

Flowing Insights: Harnessing Habitat Assessments for River Monitoring

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Musconetcong Watershed Association

• Our goal is to protect and enhance the Musconetcong River



- Education
- Promoting historical and cultural values
- Water quality monitoring
- Volunteer efforts
- Restoration









River Watcher Program

- Established in 2007-> 17th year
- Over 50 volunteers
- HAB Monitoring
- Macroinvertebrate collection
- Habitat assessment
- Road salt monitoring
- Sensor stewardship
- NEW Bacteria monitoring
- Data informs project partners and agencies

What is a habitat assessment?

- A quick quantifiable method to assess the habitat in a particular stream reach
- Involves assessing various physical and biological characteristics of the habitat to provide a rapid yet informative snapshot of the habitat condition
 - such as substrate composition
 - vegetation cover
 - habitat complexity



Our EnviroDIY stations inform us about what is going on in the water, but what about the land that surrounds it and the instream habitat?

- Conductivity why is it high?
- Depth why do I see big pulses of water every time it rains?
- Temperature why is the water so hot when my station is in a shady spot?
- We may understand this intuitively, but how can we track this and make it quantifiable and relatable to our data?





- Score based on description in metric terms and descriptive
- Optimal 20-16
- Suboptimal 15-11
- Marginal 10-6
- Poor 5-0
- Total Score
 - 160-200 Optimal
 - 110-159 Suboptimal
 - 60-109 Marginal
 - <60 Poor

What are the categories and what do they measure?

Epifaunal Substrate/Available Cover - Evaluates the availability of submerged or overhanging structures within the river, providing refuge and foraging areas for fish and other aquatic organisms

Embeddedness - degree to which sediment particles are surrounded and held in place by other materials, such as fine sediment, organic matter, or vegetation, within a riverbed

Velocity/Depth Regimes - pattern or distribution of flow velocities and water depths within a river or stream channel (slow-deep, slow-shallow, fast-deep, fast-shallow)

Sediment Deposition - Indicates the accumulation of sediments within the river channel, affecting water quality, habitat availability, and aquatic organism health

Channel Flow Status - Describes the flow characteristics of the river channel, including flow velocity, depth, and patterns, which influence habitat suitability and ecosystem dynamics

Channel Alteration - Measures changes to the natural flow and shape of the river channel caused by human activities, such as channelization or dredging

Frequency of riffles/pools - Measures the occurrence and distribution of pools& riffles within the river, which provide habitat for fish and macroinvertebrates, refuge during low flow periods, and areas for sediment deposition

Bank Stability (x2)- Assesses the stability of riverbanks, which is crucial for preventing erosion, maintaining habitat structure, and preserving water quality

Bank Vegetative Cover (x2) - Assesses the presence and health of vegetation along the riverbanks, contributing to bank stability, erosion control, and habitat diversity

Bank Vegetative Zone (x2) – Measures how far back from the shoreline the vegetative buffer exists

