



EASTERN
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Analyzing the Diet Composition of Lake Trout in Upper Priest Lake, Idaho

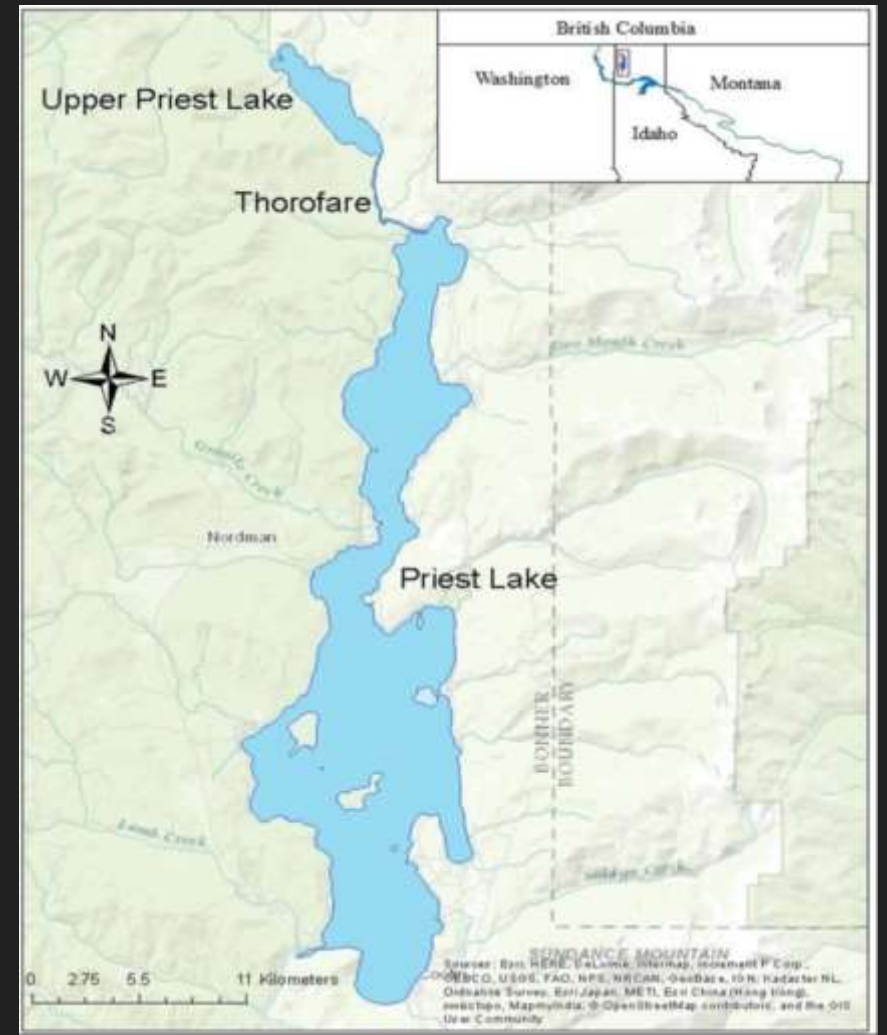
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4/11/19

AFS 2019 Meeting

Priest Lake

- Located in Northern Idaho
- Consists of upper and lower sections
- These sections are connected via a channel
 - This channel is called the thorofare

