

Are the use of index reaches an effective method of monitoring juvenile bull trout abundance and adult spawning?
Preliminary results from two streams within the Confederated Tribes of Warm Springs Reservation, Oregon.

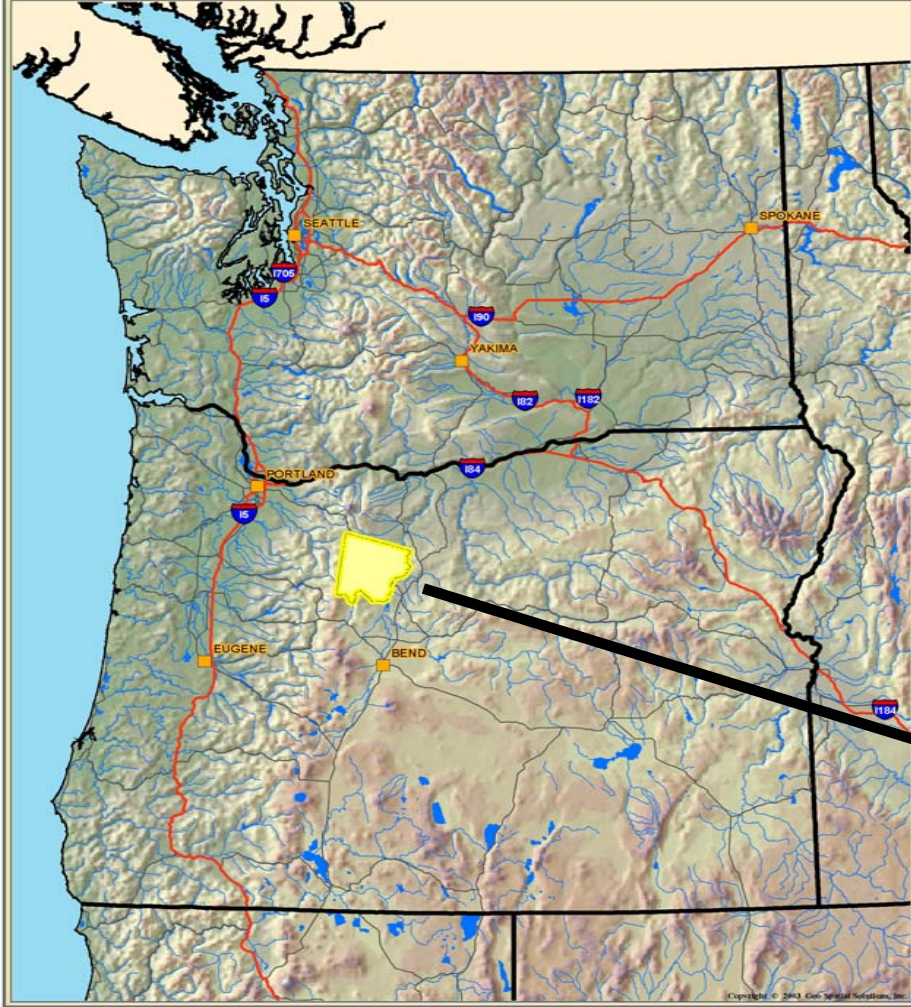


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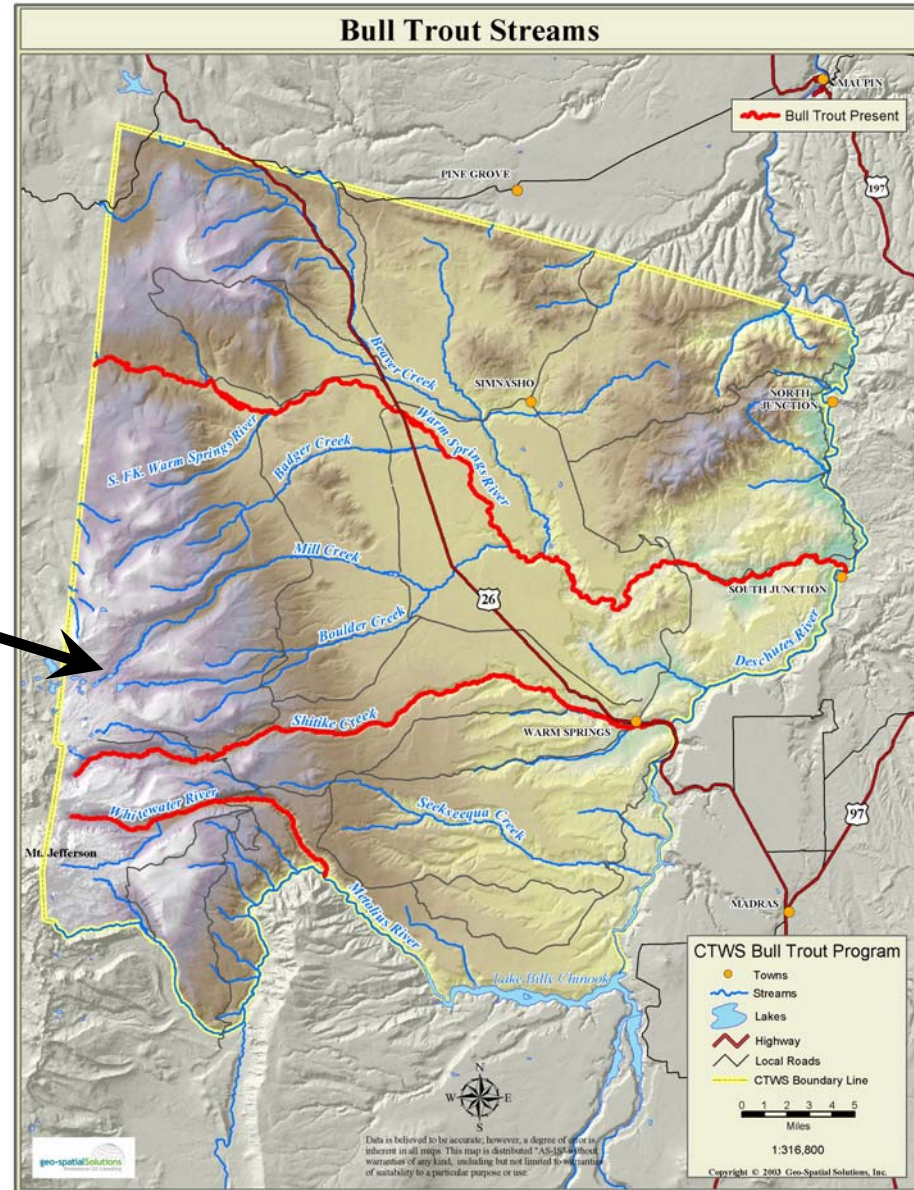
Confederated Tribes of Warm Springs Reservation, Oregon



