

Development of a Fish Index for King County Lowland Streams



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Data Collection

➤ Existing data

- 1996 Juvenile survey (Gino Lucchetti/KC)
- 1997 follow-up (Kurt Fresh)
- 2003 cutthroat population study (John Serl)
- 2002 Kelsey, Coal, Richards Creeks (The Watershed Company)
- 2003 May Creek (Hans Berge/KC)
- 2002 Thornton Creek (Shapiro and Associates)
- 1998 Bear Creek (Alison Cardwell, senior thesis)

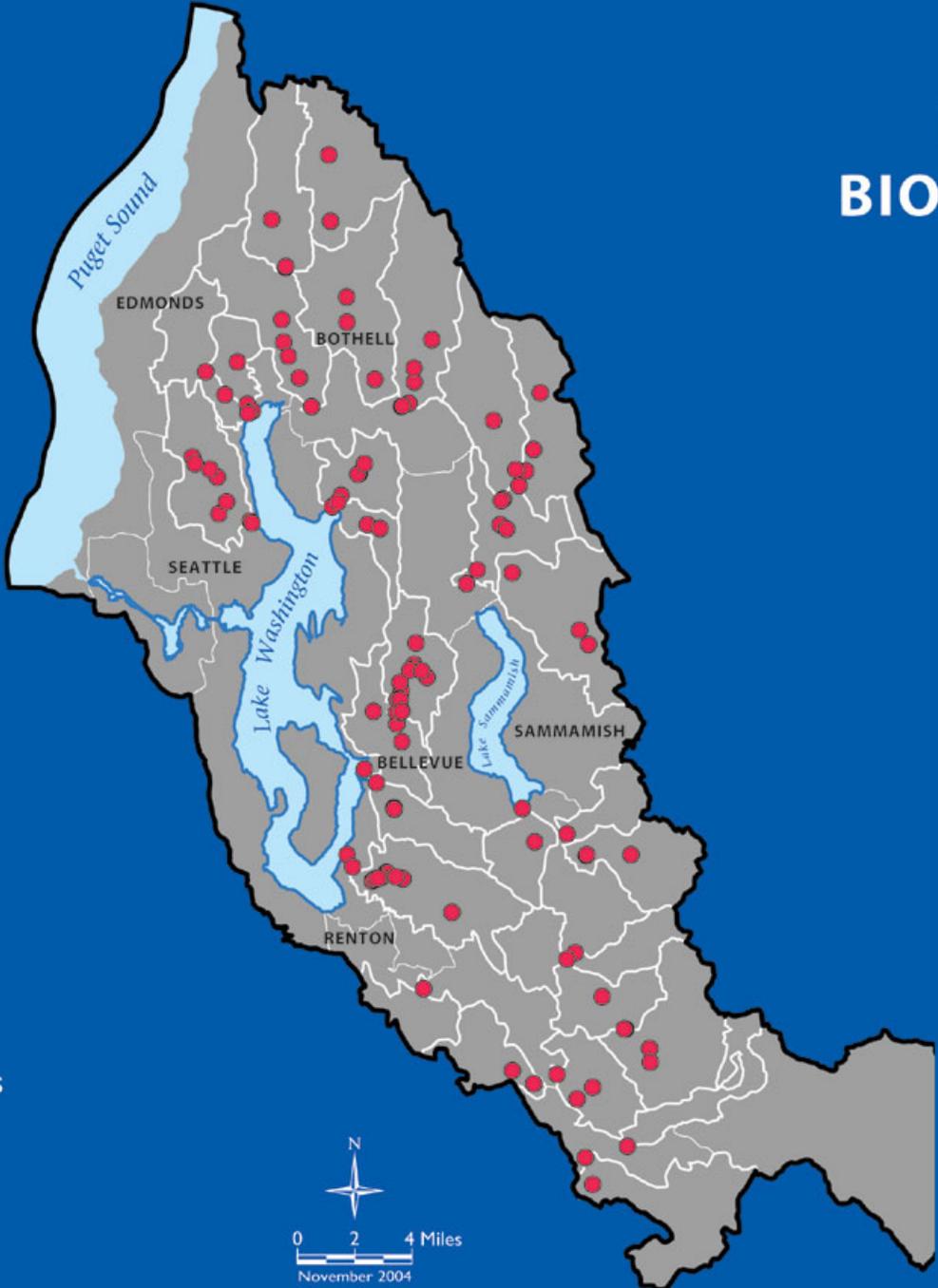
Data Inclusion/Exclusion

- Sampling occurred between 1994 and 2003
 - Data were collected from wadeable streams in WRIA 8
 - Electrofishing methods were used
 - All collected fish were identified and counted
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Data Inclusion

