Non-lethal methods used to detect *Renibacterium salmoninarum* (causing Bacterial Kidney Disease) in Brook Trout

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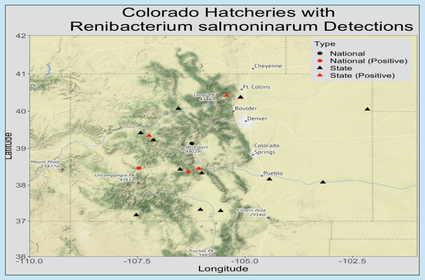
BACKGROUND

- *Renibacterium salmoninarum* is the pathogen that causes bacterial kidney disease in salmonids[3]
  - Can cause high mortality
  - Detection restricts stocking fish from infected hatcheries with a positive status
  - 6 positive hatcheries in Colorado since 2015

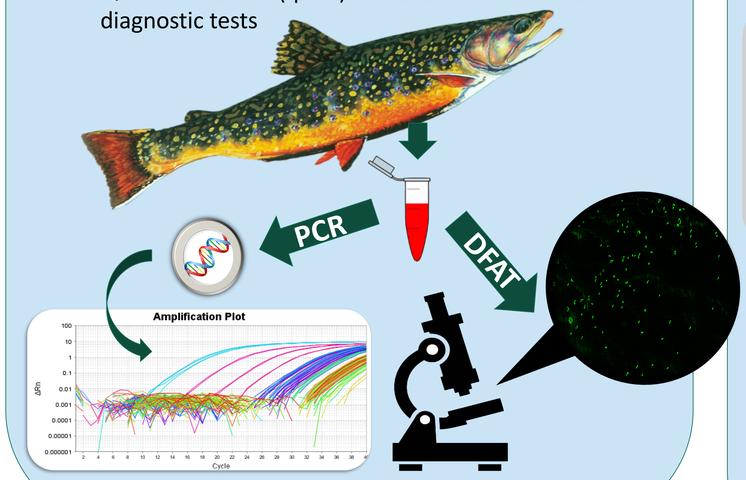


- Current methods to detect *R. salmoninarum* requires sacrificing fish to collect kidney tissue.

- Goal: To assess non-lethal methods for detection of *R. salmoninarum,* thereby preventing unnecessary mortality of hatchery and wild broodstocks for testing.

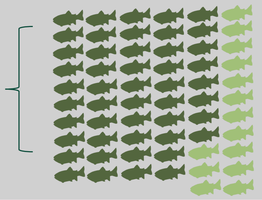
METHODS

- 72 Brook Trout (*Salvelinus fontinalis*) were sampled from CPW Pitkin Brood Unit, in 2017
- Mucus, buccal, and anal swabs were collected from each fish
- Kidney tissue was collected by standard methods from each fish[1,2,3]
- Direct fluorescent antibody test (DFAT) was used for kidney tissue diagnostic tests
- Quantitative PCR (qPCR) was used for non-lethal diagnostic tests



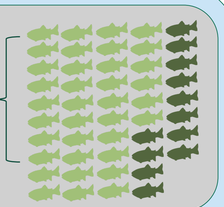
RESULTS

76% test positive by **lethal methods**

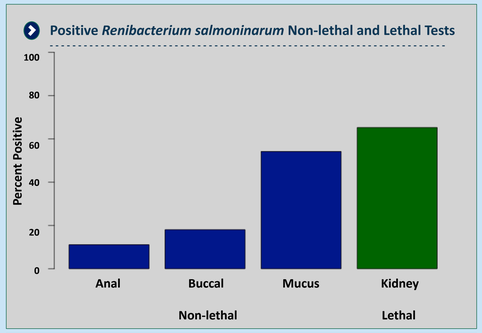


An additional **24%** test positive by **non-lethal methods**

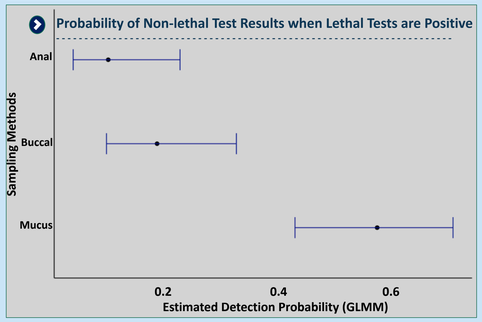
75% of fish positive by lethal methods also test positive by **non-lethal methods**



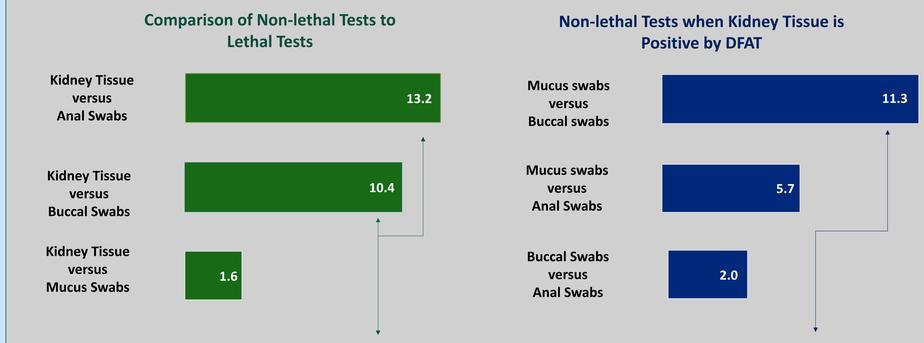
Standard kidney tissue tests represent the best method to test for the presence of *R. salmoninarum*, but the use of mucus swabs also indicate the bacteria is present in a high proportion of positive cases.



Mucus swabs have the highest estimated detection probability among non-lethal sampling methods, when kidney tissues test positive for *R. salmoninarum.*



BROOK TROUT TESTED FOR *RENIBACTERIUM SALMONINARUM* BY MUCUS SWABS AND KIDNEY TISSUES HAVE GREATER ODDS OF DETECTION



Kidneys have 13.2x or 10.4x greater odds for detecting *R. salmoninarum* than anal and buccal swabs, indicating that these non-lethal methods are not effective

Mucus swabs have 11.3x greater odds for detecting *R. salmoninarum* when kidney tissues test positive by DFAT.

DISCUSSION

- Our study offers a valuable first step in providing a relatively sensitive, non-lethal sampling method to detect *Renibacterium salmoninarum.*
- Our study also shows a strong relationship between mucus swabs and standard lethal sampling methods using kidney tissue.
- Further studies are needed to determine if positive non-lethal detections indicate infections or environmental contamination on the exterior of the fish.

CONCLUSION

- **Non-lethal tests show promise in detecting *Renibacterium salmoninarum* and may be an alternative testing method when lethal testing is not possible due to the value of the fish being tested.**
- **Further research needs to be conducted on the status of the bacteria on the exterior of the fish to determine if a non-lethal test may be indicative of infection or environmental contamination.**

Literature Cited:
1. Pascho, R. J., Elliot, D. G., and Chase, D. M. (2002). Comparison of traditional and molecular methods for detection of *Renibacterium salmoninarum*. *In:* C. O. Cunningham (ed), Molecular diagnosis of salmonid diseases. Kluwer Academic Publishers, Dordrecht, The Netherlands. 157–209.
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3. AFS-FHS (American Fisheries Society-Fish Health Section) (2016). Suggested procedures for the detection and identification of certain finfish and shellfish pathogens, 2016 ed.

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