Confederated Tribes of the Warm Springs Reservation



Bull Trout Streams



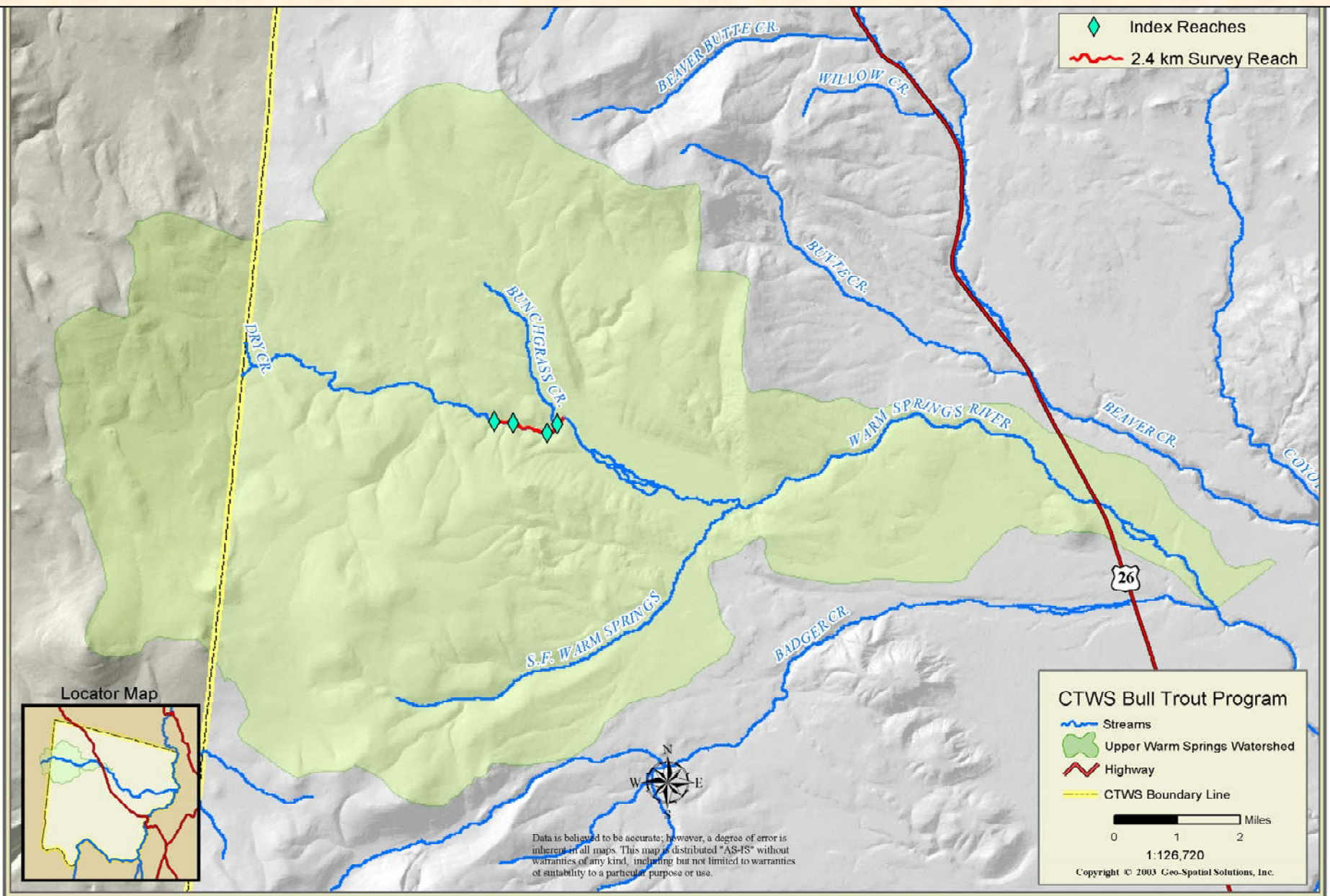
Project Area

Juvenile Monitoring



Warm Springs River

Study Area



Objectives

Objective 1: Determine the relative abundance of juvenile bull trout and brook trout.

Objective 2: Determine habitat use by juvenile bull trout and brook trout.

Objective 3: Assess the utility of using "index" reaches for monitoring trends in juvenile bull trout and brook trout relative abundances.



Methods - Relative Abundance

- Night snorkeling
 - Mid-June through early July
 - 22:00-03:00

- Surveyed upstream
 - 2-3 divers



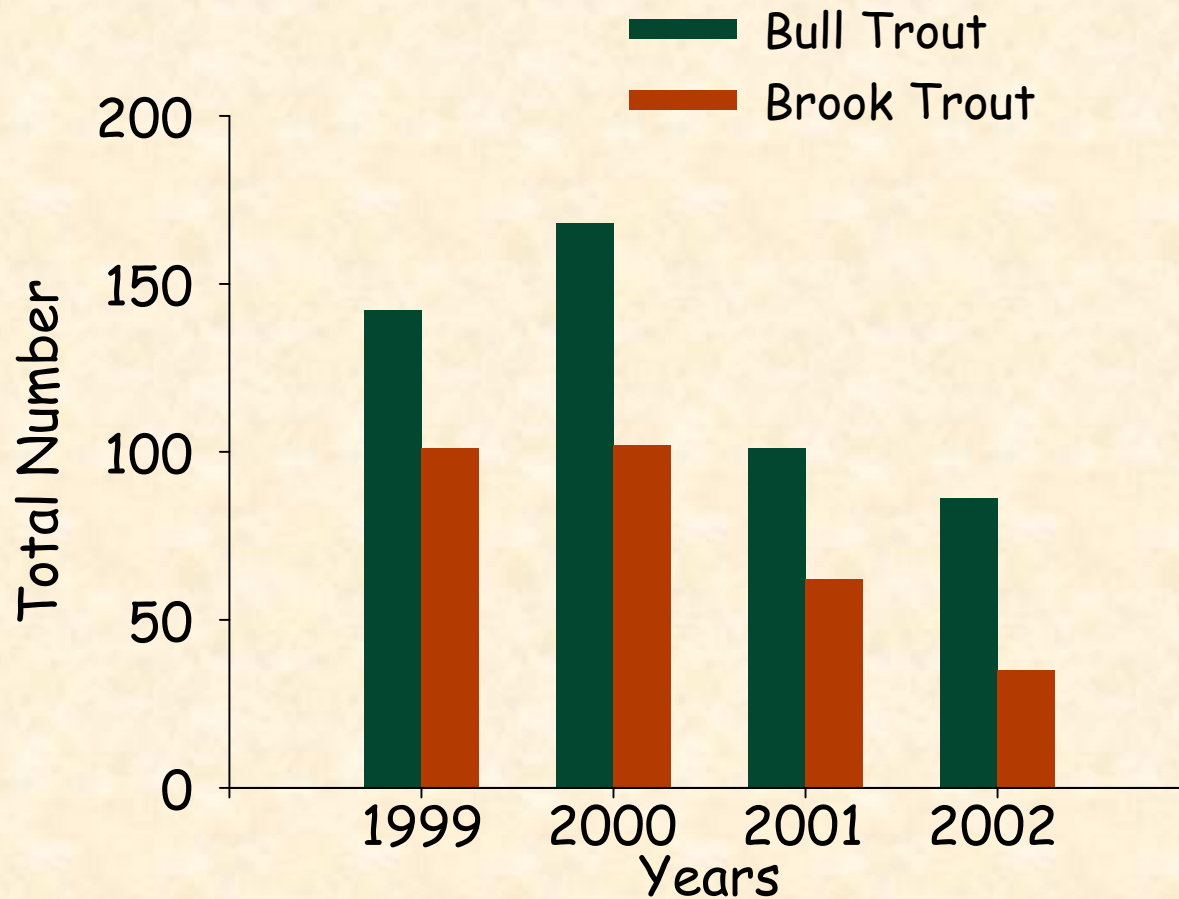
- Enumerate bull and brook trout
 - Estimated total length





