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DEPARTMENT OF ENVIRONMENTAL PROTECTION

Bureau of Clean Water

Stream Fish Assessment Method Based on a Thermal Fish Index (TFI)

Water Resources Advisory Committee Meeting

July 29, 2020

Tom Wolf, Governor

Patrick McDonnell, Secretary

Justification

- In 2018 the Water Quality Division (WQD) consolidated data collection protocols and assessment methods for streams and rivers into two public documents, the Monitoring Book and the Assessment Book.
- The data collection protocols and assessment methods are founded on technical documentation created from WQD data analysis, peer reviewed technical reports and published literature.
- The TFI technical report has been developed by DEP staff and reviewed by EPA and is now ready to be posted on the WQD, 'Technical Documentation' webpage.
- Once finalized, the assessment method will be used to support section 303(d) listings, relating to impaired waters.

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Brief Outline

- AQUATIC LIFE USE – review
- THERMAL FISH INDEX – introduction
- THERMAL TRANSITION CONCEPT – introduction
- WQS APPLICATION – introduction
- SUMMARY – review

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"USES"

Aquatic Life	
CWF - Cold Water Fishes	Maintenance or propagation, or both, of fish species including the family Salmonidae and additional flora and fauna which are indigenous to a cold water habitat.
WWF - Warm Water Fishes	Maintenance and propagation of fish species and additional flora and fauna which are indigenous to a warm water habitat.
MF - Migratory Fishes	Passage, maintenance and propagation of anadromous and catadromous fishes and other fishes which move to or from flowing waters to complete their life cycle in other waters.
TSF - Trout Stocking	Maintenance of stocked trout from February 15 to July 31 and maintenance and propagation of fish species and additional flora and fauna which are indigenous to a warm water habitat.
Recreation	
B – Boating	Use of the water for power boating, sail boating, canoeing and rowing for recreational purposes when surface water flow or impoundment conditions allow.
F – Fishing	Use of the water for the legal taking of fish. For recreation or consumption.
WC – Water Contact	Use of the water for swimming and related activities.
E – Esthetics	Use of the water as an esthetic setting to recreational pursuits.

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Recreation	

NARRATIVE CRITERIA

§ 93.6. General water quality criteria

(a) Water may not contain substances attributable to point or nonpoint source discharges in concentration or amounts sufficient to be inimical or harmful to the water uses to be protected or to human, animal, plant or aquatic life.

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THE WATERBODY'S CONDITION…
ASSESSMENTS NEED TO BE DEVELOPED FROM, AND CALIBRATED TO, WATERBODY CONDITIONS

THE USER…
ASSESSMENTS NEED TO PROTECT AND SUPPORT THE USER (HUMAN HEALTH, RECREATION…)