- Data from 9 sources out of 18 were included
 - Sampled in years 1996 – 2003
 - 141 unique sampling events
 - 112 sites
 - 30 subbasins
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FISH INDEX OF BIOTIC INTEGRITY



● Sample sites

LOCATION MAP



Geophysical Classification of Sites



- Defines homogeneous sets of fish assemblage data
 - Stream order
 - Stream gradient (SSHIAP)
 - Stream confinement (SSHIAP)
 - Basin level gradient (% of stream reach $>4\%$ gradient and $<2\%$ gradient) (KC 2004)



Measuring Human Influence

- TIA chosen as surrogate for human influence
- FBI data encompass TIA range of 0.5% to 56.25%
- Lowest TIA = minimally-disturbed conditions
- Highest TIA = most disturbed

Metric Development

- Literature search combined with hypotheses produced over 50 possible metrics
- To be considered for inclusion in index:
 - Metric had to respond to human influence in predicted direction, or
 - Metric had to add valuable information

Metric Development

➤ Included

- Proportion of:
 - Tolerant individuals
 - Invertivore individuals
 - Omnivore individuals
 - Benthic individuals
 - Coho salmon individuals
 - Cutthroat trout individuals
 - The two most abundant species

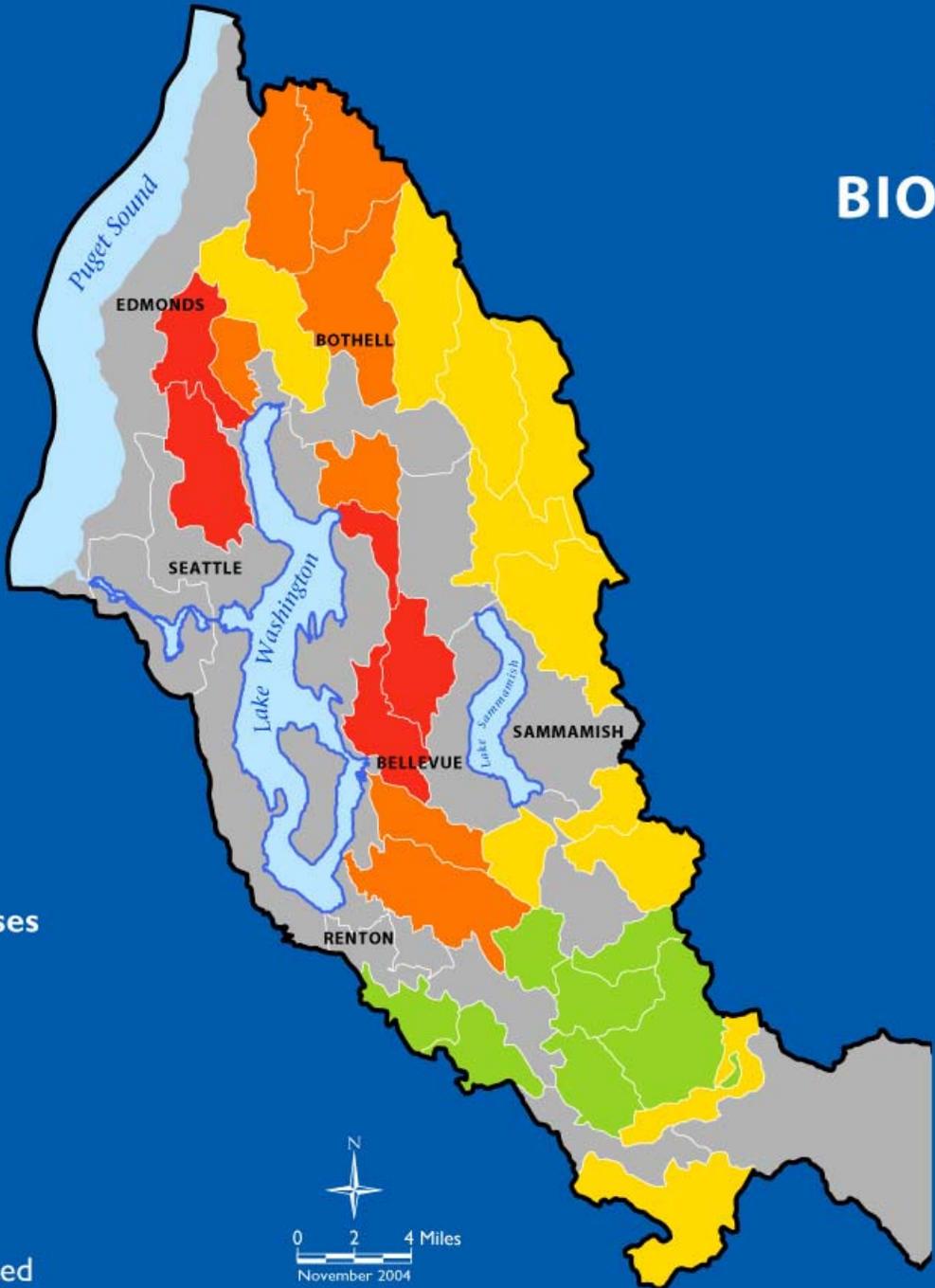
➤ Considered, not included

- Proportion of:
 - Alien individuals
 - Cold individuals
 - Cool individuals
 - Warm individuals
 - Sculpin individuals
 - The single most abundant species

Metric Scoring

- Scoring similar to BIBI
- Maximum score = 35
- Site scores averaged = Basin score
- Grouped into descriptive classes ranging from Very Poor to Excellent