Night Snorkeling

Total Number of Observed Fish



1999-2002	Mean	Range
Bull Trout	124	86-168
Brook Trout	75	35-102

Methods - Habitat Use

- Classified habitat
 - ODFW Aquatic Inventory Protocol



- Flagged all habitat units



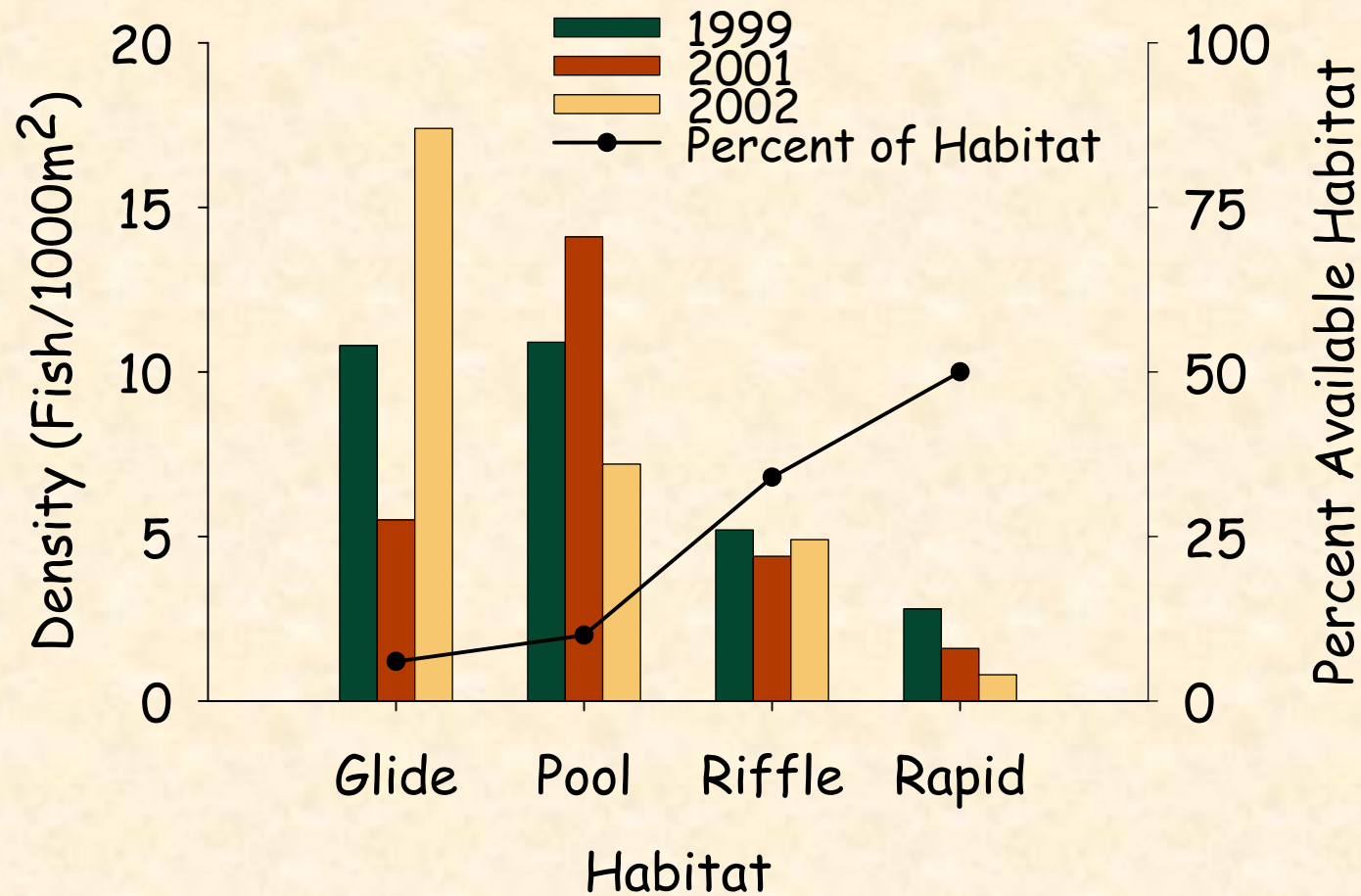
- Calculated surface area
 - Measured length and average bankful width



