



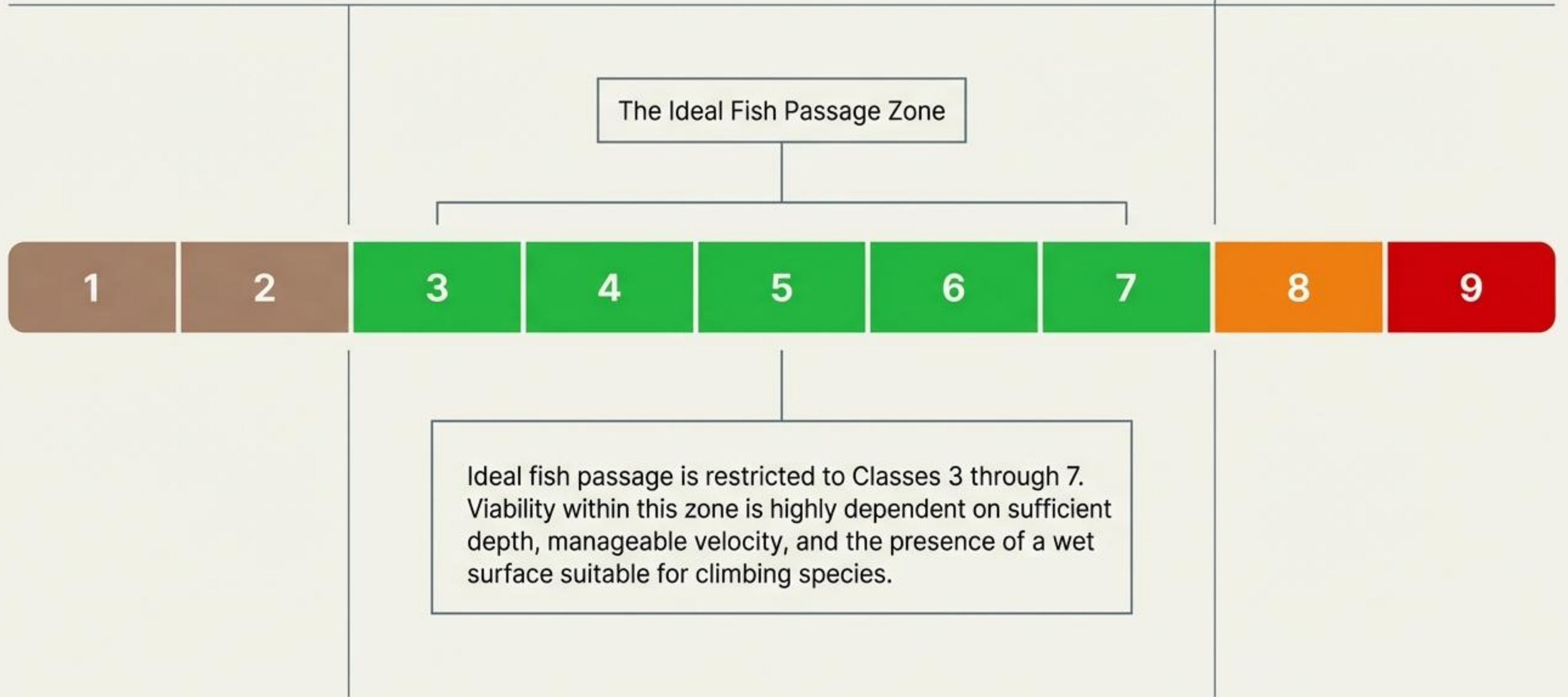
Laminar Flow

Complex riffle

Hydraulic Complexity & Flow Classification Indices

A Visual Field Guide to Indexing Fluid Dynamics for Fish Passage Continuity.