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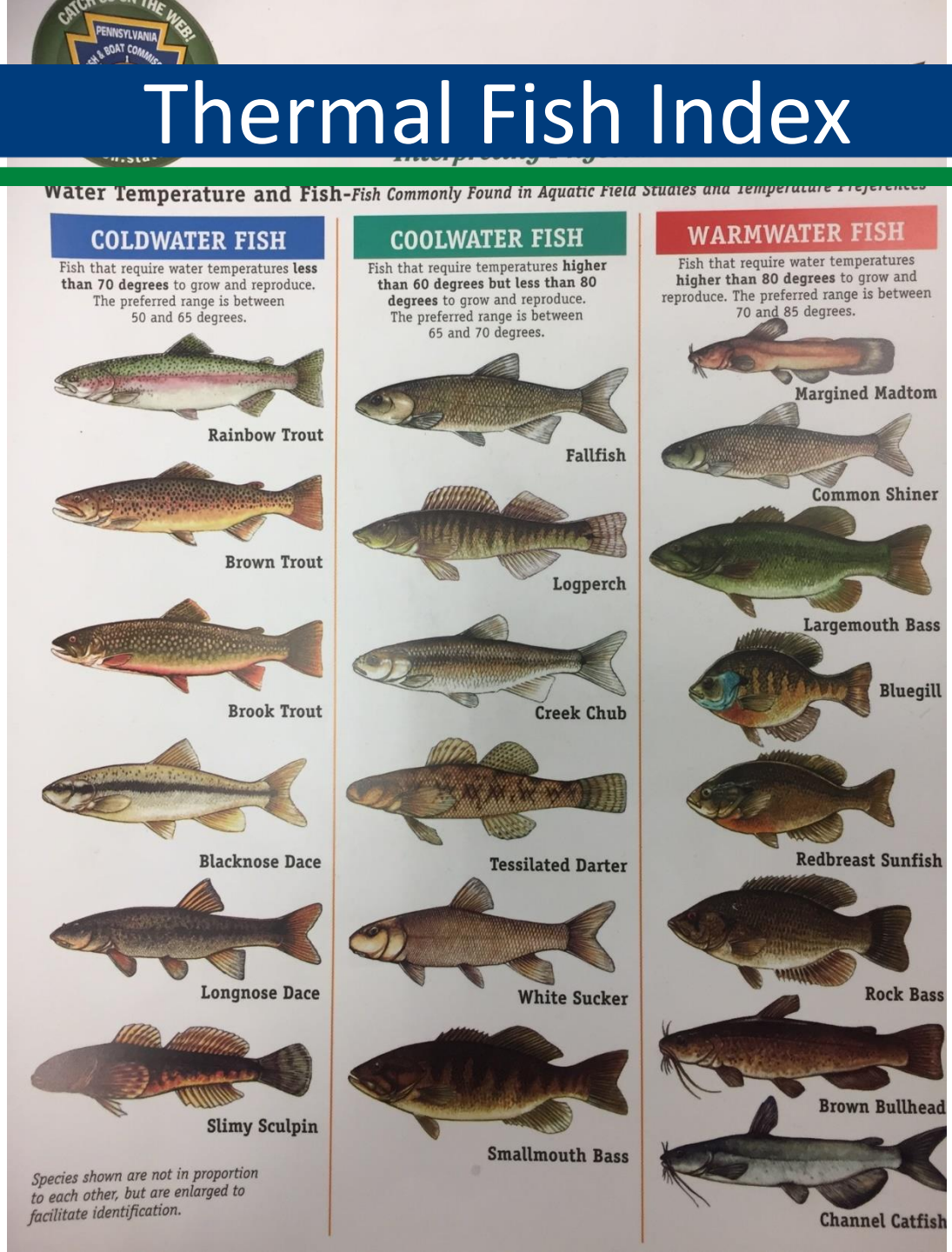
Thermal Fish Index