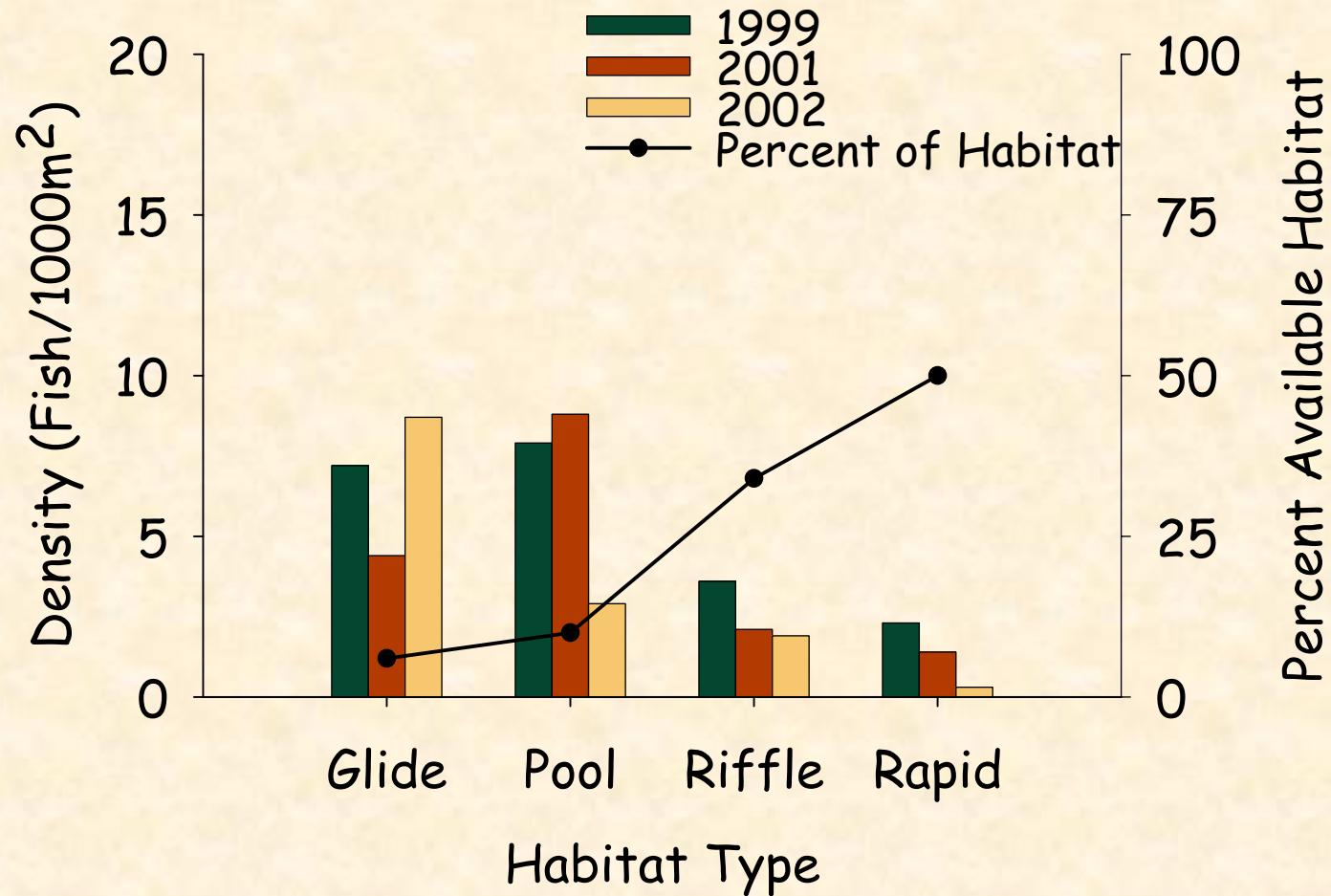


Warm Springs River

Bull Trout Density by Habitat Type



Brook Trout Density by Habitat Type



Methods - Assessing Index Reaches

- Divided 2.4 km study area into 4 index reaches
 - Randomly selected, ~100m long reaches
- Night snorkeling
 - Surveyed upstream
 - Enumerated bull and brook trout



Juvenile Bull Trout Monitoring Sites

Mean Length of Index Reaches 105 m
Range 89-109 m
17% of Study Area

◆ Index Reaches
~ 2.4 km Survey Reach



Data is believed to be accurate; however, a degree of error is inherent in all maps. This map is distributed "AS-IS" without warranties of any kind, including but not limited to warranties of suitability to a particular purpose or use.