The Ecological Continuum and the Ideal Viability Zone



FTCM Class 1: Not Assessed or Obscured

01



Flow Characteristics:
Unknown/Unverified

Velocity:
Unknown

Fish Passage Viability:
Cannot be determined



FTCM Class 2: Dry - No Flow

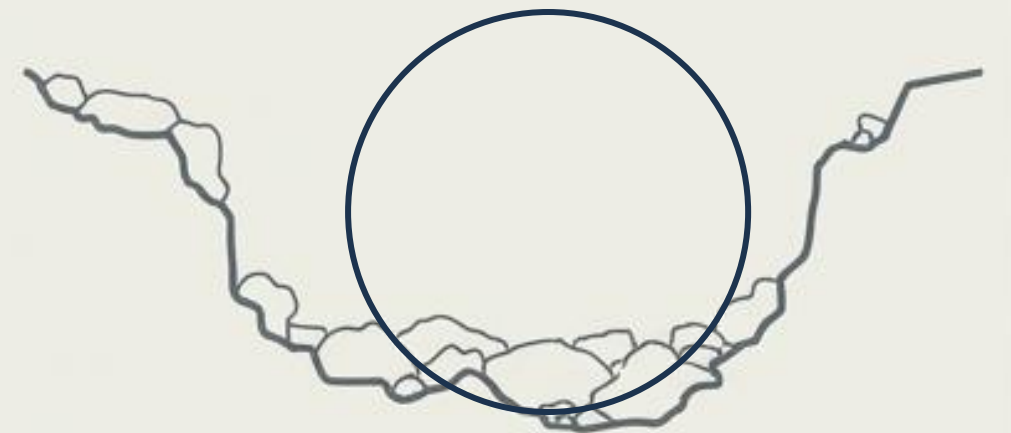
02



Flow Characteristics:
Zero fluid volume

Velocity:
None

Fish Passage Viability:
0% (Absolute Barrier)



FTCM Class 3: Still – Backwatered

03



Flow Characteristics:
Static / Pooled

Depth Variance:
High consistency

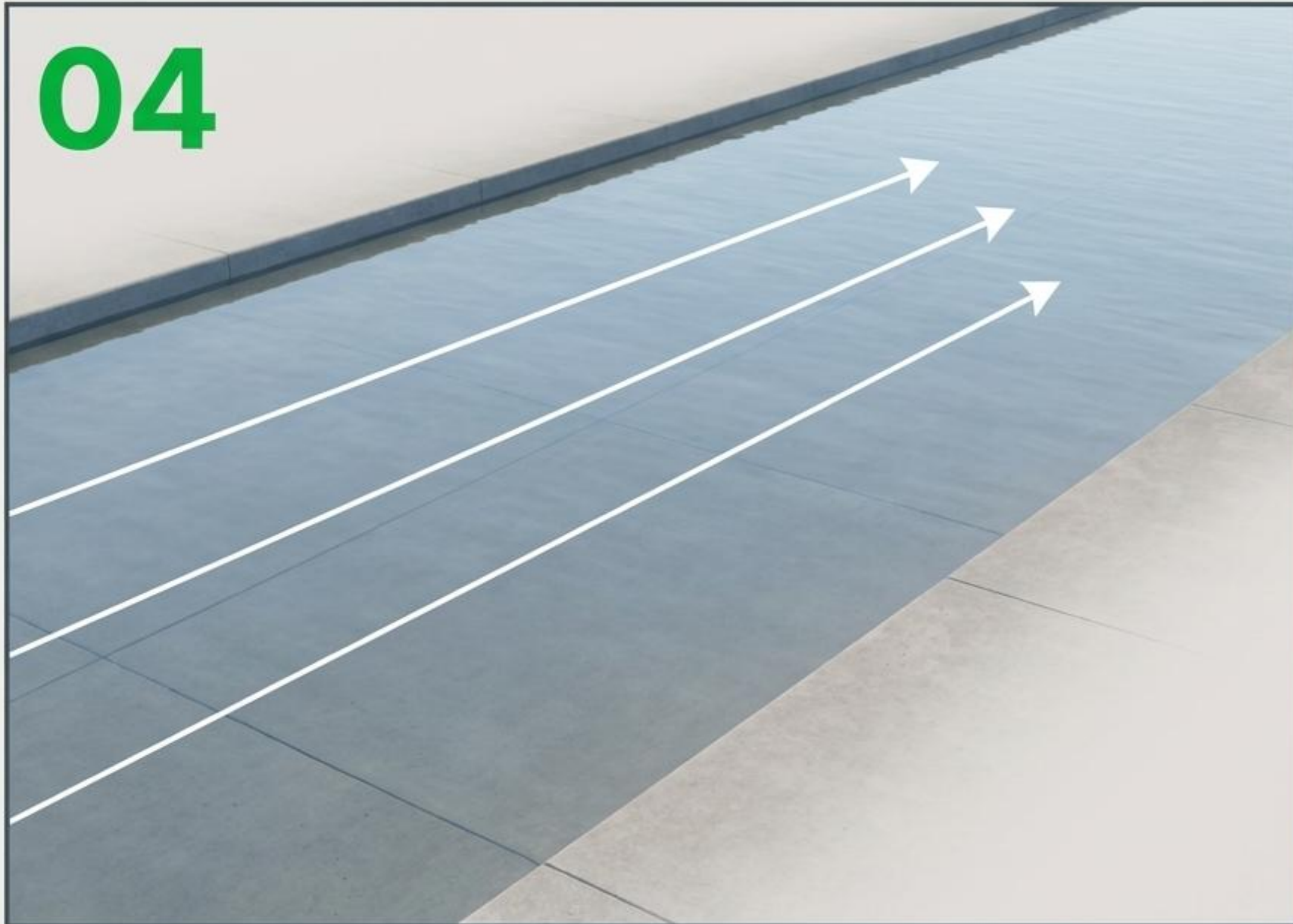
Fish Passage Viability:
Viable (Resting Zone)