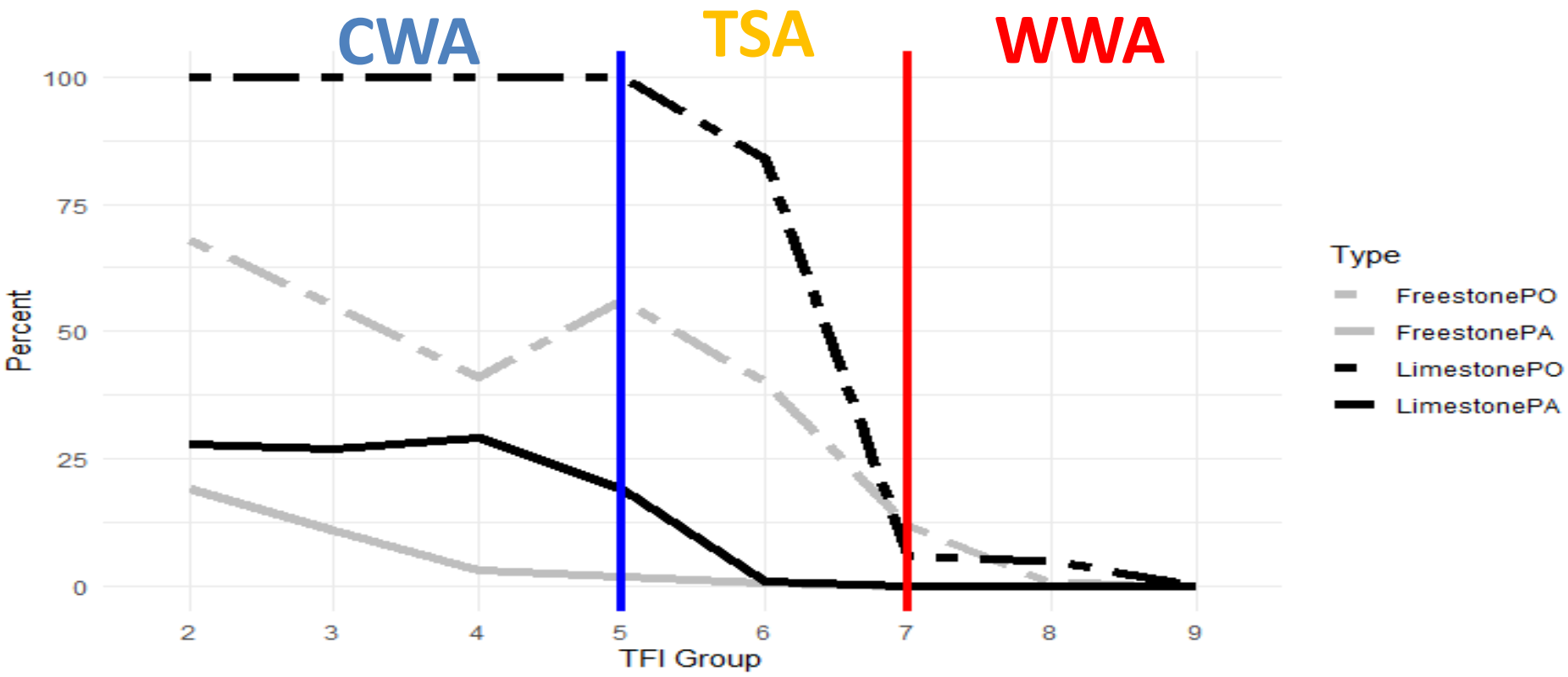


Thermal Fish Index

The TFI expands upon this concept. Five thermal classes were identified and numerically "weighted".

Cold	Cold-Cool	Cool	Cool-Warm	Warm	TFI
1	2	3	4	5	Score
1.00					2
0.60	0.30	0.10			3
	0.60	0.30	0.10		5
		0.60	0.30	0.10	7
		0.10	0.30	0.60	9
				1.00	10

Thermal Assemblage



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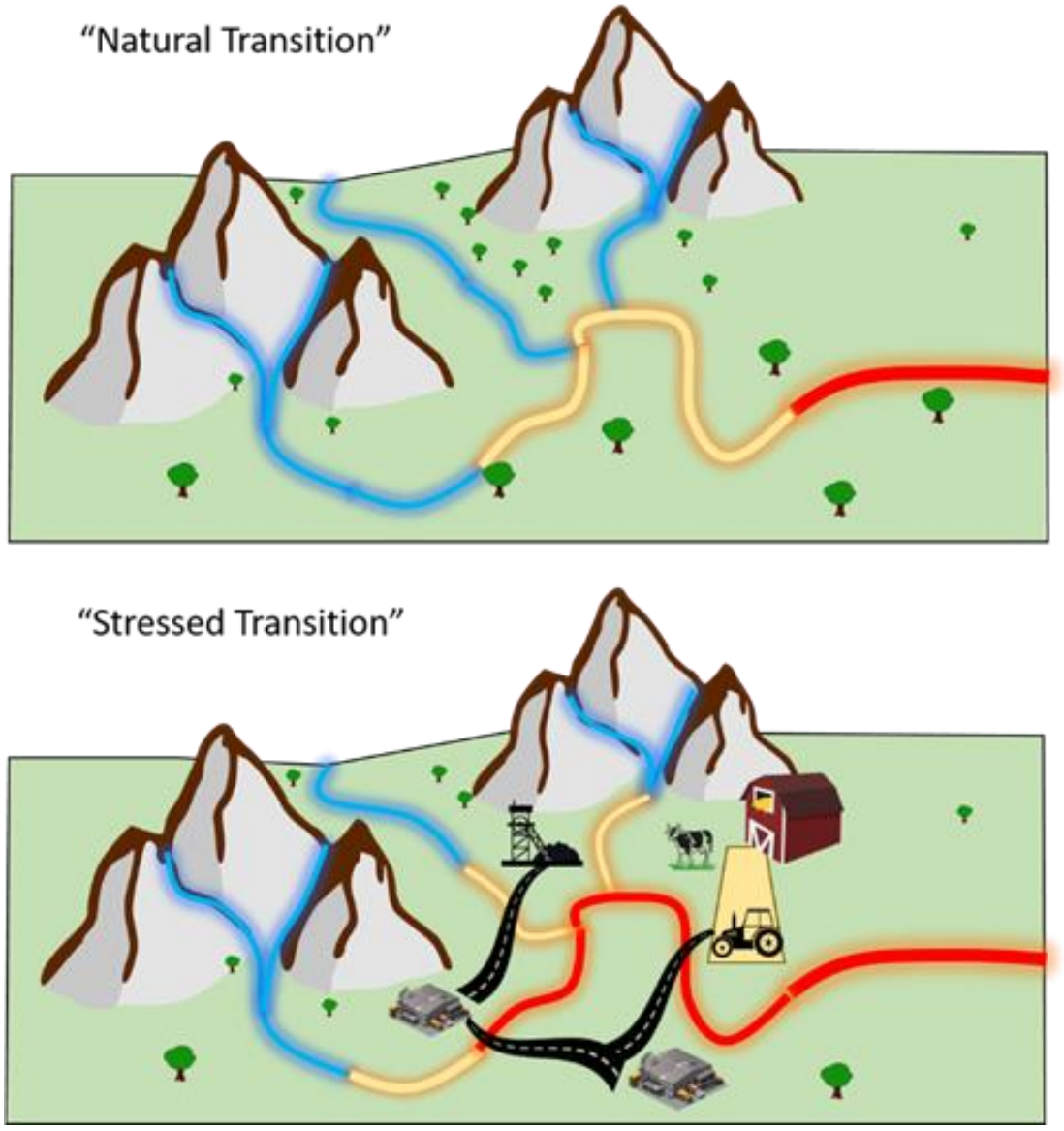
Thermal Transition Concept