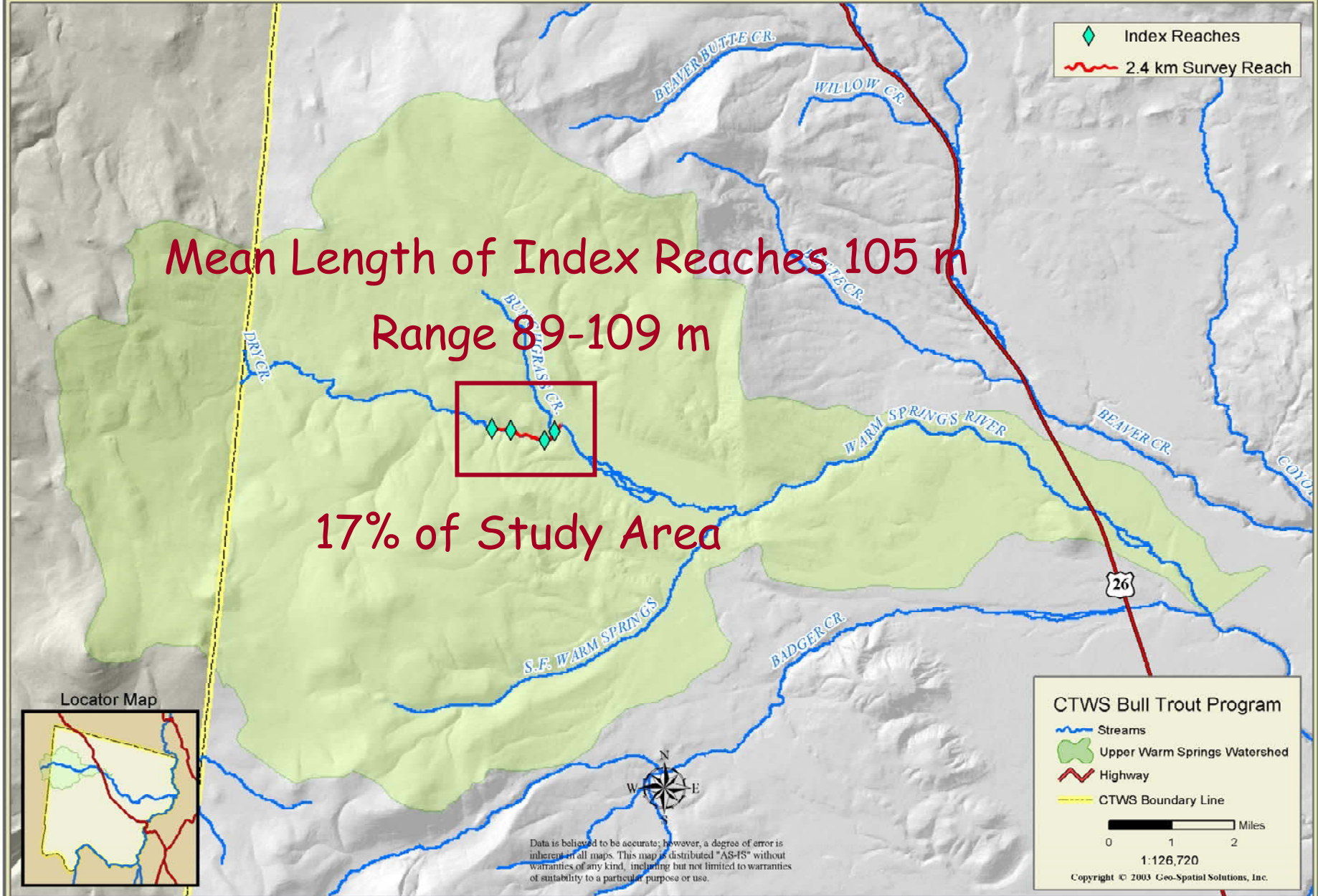
CTWS Bull Trout Program

- Streams
- Upper Warm Springs Watershed
- Highway
- CTWS Boundary Line

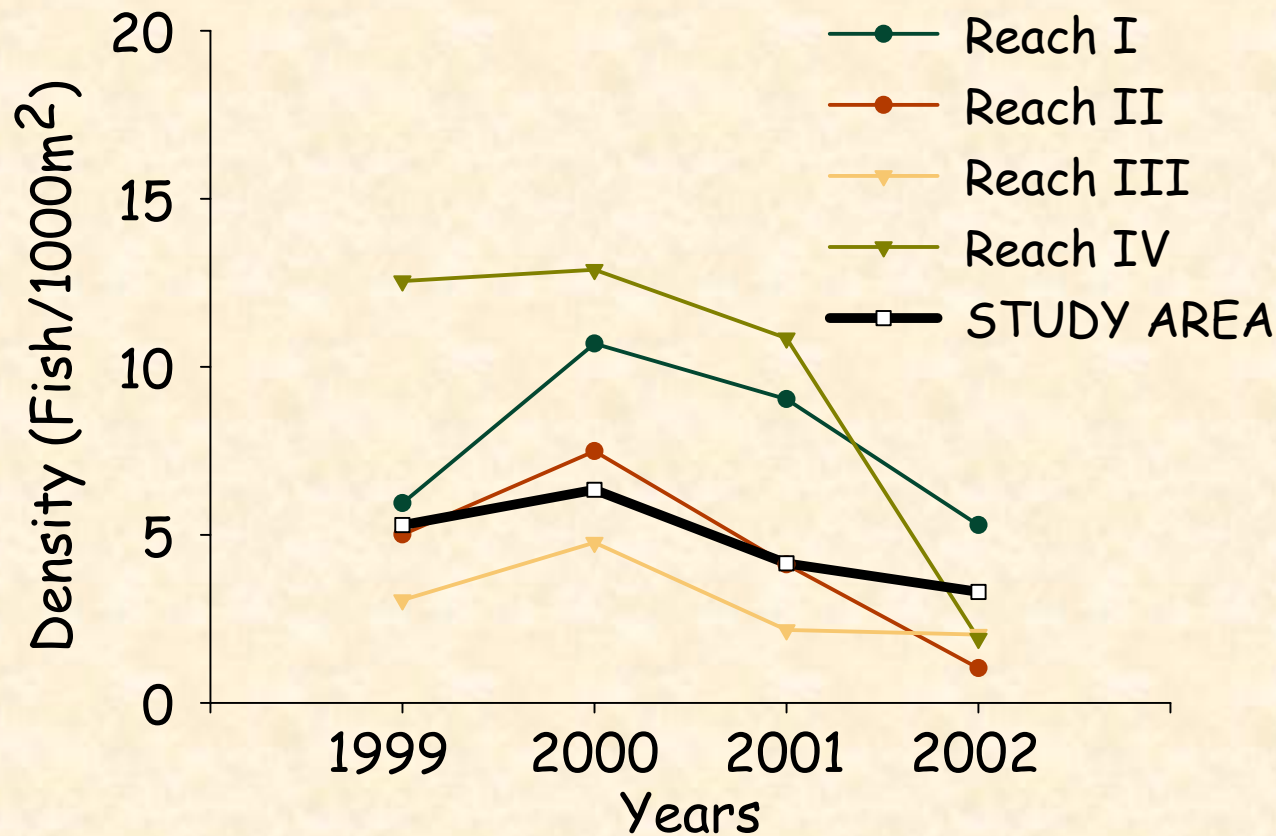
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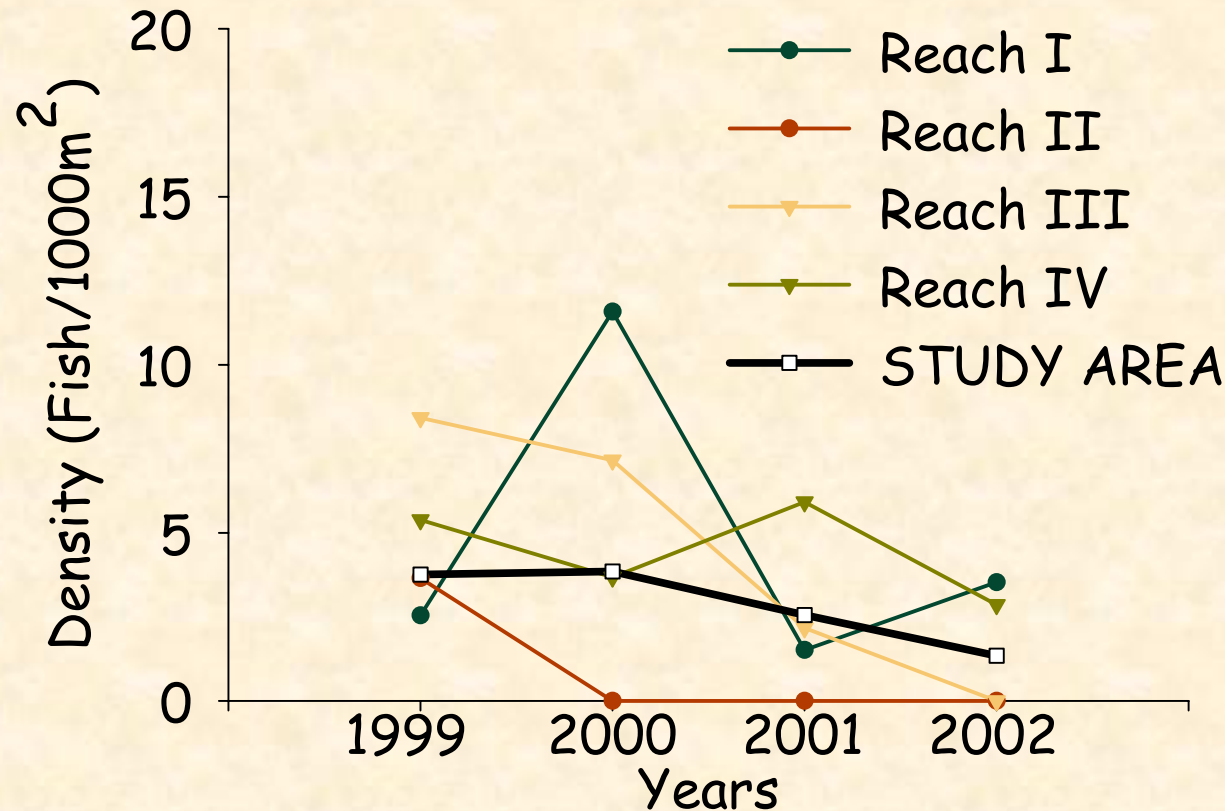
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Density of Bull Trout in Index Reaches