Features optimal depth for resting, offering a safe harbor prior to traversing more complex structures.



FTCM Class 4: Straight or Laminar Flow

04



Flow Characteristics:
Unidirectional / Undisturbed

Depth Variance:
Uniform or variable

Fish Passage Viability:
Viable providing low
velocity and enough depth



FTCM Class 5: Slightly Complex



Flow Characteristics: Riffles and/or small back eddies

Depth Variance: Minor fluctuations

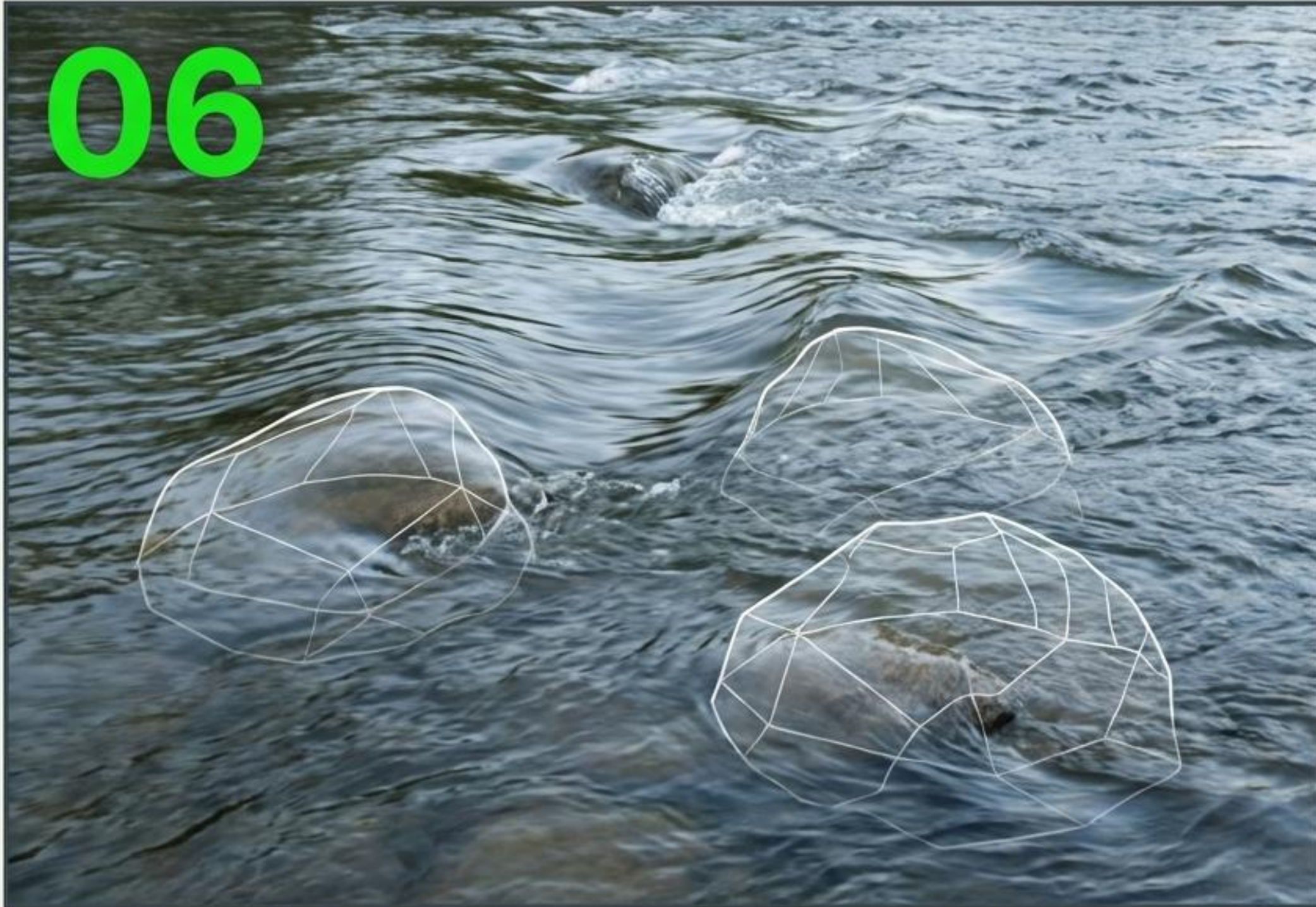
Fish Passage Viability: Highly Viable

The introduction of minor turbulence creates crucial micro-habitats, offering resting zones within small back eddies.