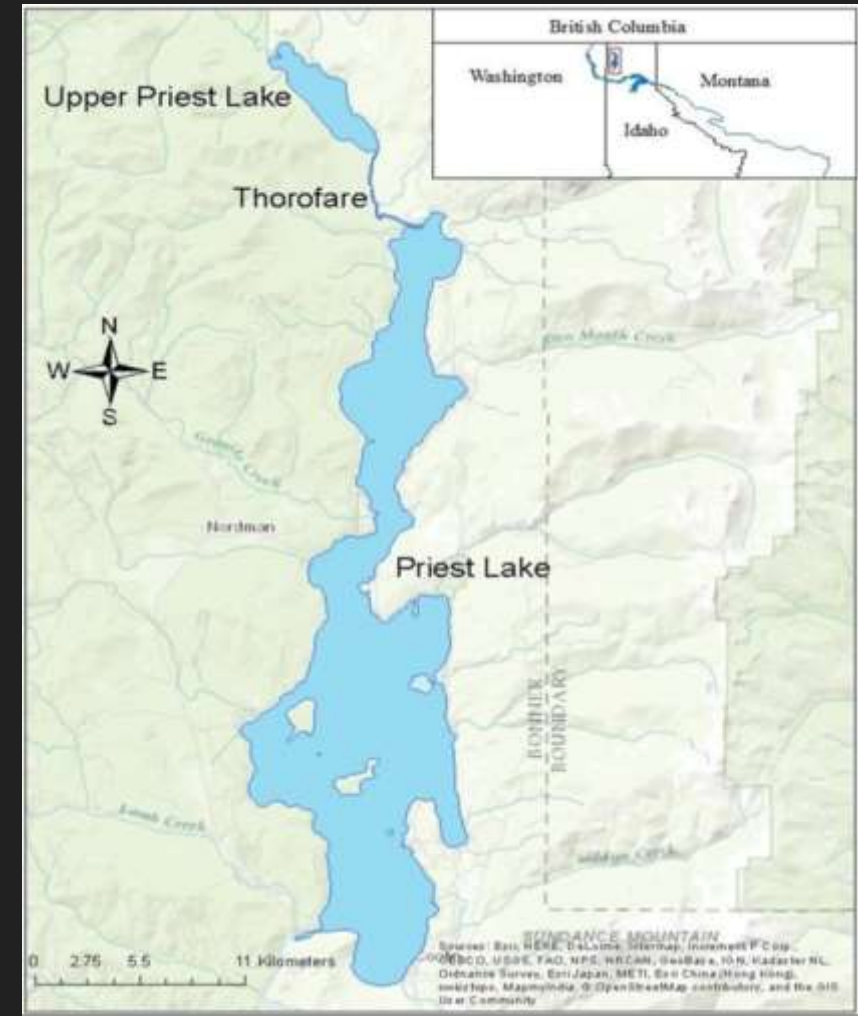


Bull Trout (*Salvelinus confluentus*)