FISH INDEX OF BIOTIC INTEGRITY



LOCATION MAP



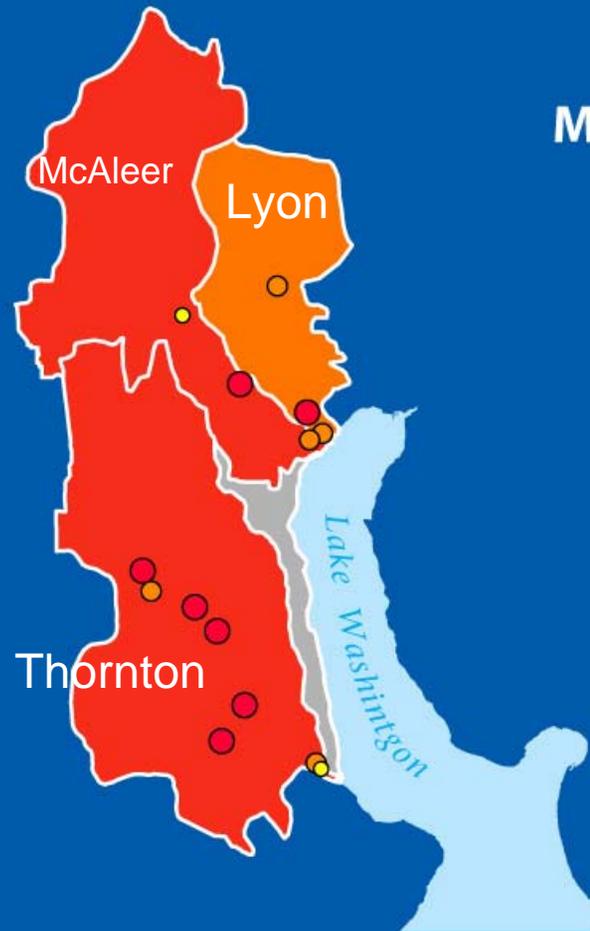
Descriptive classes

- Excellent
- Good
- Fair
- Poor
- Very Poor
- Not evaluated



FISH INDEX OF BIOTIC INTEGRITY

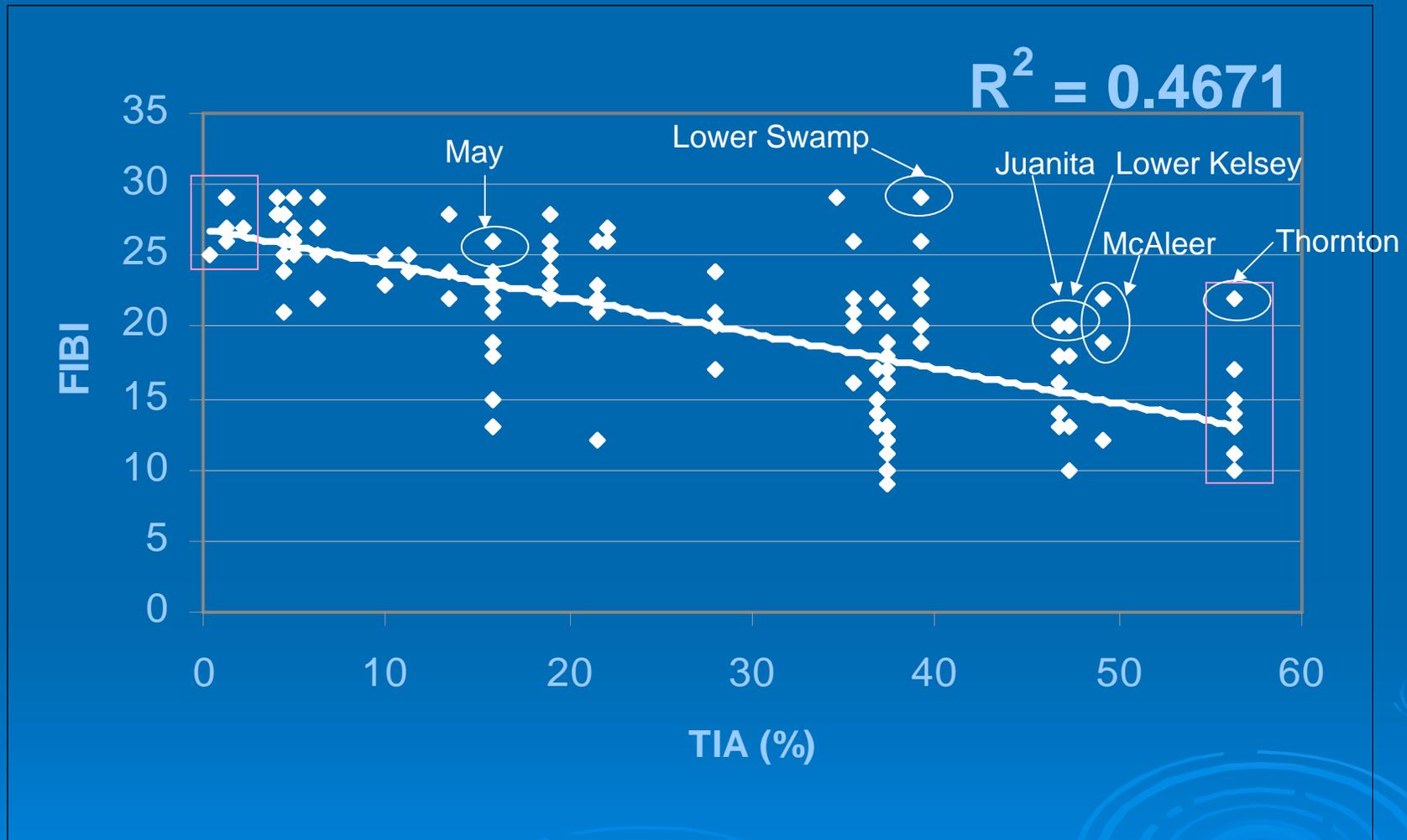
THORNTON CREEK, MCALEER CREEK, AND LYON CREEK BASINS



Descriptive classes

- Excellent
- Good
- Fair
- Poor
- Very Poor
- Not evaluated