FTCM Class 6: Moderately Complex

06



Flow Characteristics:
Ranges in depth

Rough Elements:
Present below waterline only

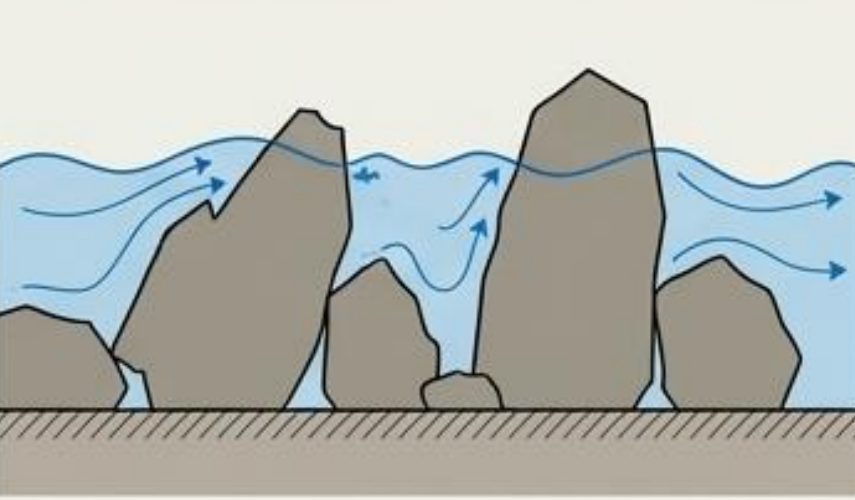
Fish Passage Viability:
Highly Viable (Varied Velocity Zones)



FTCM Class 7: Highly Complex

07



1	<p>Flow Characteristics: Ranges in depth and velocity</p> <p>Rough Elements: Present above and below waterline</p> <p>Fish Passage Viability: Viable – many choices</p>
2	<p>Crucial for Ecological Continuity: Exposed rough elements provide the essential wetted surfaces required for climbing species to traverse the structure.</p>
3	