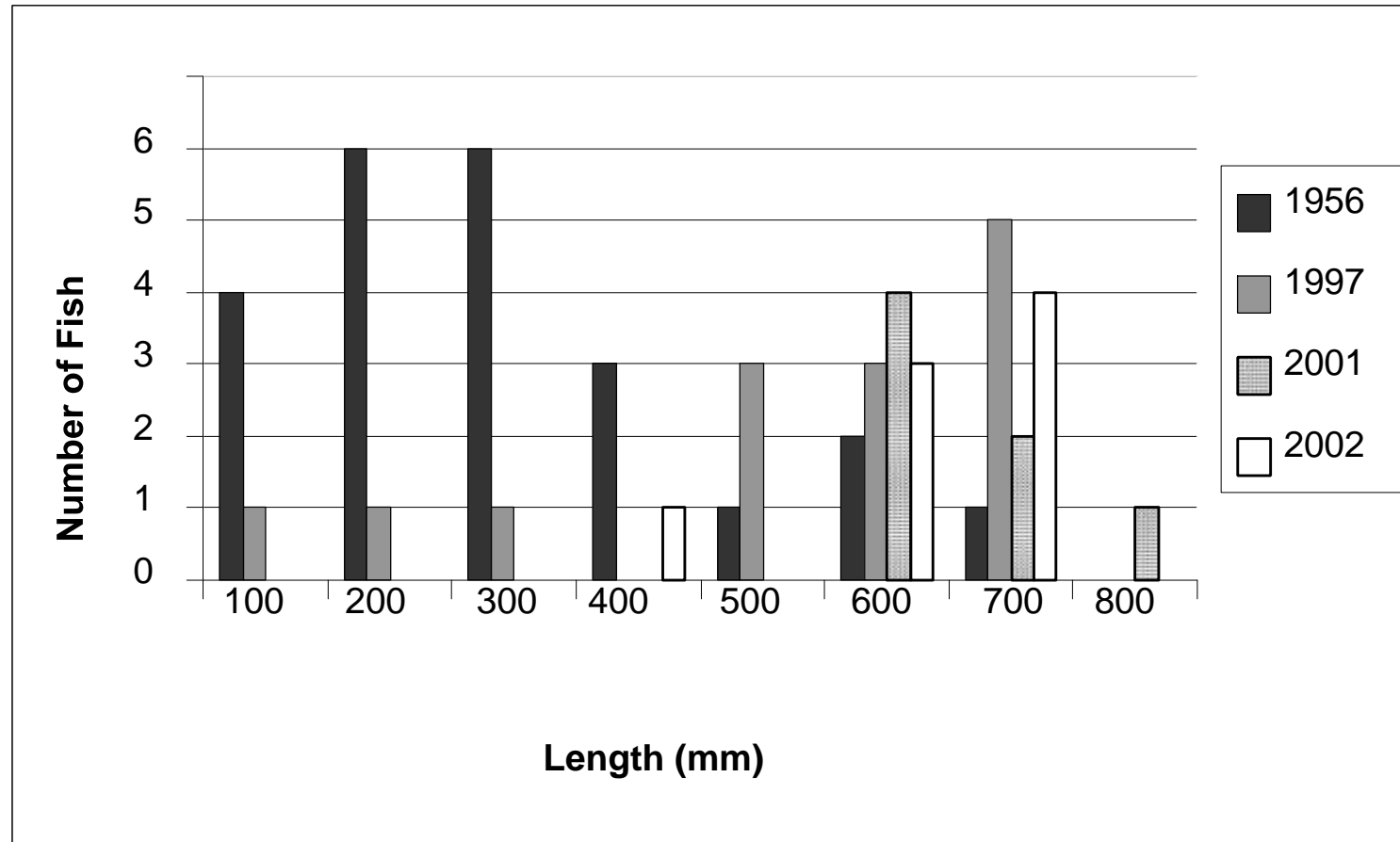
- Native to the northwest
- Listed as threatened under the ESA
- Native to Priest Lake ID
- Have seen a major decline
- In 1978 Historic records show annual catch of up to 1800 Bull Trout
- Current population is estimated at several hundred

Bull Trout distribution in Priest Lake

- Found primarily in Upper Priest Lake
- Also found in Upper Priest River
- Can sometimes be found in Priest Lake
- Utilize Upper Priest River as spawning habitat



IDFG Bull Trout Sampling (2002)



Non-Native Species

- A species introduced geographically beyond its native range and possibly established via human activity
- Can be Problematic for native species in a system if competition occurs
- Native Species have not experience selection pressures for competition
- Can be hard for native species to adapt to competition
- Create trophic cascades
- Directly predate on native species

Lake Trout (*Salvelinus namaycush*)