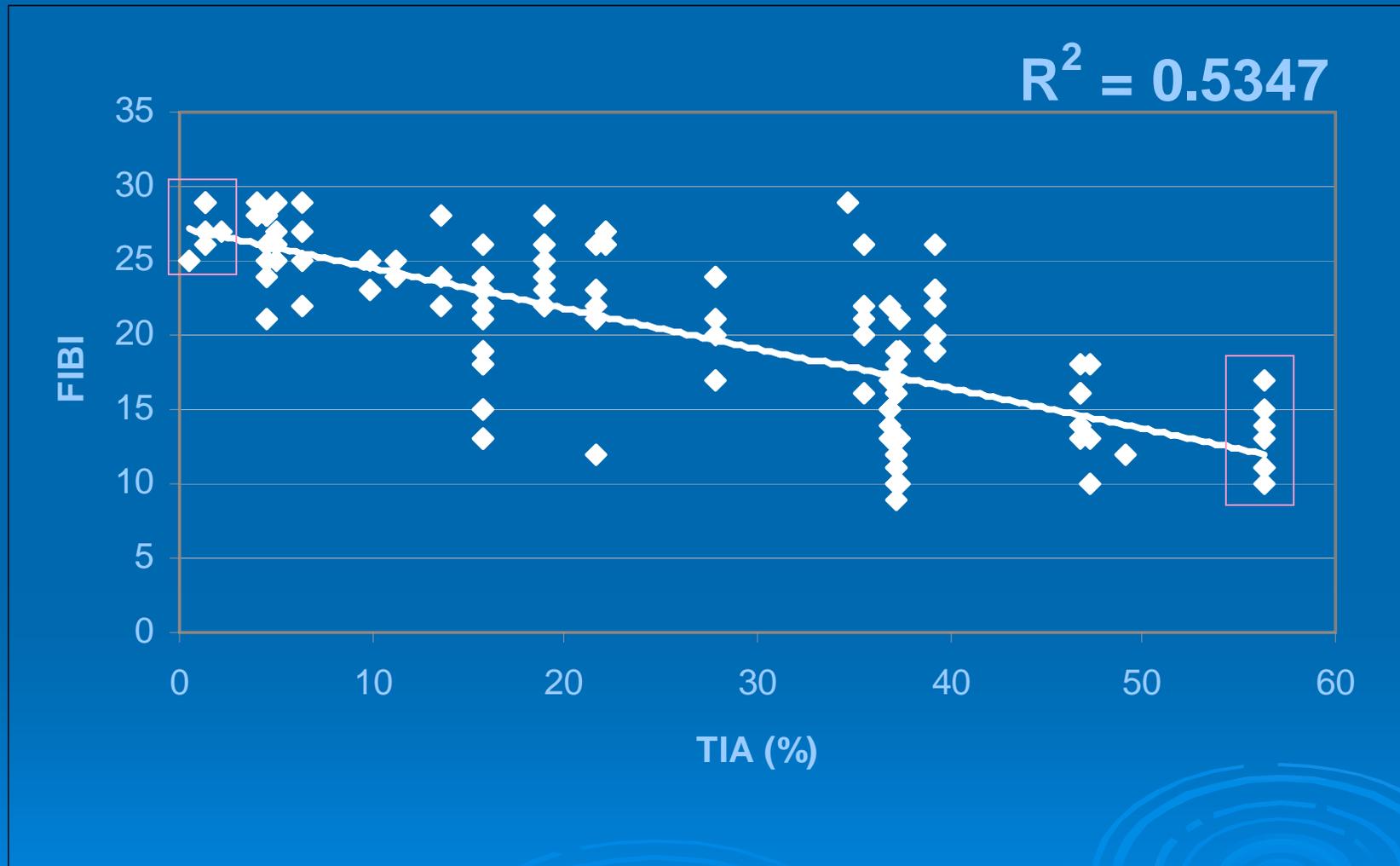
FIBI vs TIA



FIBI vs Road Density $R^2 = 0.448$

2003 BIBI vs TIA $R^2 = 0.5351$

FIBI vs TIA (natural variation removed)



FIBI vs Road Density $R^2 = 0.448$

2003 BIBI vs TIA $R^2 = 0.5351$

Limitations

- Inappropriate study/sampling design
- Natural variation (especially over an 8-year time period)
- Measurement error of geophysical attributes and human influence
- First and fourth order streams did not evaluate the full spectrum of human influence

Conclusions

- A fish index of biotic integrity can be developed for the Puget Sound lowland region
- FIBI fits existing data, more robust study may lead to modifications to FIBI
- Not intended as a stand alone measure of ecosystem health
- Useful tool for the ecological risk assessment

Questions?