FTCM Class 8: Extreme

08



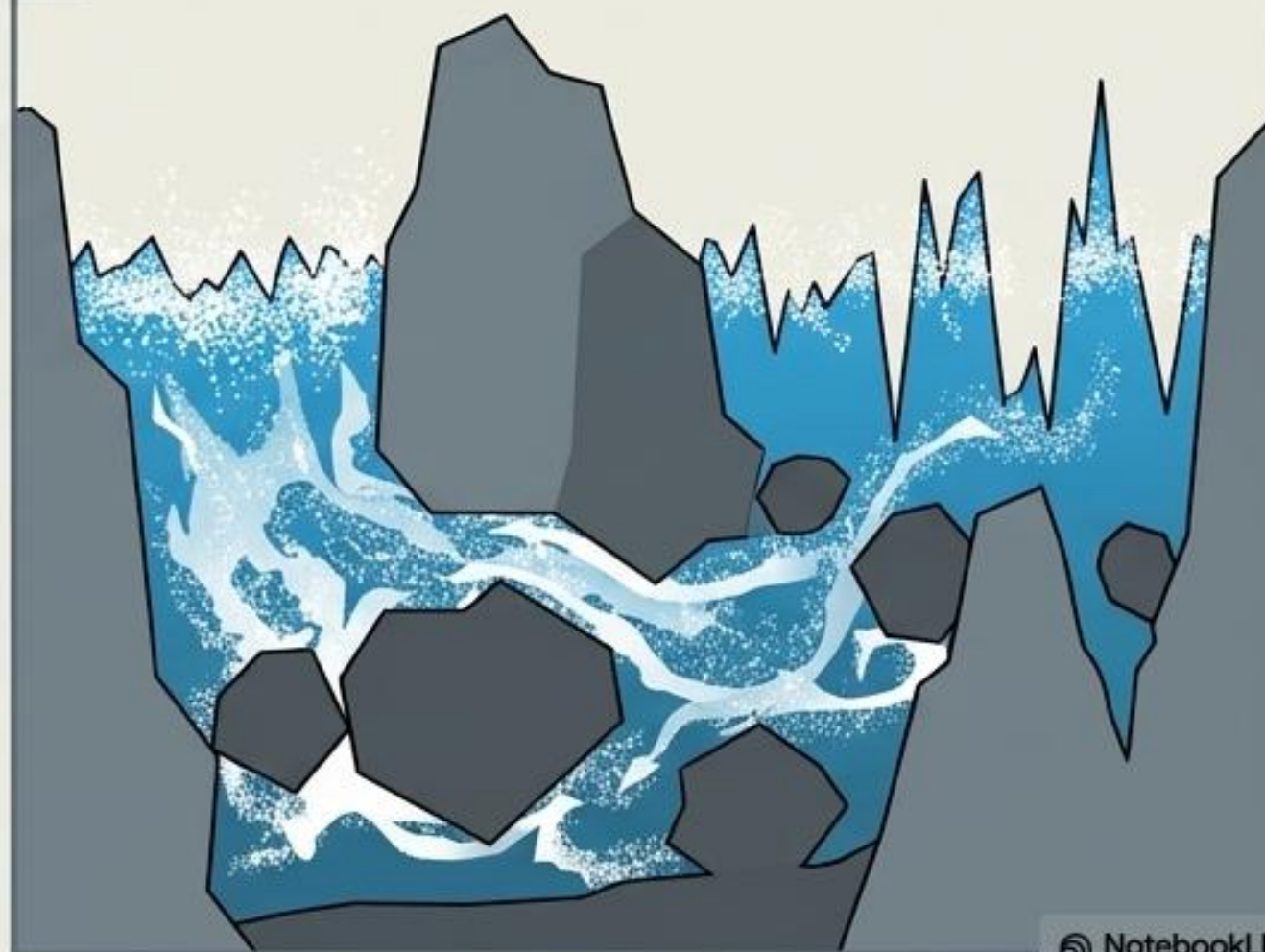
1

Flow Characteristics: White water, splash zones
Rough Elements: Present above and below waterline
Fish Passage Viability: Impassable (Energy Barrier)

2

Velocity and turbulence dramatically exceed the physiological swimming and climbing capacity of most target species.