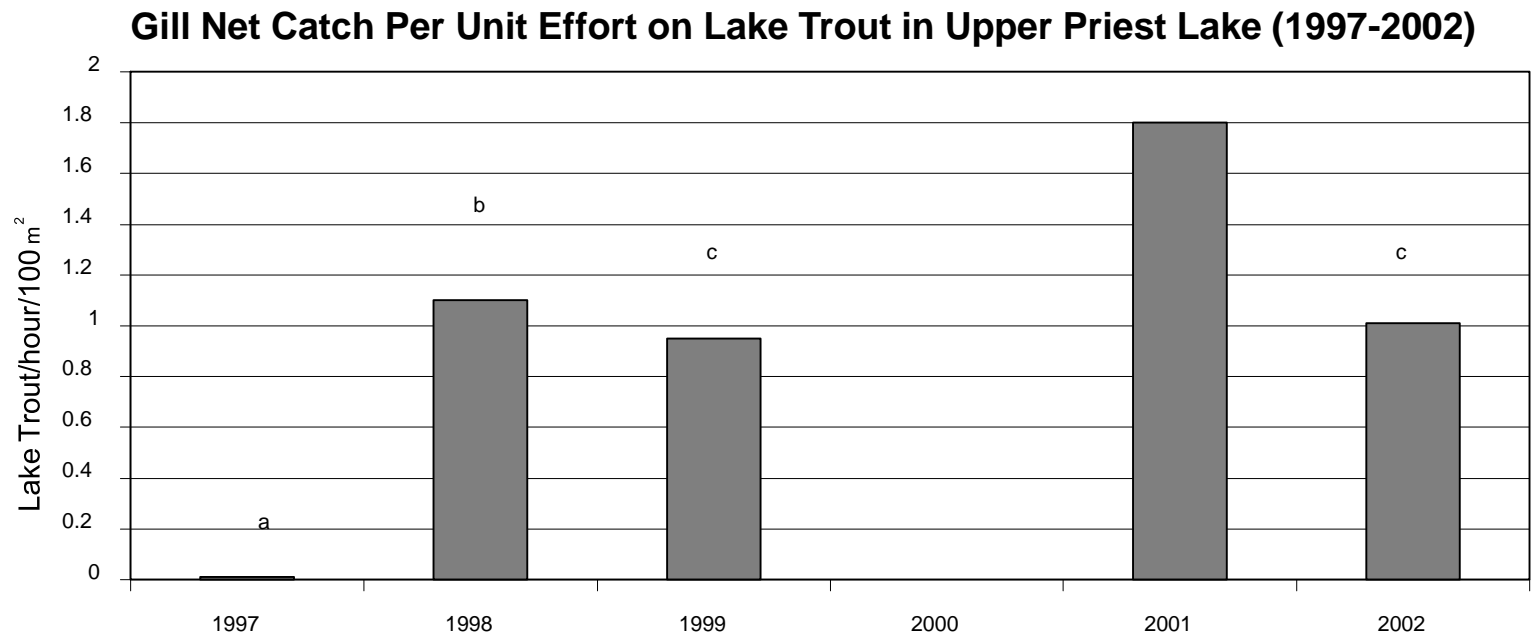
- Found largely throughout North America
- Have been used in the past to establish recreational fisheries
- Have been found to have major impacts on native species within these fisheries



Lake Trout in Priest Lake

- Lake Trout are the major non-native species in Priest Lake
- Introduced to Priest Lake in 1925 by to establish recreational fishery
- Took several attempts to establish
- Population greatly increased after introduction of Mysis shrimp (*Mysida diluviana*)