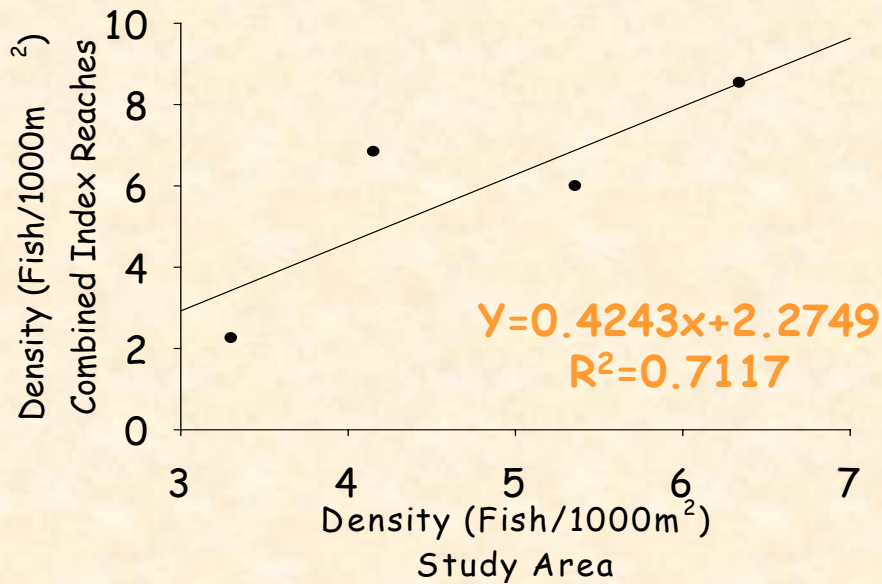


Density of Brook Trout in Index Reaches



Density Comparison

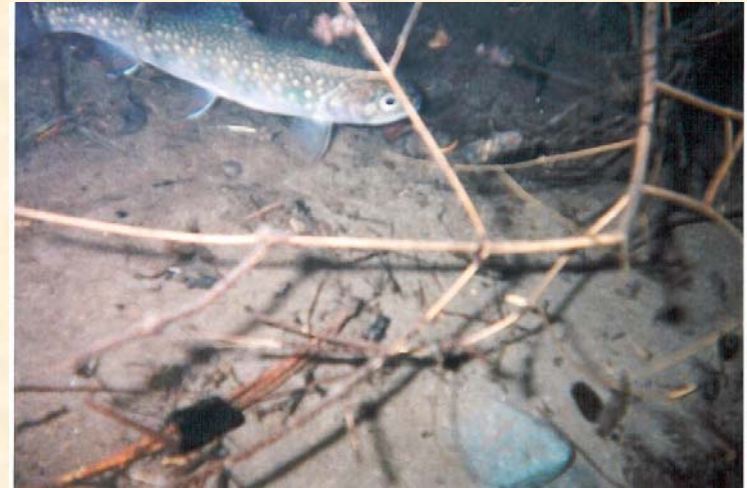
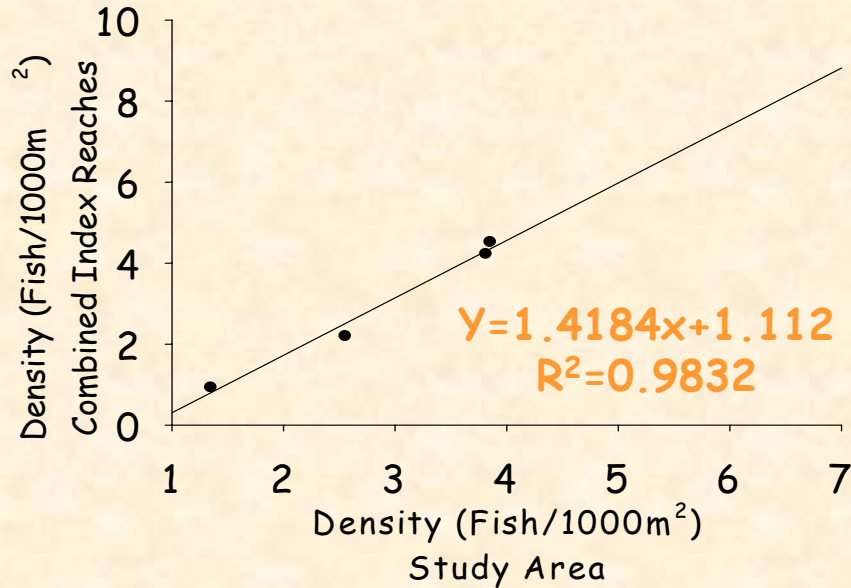
Bull Trout



Bull Trout: $\chi^2_{0.05,3}=2.93$ $0.025 < P < 0.05$ [$P=0.403$]

Density Comparisons

Brook Trout



Brook Trout: $\chi^2_{0.05,3}=0.33$ $0.025 < P < 0.05$ [$P=0.954$]

Summary

- Juvenile bull trout and brook trout present in low densities
- Juvenile bull trout and brook trout are found in the highest densities in pools and glides
- Each individual index reach is not representative of the total 2.4 Km study area

