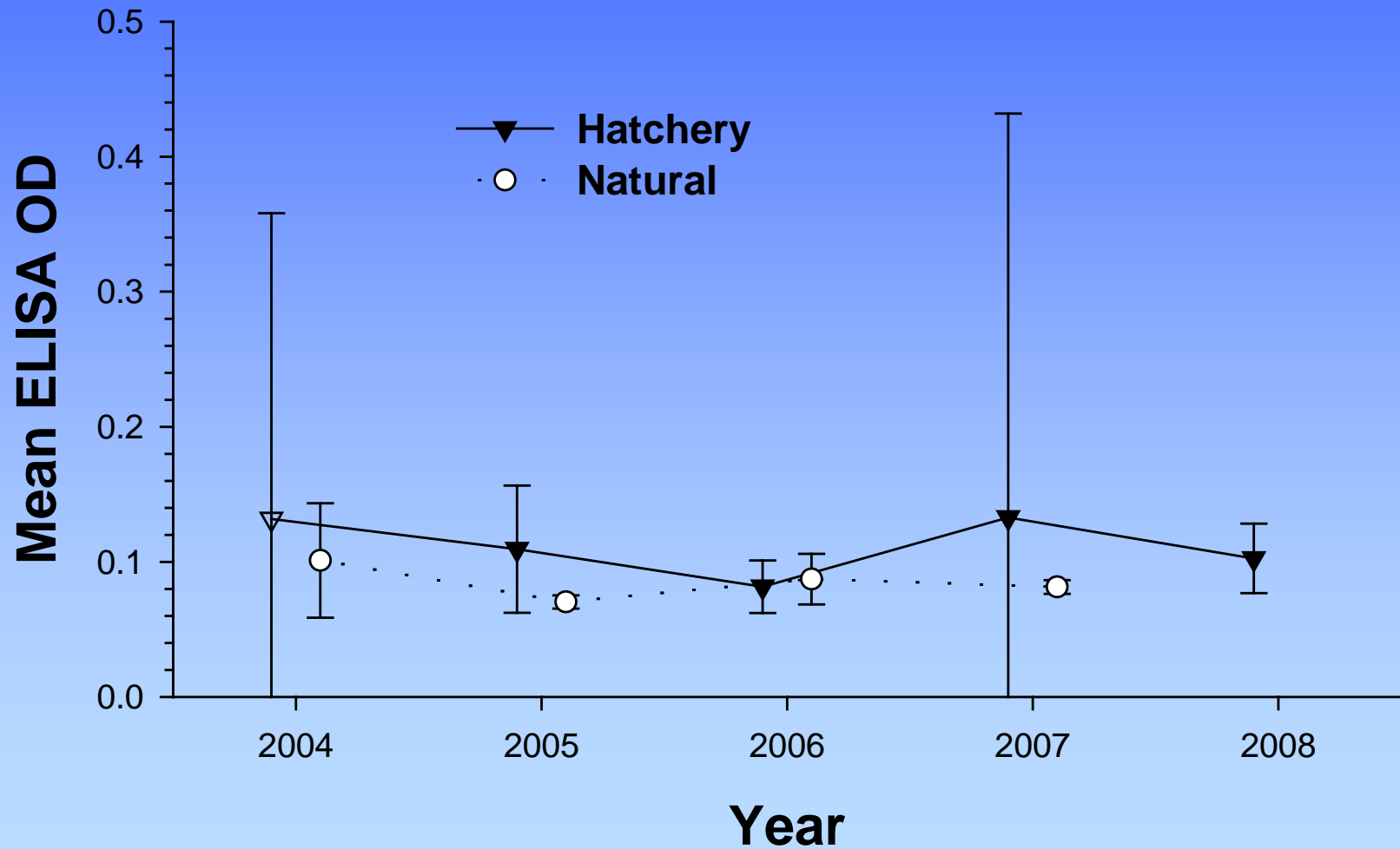
ELISA OD Categories



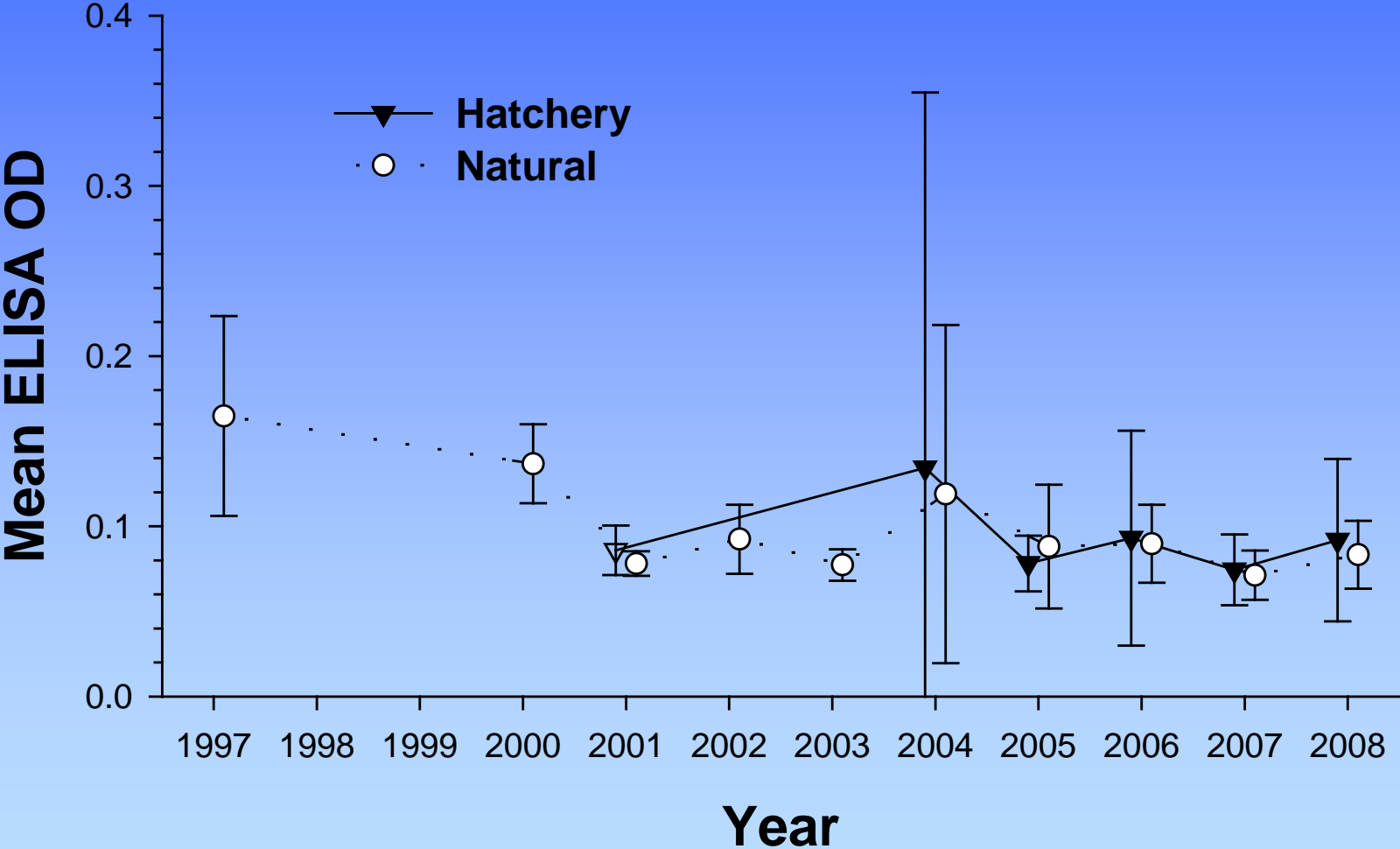
Grande Ronde River



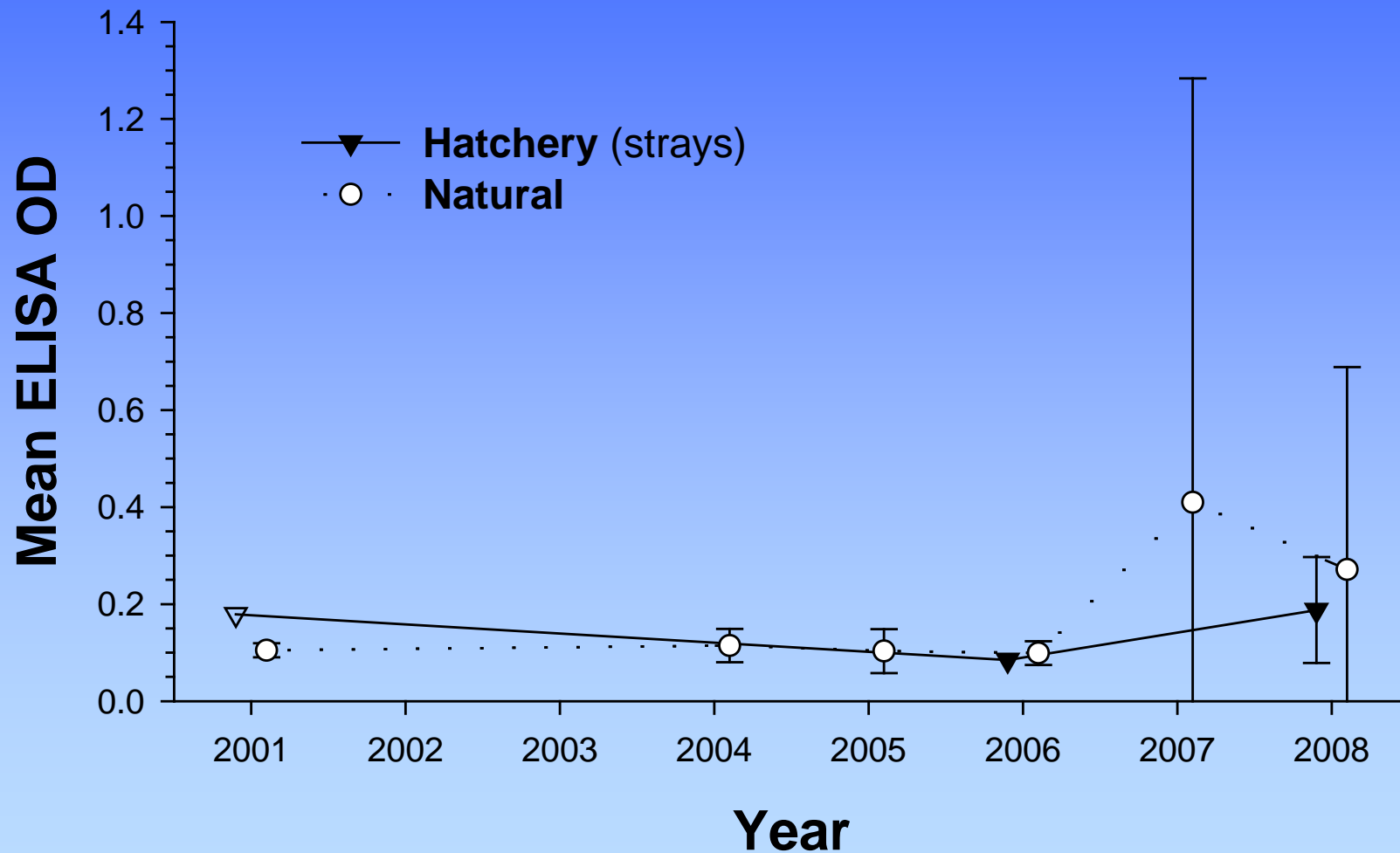
Lookingglass Creek