Lake Trout Gill Netting Densities

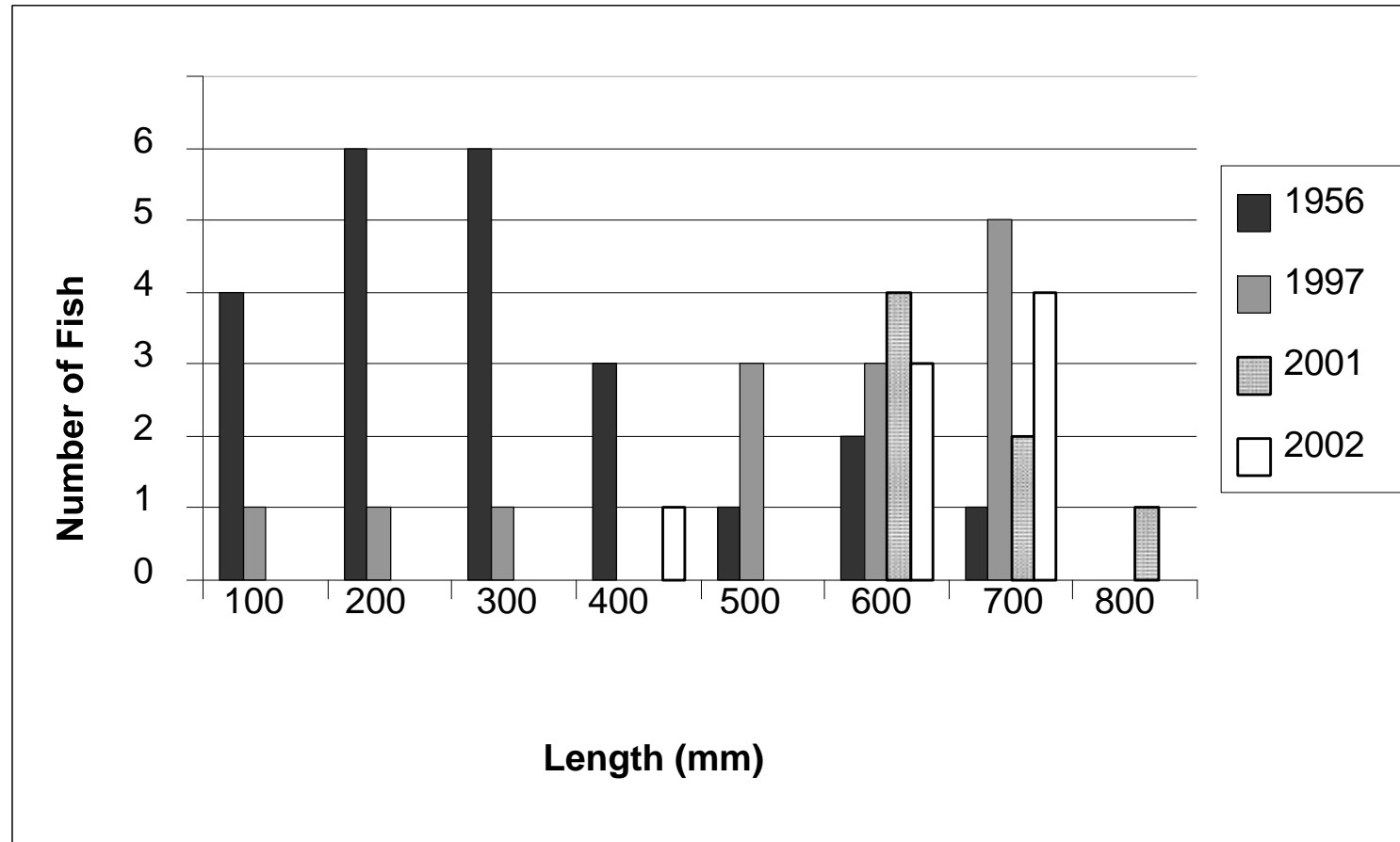


^a During 1997, 150 X 6 ft gill nets were used and gill net placement occurred throughout the lake.