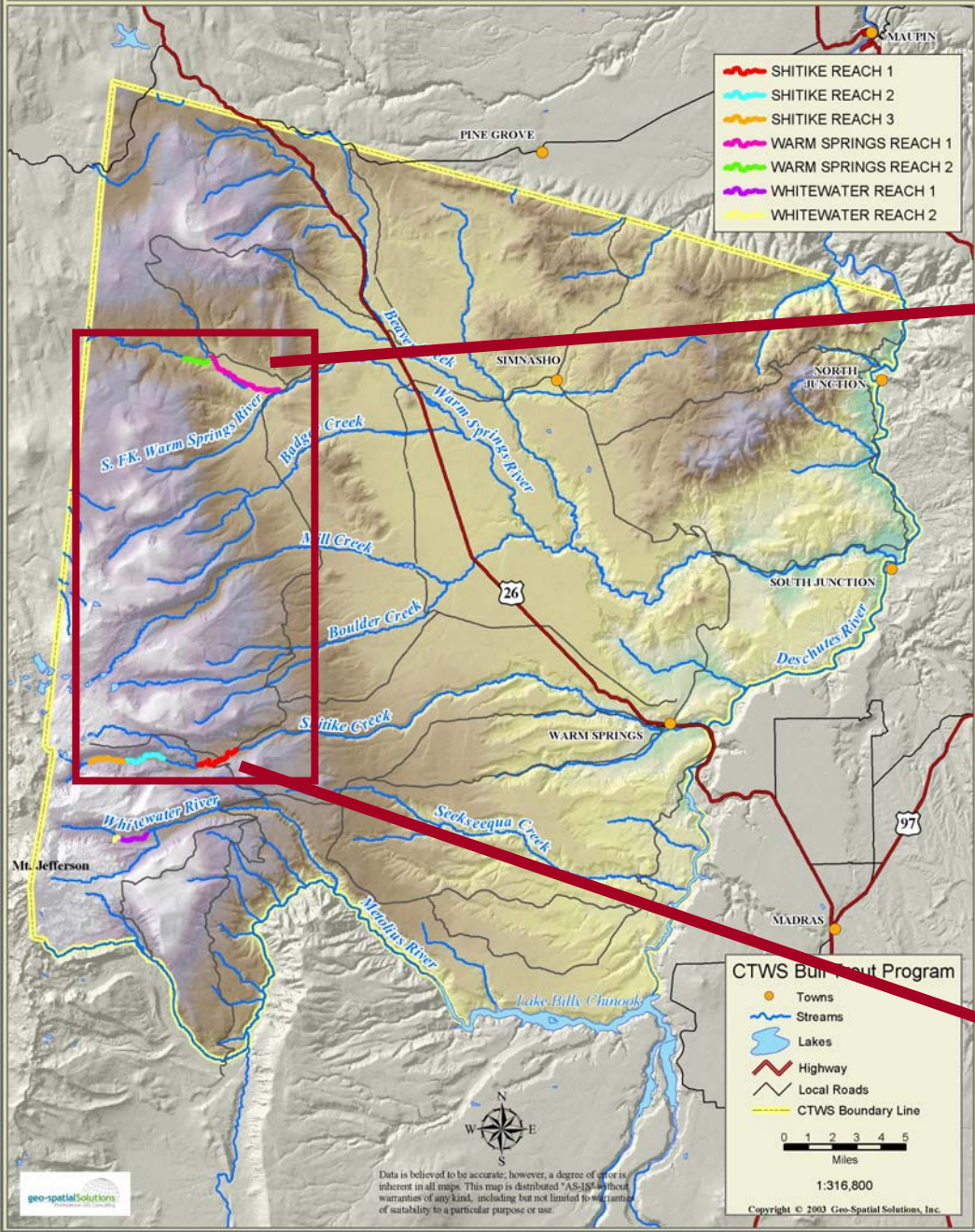


SPAWNING SURVEYS



Warm Springs River and Shitike Creek

Spawning Survey Reaches



Study Area



Objectives

Objective 1: Enumerate bull trout redds.

Objective 2: Determine if there are annual changes in spawning distribution.

Objective 3: Detect changes in timing of peak spawning.



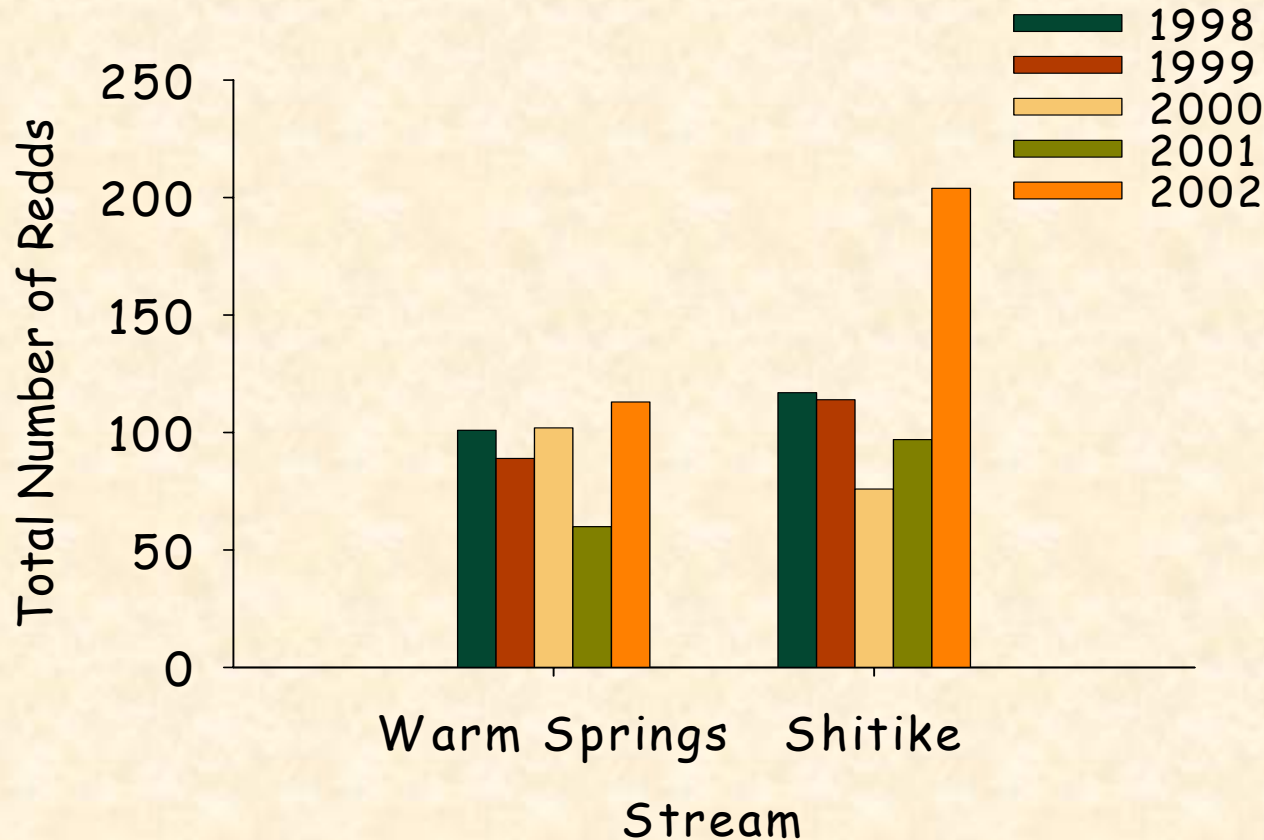
Suitable Spawning Habitat



METHODS

- Multiple-pass spawning ground surveys
- Surveys conducted on alternate weeks
 - Late August - October
 - 3-5 passes
- Surveyed downstream
- Recorded and Flagged all redds
 - Recorded presence of live fish and approximate total lengths

Number of Redds within the Study Area



1998-2002	Total	Mean	Range
Shitike	602	120.4	76-204
Warm Springs	465	93.0	60-113

The map shows a river network with several reaches highlighted in different colors. A red line runs north-south through the center. A yellow dashed line is on the left. A yellow dot is on the Whitewater River. A yellow circle is on the main river near WARM SPRINGS. A yellow rectangle is on the left side of the map.