3



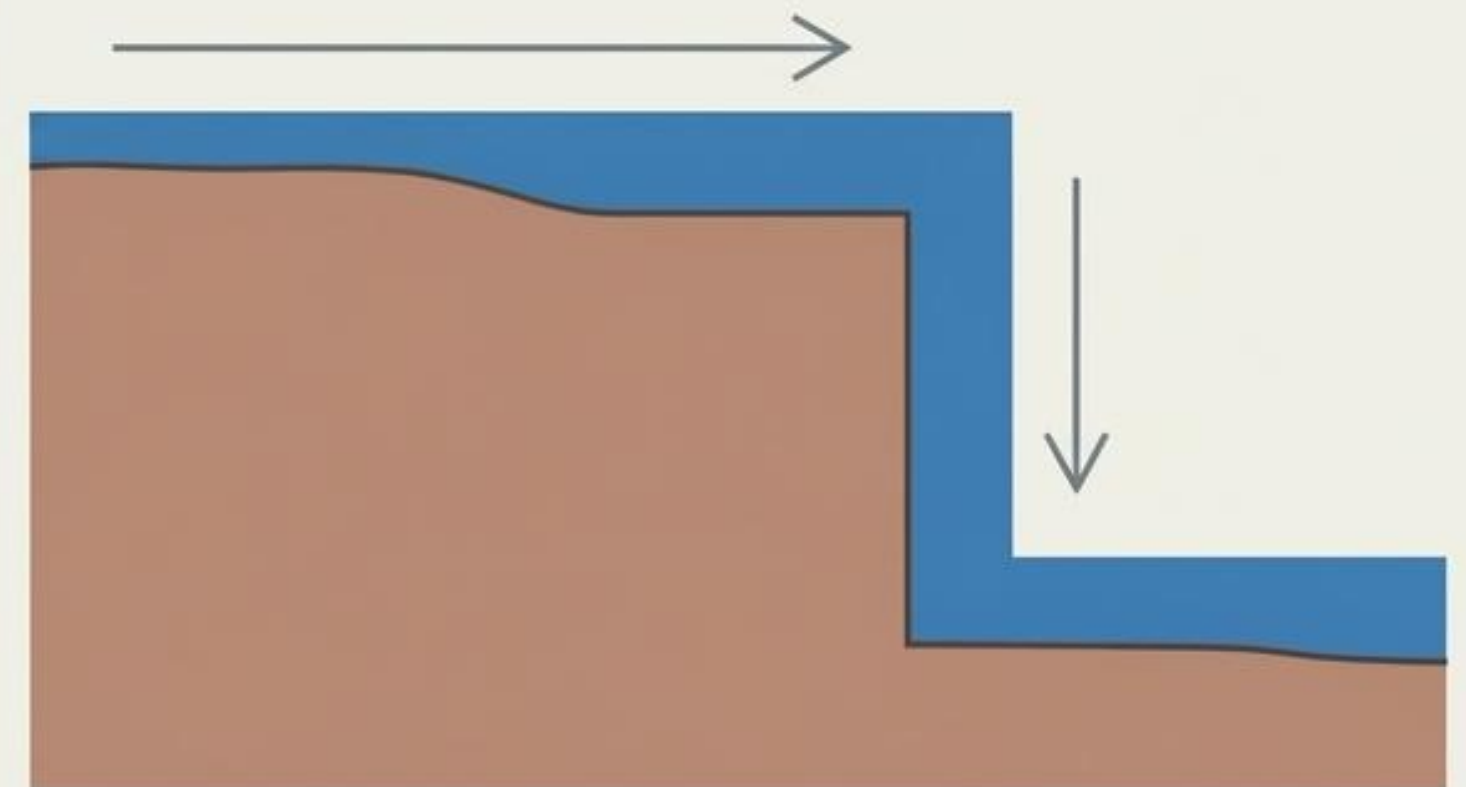
FTCM Class 9: Vertical or Waterfall



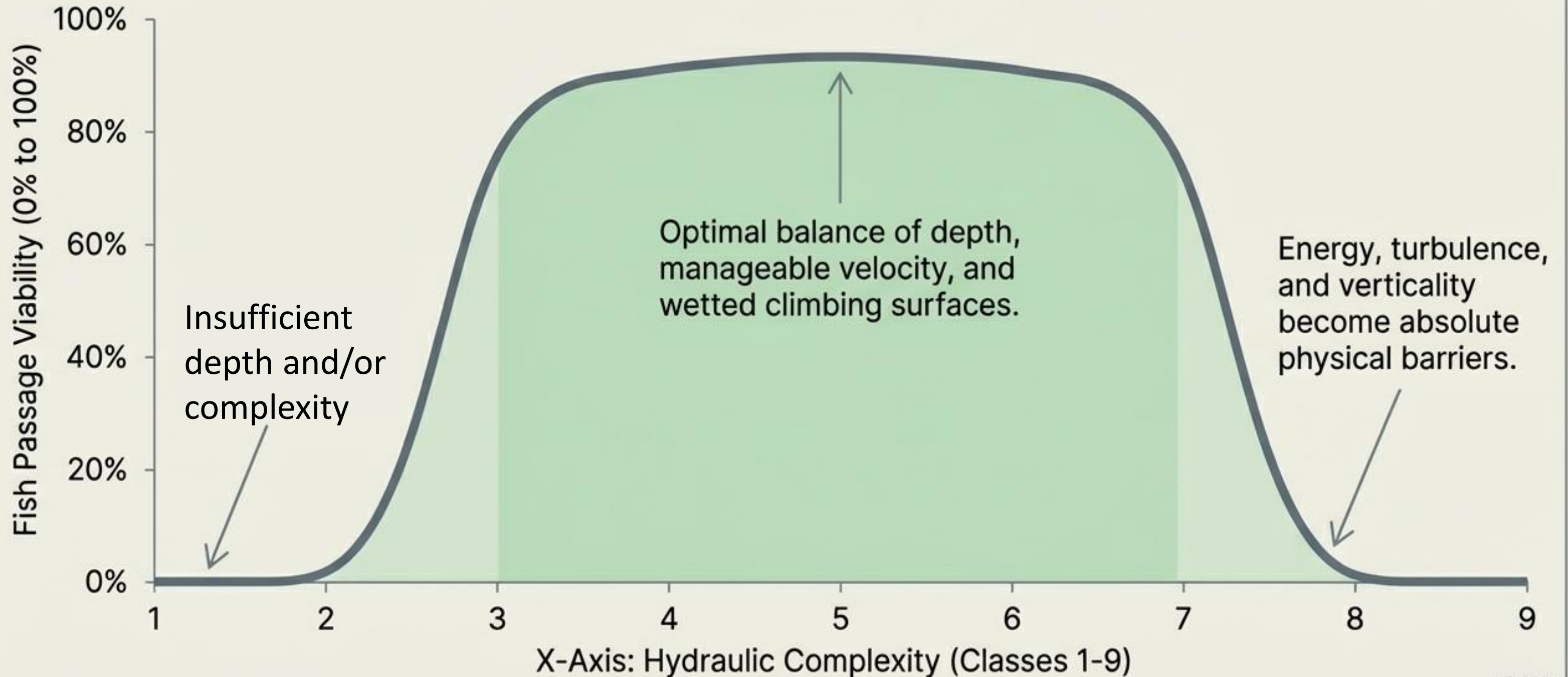
Flow Characteristics: Sheer vertical drop

Velocity: Extreme / Gravitational

Fish Passage Viability: 0% (Absolute Barrier)



The Viability Curve: Balancing Energy and Complexity



The Hydraulic Complexity Diagnostic Matrix

Class	Flow State	Depth Variance	Rough Elements (Below)	Rough Elements (Above)	Fish Passage Status
1	Obscured	Unknown	-	-	Unknown
2	Dry	Zero	-	-	Barrier
3	Still	High Consistency	-	-	Highly Viable
4	Laminar	Ranges	-	-	Viable
5	Riffles/Eddies	Minor Fluctuation	-	-	Highly Viable
6	Moderate	Ranges	✔ Yes	-	Highly Viable
7	Highly Complex	Ranges	✔ Yes	✔ Yes	Viable
8	Extreme/Whitewater	Chaotic	✔ Yes	✔ Yes	Very difficult
9	Vertical	90-Degree Drop	✔ Yes	✔ Yes	Barrier

Field Assessment Quick-Reference. Target Classes 3-7 during structural planning and remediation.