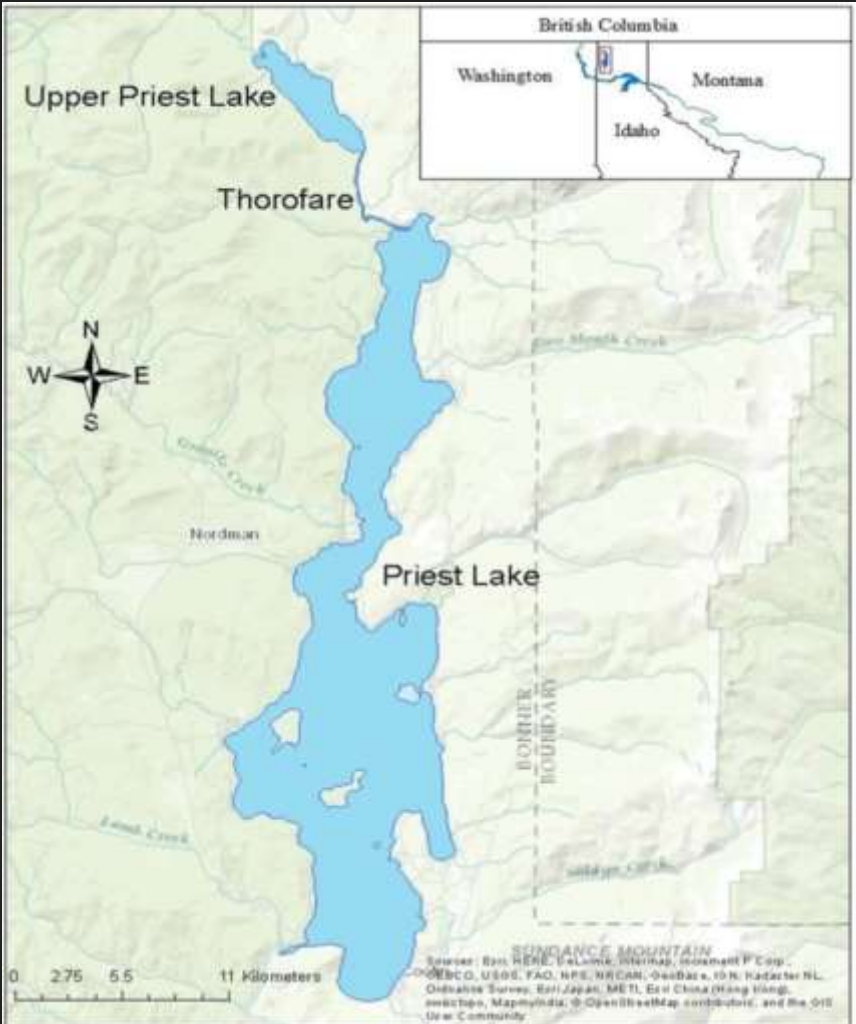
^b During 1998, 150 X 6 ft gill nets were used for approximately 25% of the effort and remaining effort used 300 X 8 ft nets. Net placement occurred throughout the lake.