Index Reach II (25%)
Index Reach I (75%)

Index Reach III (20%)
Index Reach II (35%)
Index Reach I (45%)

S. FK. Warm Springs River

Badger Creek

Warm Springs River

Mill Creek

Shitike Creek

WARM SPRINGS

Whitewater River

Seekseequa Cre

Redds Per Kilometer

Shitike Creek

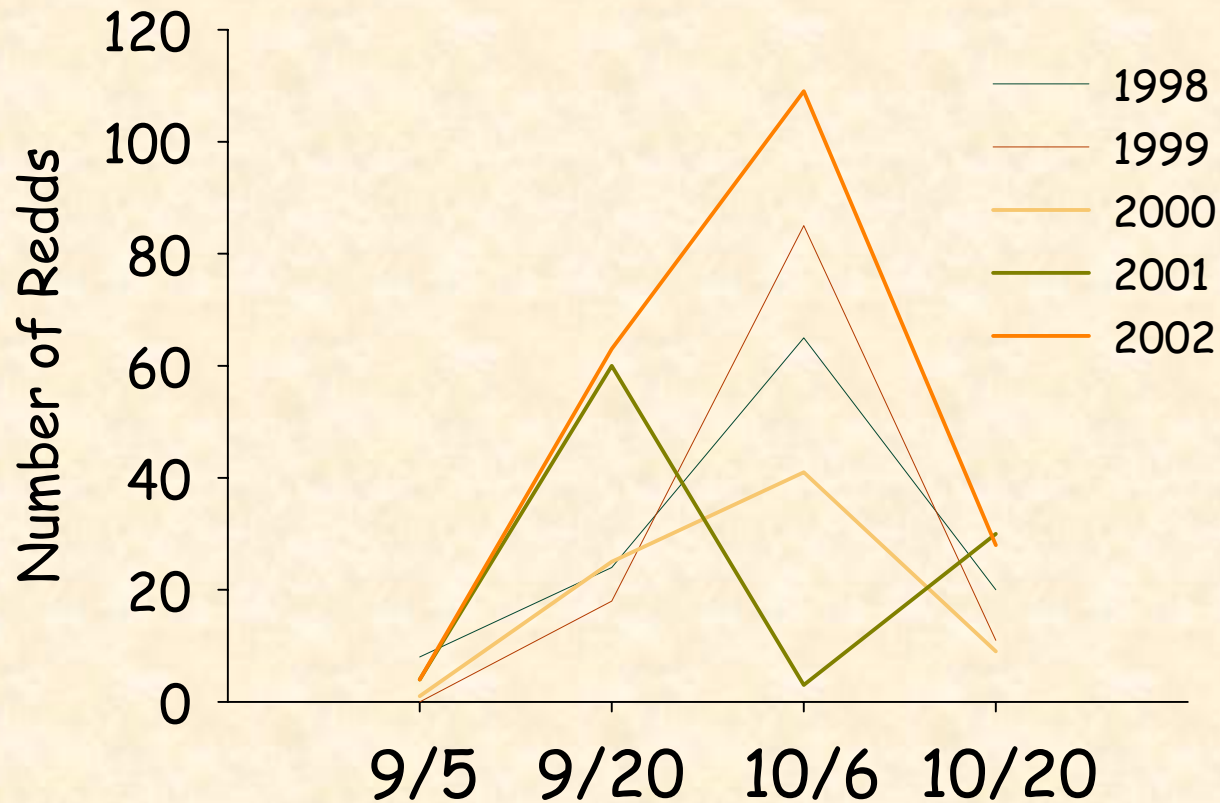
<u>Reach</u>	<u>I (45%)</u>	<u>II (35%)</u>	<u>III (20%)</u>	<u>Combined</u>
Mean	3.9	19.2	22.3	15.1
Variance	4.6	26.0	212.1	138.4
95% C.I.	2.6	6.3	18.1	6.5

Redds Per Kilometer

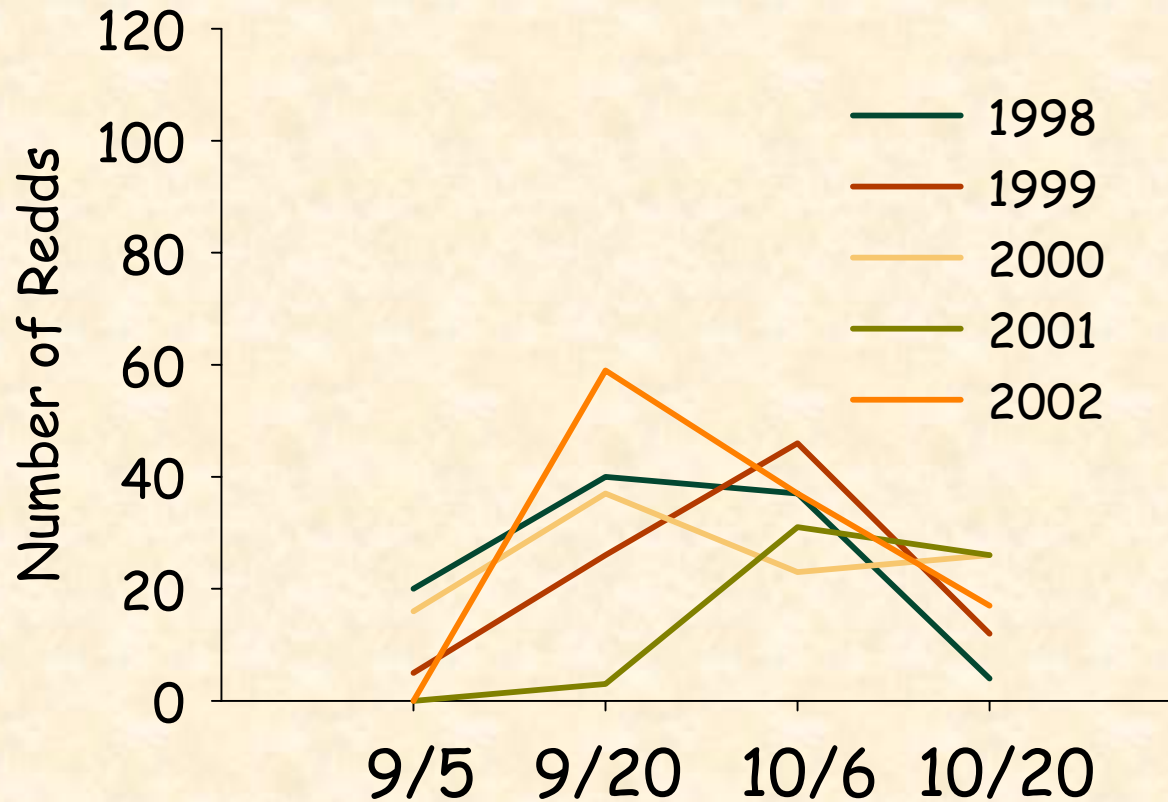
Warm Springs River

<u>Reach</u>	<u>I (75%)</u>	<u>II (25%)</u>	<u>Combined</u>
Mean	12.6	13.2	12.9
Variance	8.3	11.1	8.9
95% C.I.	3.6	4.1	2.1

Shitike Creek Peak Spawning



Warm Springs River Peak Spawning



Summary - Spawning Surveys

- Conducted basin-wide surveys
- Shift in spawning distribution in Shitike Creek
- Shift in spawn timing in the Warm Springs River



Difficulties with Redd Surveys

- Overcounting of redds
- Overlapping of bull trout and spring chinook redds
- Superimposition of redds

Difficulties with Redd Surveys

- Fish/redd ratio difficult to determine
- Low weir numbers; high redd numbers





Acknowledgements

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