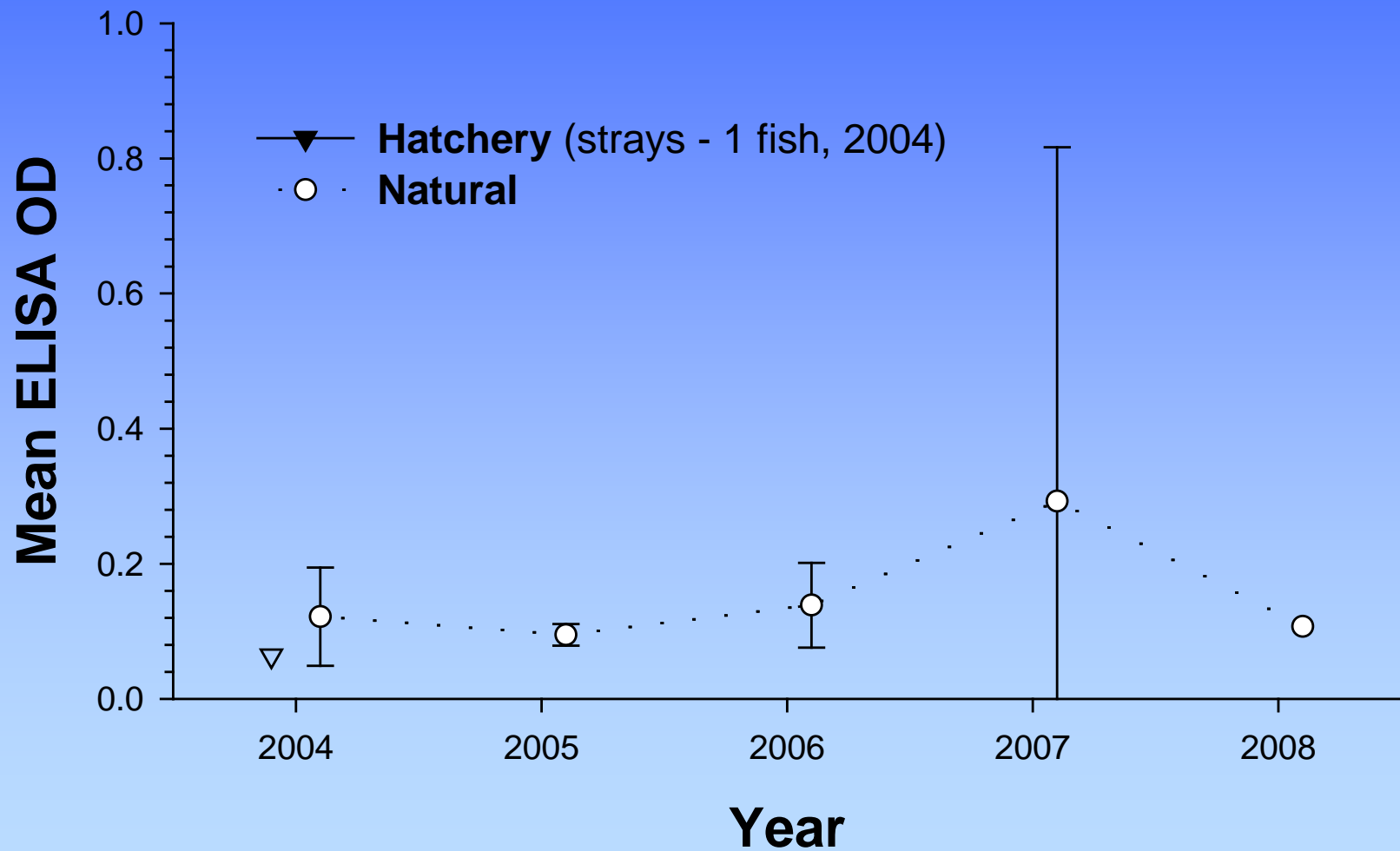
Lostine River



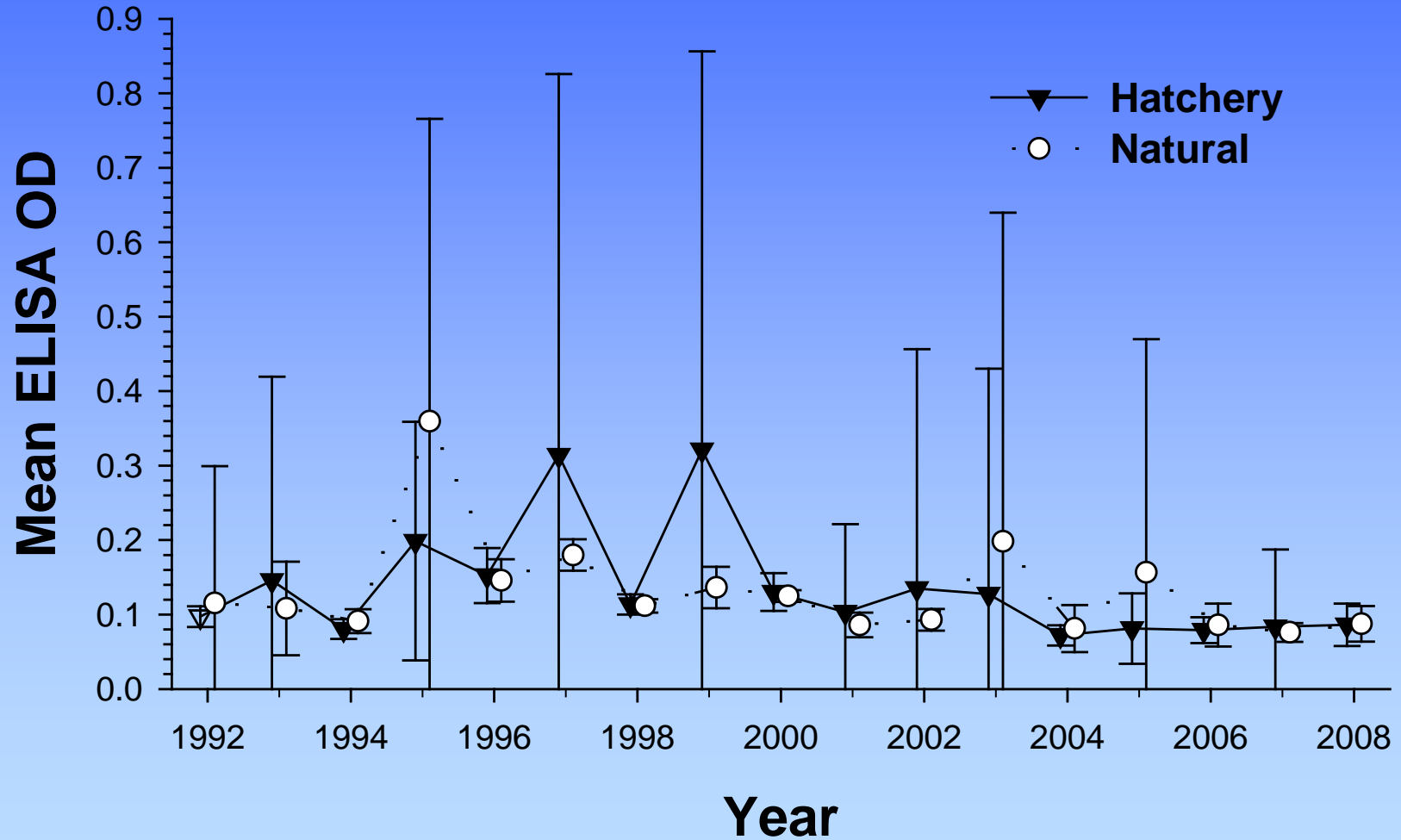
Minam River



Wenaha River



Imnaha River



Conclusions

- BKD is not prevalent in northeast Oregon Chinook salmon
- ELISA can be run on kidneys collected from intact carcasses on spawning ground surveys
- Naturally spawning salmon had higher ELISA OD levels than those spawned in the hatchery
 - However, comparisons between hatchery and SGS samples are confounded by the use of antibiotics in the hatchery
- No difference in ELISA ODs between hatchery vs. natural salmon
- Supplemented streams may have less BKD than wilderness streams.
- No trends in BKD prevalence

Acknowledgements

- ODFW La Grande Fish Health Lab
- Spawning ground surveyors from ODFW, CTUIR, NPT, USFWS and USFS
- Lower Snake River Compensation Plan