6. Channel Alteration	Channelization or dredging absent or minimal; stream with normal pattern.	Some channelization present, usually in areas of bridge abutments; evidence of past channelization, i.e., dredging, (greater than past 20 yr) may be present, but recent channelization is not present.	Channelization may be extensive; embankments or shoring structures present on both banks; and 40 to 80% of stream reach channelized and disrupted.	Banks shored with gabion or cement; over 80% of the stream reach channelized and disrupted. In stream habitat greatly altered or removed entirely.
SCORE	20 19 18 17 16	15 14 13 12 11	10 9 8 7 6	5 4 3 2 1 0
7. Frequency of Riffles (or bends)	Occurrence of riffles relatively frequent; ratio of distance between riffles divided by width of the stream <7:1 (generally 5 to 7); variety of habitat is key. In streams where riffles are continuous, placement of boulders or other large, natural obstruction is important	Occurrence of riffles infrequent; distance between riffles divided by the width of the stream is between 7 to 15.	Occasional riffle or bend; bottom contours provide some habitat; distance between riffles divided by the width of the stream is between 15 to 25.	Generally all flat water or shallow riffles; poor habitat; distance between riffles divided by the width of the stream is a ratio of >25.
SCORE	20 19 18 17 16	15 14 13 12 11	10 9 8 7 6	5 4 3 2 1 0
8. Bank Stability (score each bank) Note: determine left or right side hu facing unstream	Banks stable; evidence of erosion or bank failure absent or minimal; little potential for future problems. <5% of bank affected.	Moderately stable; infrequent, small areas of erosion mostly healed over. 5-30% of bank in reach has areas of erosion.	Moderately unstable; 30-60% of bank in reach has areas of erosion; high erosion potential during floods.	Unstable; many eroded areas; "raw" areas frequent along straight sections and bends; obvious bank sloughing; 60-100% of bank has erosional scars.
SCORE (LB)	Left Bank 10 9	8 7 6	5 4 3	2 1 0
SCORE (RB)	Right Bank 10 9	8 7 6	5 4 3	2 1 0
9. Bank Vegetative Protection (score each bank)	More than 90% of the streambank surfaces and immediate riparian zone covered by native vegetation, including trees, under story shrubs, or nonwoody macrophytes; vegetative disruption through grazing or mowing minimal or not evident; almost all plants allowed to grow naturally.	70-90% of the streambank surfaces covered by native vegetation, but one class of plants is not well-represented; disruption evident but not affecting full plant growth potential to any great extent; more than one-half of the potential plant stubble height remaining.	50-70% of the streambank surfaces covered by vegetation; disruption obvious; patches of bare soil or closely cropped vegetation common; less than one-half of the potential plant stubble height remaining.	Less than 50% of the streambank surfaces covered by vegetation; disruption of streambank vegetation is very high; vegetation has been removed to 5 centimeters or less in average stubble height.
SCORE (LB)	Left Bank 10 9	8 7 6	5 4 3	2 1 0
SCORE (RB)	Right Bank 10 9	8 7 6	5 4 3	2 1 0
10. Riparian Vegetative Zone Width (score each bank riparian zone)	Width of riparian zone >18 meters; human activities (i.e., parking lots, roadbeds, clear-cuts, lawns, or crops) have not impacted zone.	Width of riparian zone 12-18 meters; human activities have impacted zone only minimally.	Width of riparian zone 6-12 meters; human activities have impacted zone a great deal.	Width of riparian zone <6 meters: little or no riparian vegetation due to human activities.
SCORE (LB)	Left Bank 10 9	8 7 6	5 4 3	2 1 0
SCORE (RB)	Right Bank 10 9	8 7 6	5 4 3	2 1 0

TOTAL HABITAT SCORE

HABITAT SCORES	VALUE	
OPTIMAL	160 X 200	
SUB-OPTIMAL	110 X 159	
MARGINAL	60 X 109	
POOR	< 60	

When and where to perform HA?

When?

- In spring or early summer, after leafout
- Before a restoration project
- Each year of an on-going restoration project
- When you collect macroinvertebrates
- After the completion of restoration projects
- When your EnviroDIY is showing problematic data

Where?

- In relationship to your EnviroDIY station, ideally above and including your station placement
- Away from the influence of other waterbodies, i.e., tributaries
- Below culverts, dams, bridges and other infrastructure
- In a 100 meter reach that is characteristic of where you are performing other monitoring



How to learn...if you don't already know?

- Get trained with local watershed association, like MWA
- Read resource guides, like the EPA handbook
- OR
- Watch YouTube videos
- <u>https://youtube.com/playlist?list=PLMS</u> <u>a5d-</u> <u>ill6OIUvw2l55DUL5Ol3R8u7M9&si=5Qe</u> <u>weC86Bg1bGjzN</u>
- I find that the discussions with peers is the most helpful and rewarding part of this experience



Scores across the watershed

Score Total vs. Site



Site

4 years of habitat assessments at Site A



In Summary...

- Helps understand water quality data
- Informs restoration efforts
- Provides holistic perspective on river ecosystems, enriching the effectiveness of in-river sensor stations for monitoring
- Great for engagement, outreach and education
- Quantifies habitat and can be compared across agencies and other orgs