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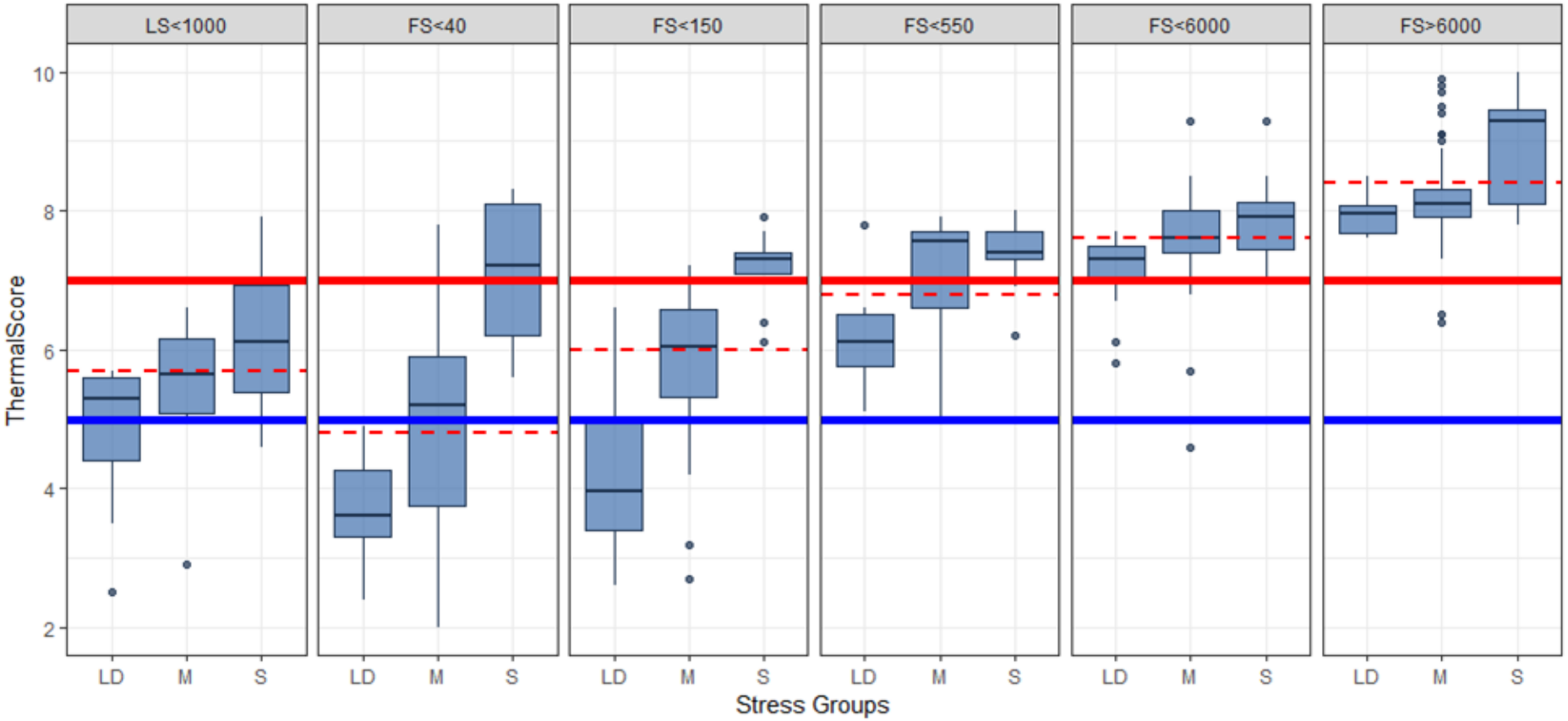
WQS Application