^c During 1999, 2001 and 2002, all gill nets were 300 x 8 ft and gill net placement was standardized in areas of higher catch rates.

IDFG Bull Trout Sampling (2002)



Lake Trout Distribution in Priest Lake



Lake Trout affects on Bull Trout

- As Lake Trout population increased Bull Trout Population decreased
- It is possible this is due to be competition with Bull Trout over resources
- Also Possible direct predation on Bull Trout

Objective

- Identify any possible predation of Lake Trout on Bull Trout

Lake Trout diet analysis

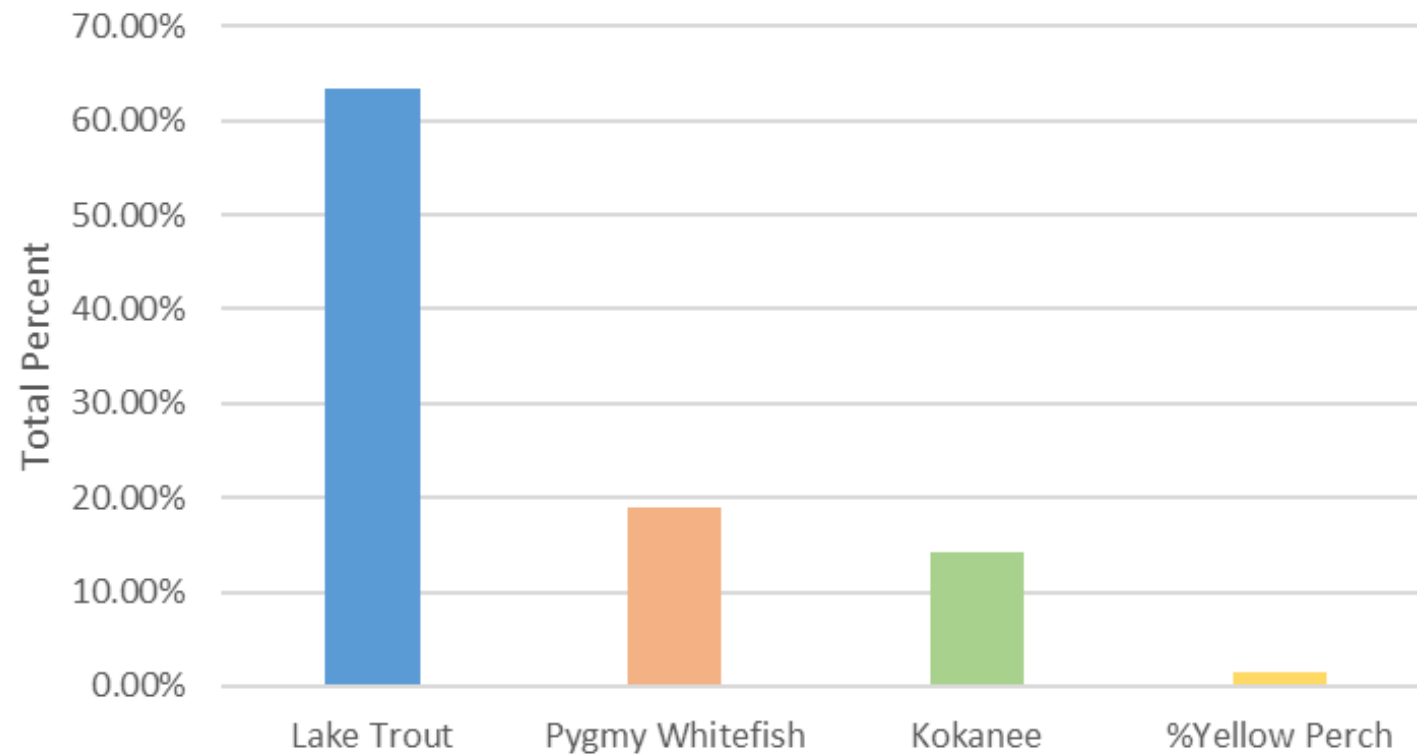
- Previously we analyzed the stomach contents of Lake Trout caught by IDFG gill nets
- By weight 42% of all stomach content was unidentified fish tissue
- Only species identified were Kokanee salmon (*Oncorhynchus nerka*) (17% by weight)