Drainage area groups for Limestone (LS) and Freestone (FS) streams and drainage area in sq/km



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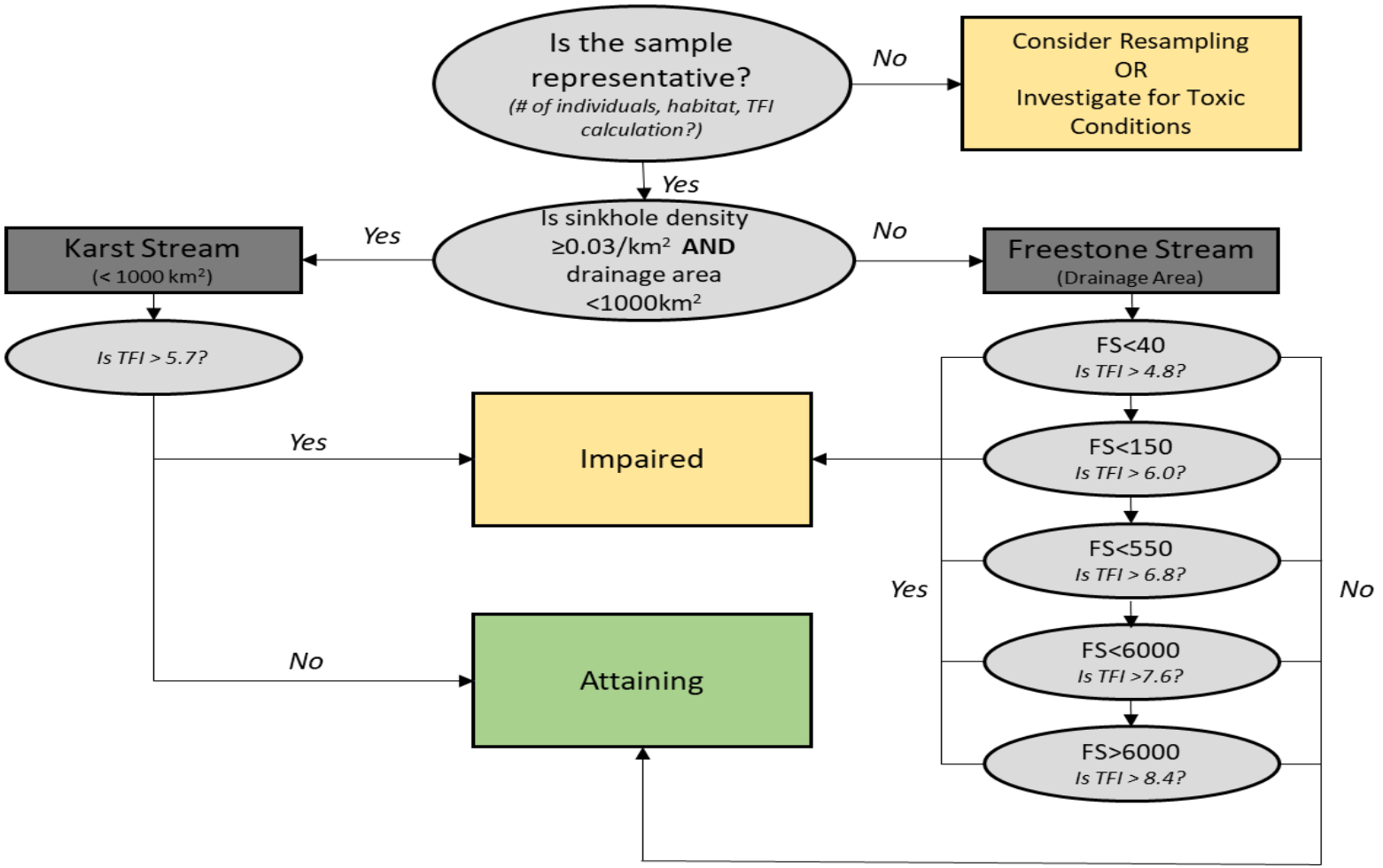
WQS Application



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TFI Assessment Method Summary

- Standardized score for all of PA waterbodies
- Unitless score with major ecological relevance
- Tool used to translate narrative ALU criteria
- May hone in on impairments not identified with macroinvertebrates alone
- Performs as well as, and often better than, traditional fish IBI's
- Independent Applicability

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