Methods

- Extract DNA from 63 tissue samples
- Use species specific “barcode” primers to amplify mitochondrial DNA
- Used Cytochrome oxidase 1 primers
 - 652 bp amplicon
 - Identifies tissue to species specific level
- Analyze sequence for tissue species
- Used BLAST to identify species from sequence
 - 84% was the lowest percent match

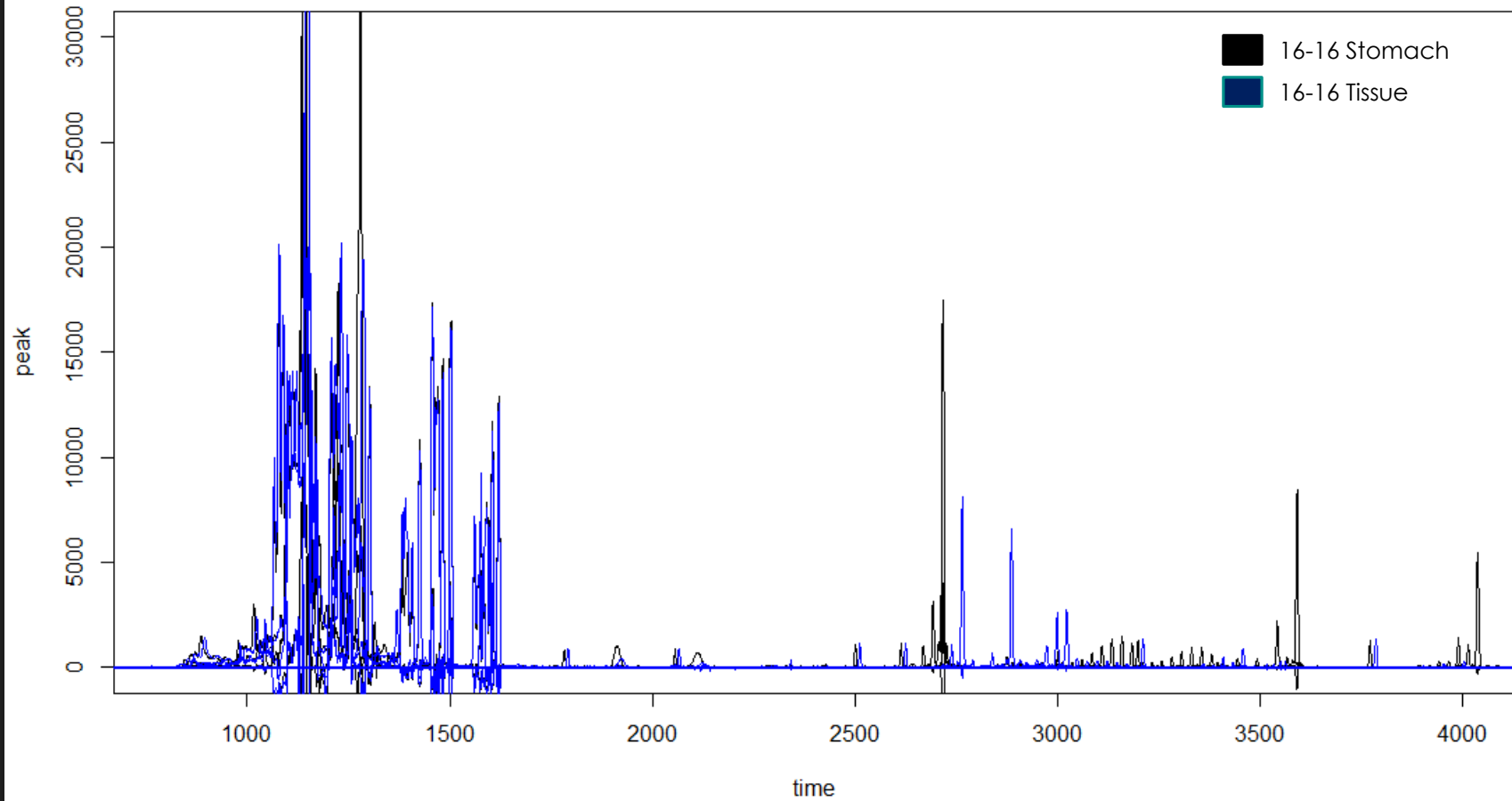
Results

Lake Trout Diet Composition in Upper Priest Lake



Microsatellite results

16-16 predator/prey comparison

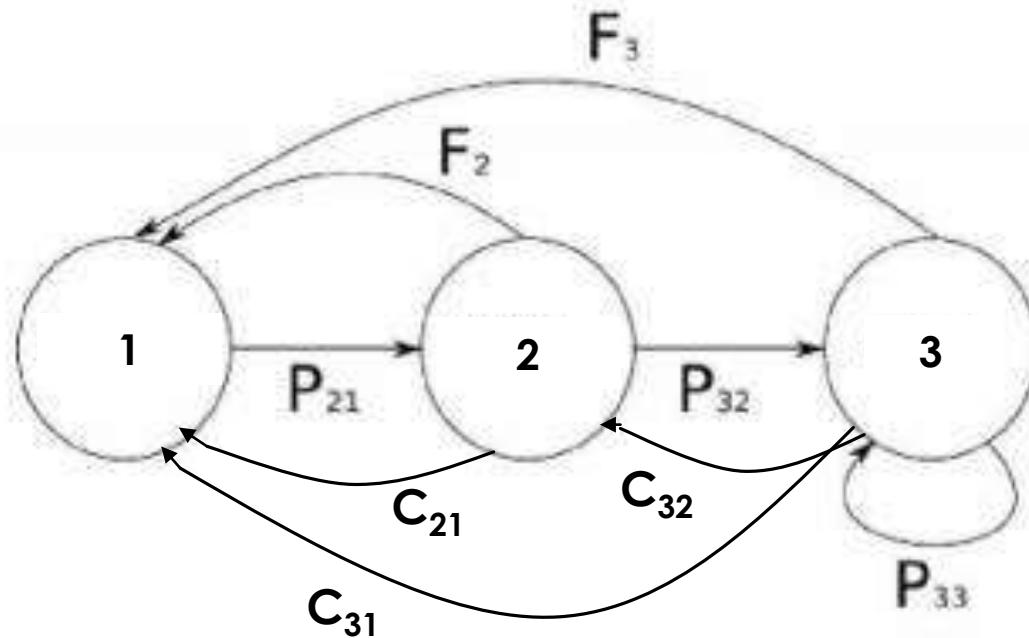


Microsatellite results

- Microsatellites show that stomach tissue is genetically different from digested tissue samples

Future Directions: Models

- Could use these data to develop modified Leslie Matrix model
 - Could include adult predation on juveniles
- Could be used to make predictions about management techniques



Future Directions: Management Implications

- Current gill netting targets adult Lake Trout
- May be beneficial to target smaller size classes with gill nets
- If juvenile mortality increased higher than other age class fecundity the population could crash in Upper Priest Lake

Questions?

