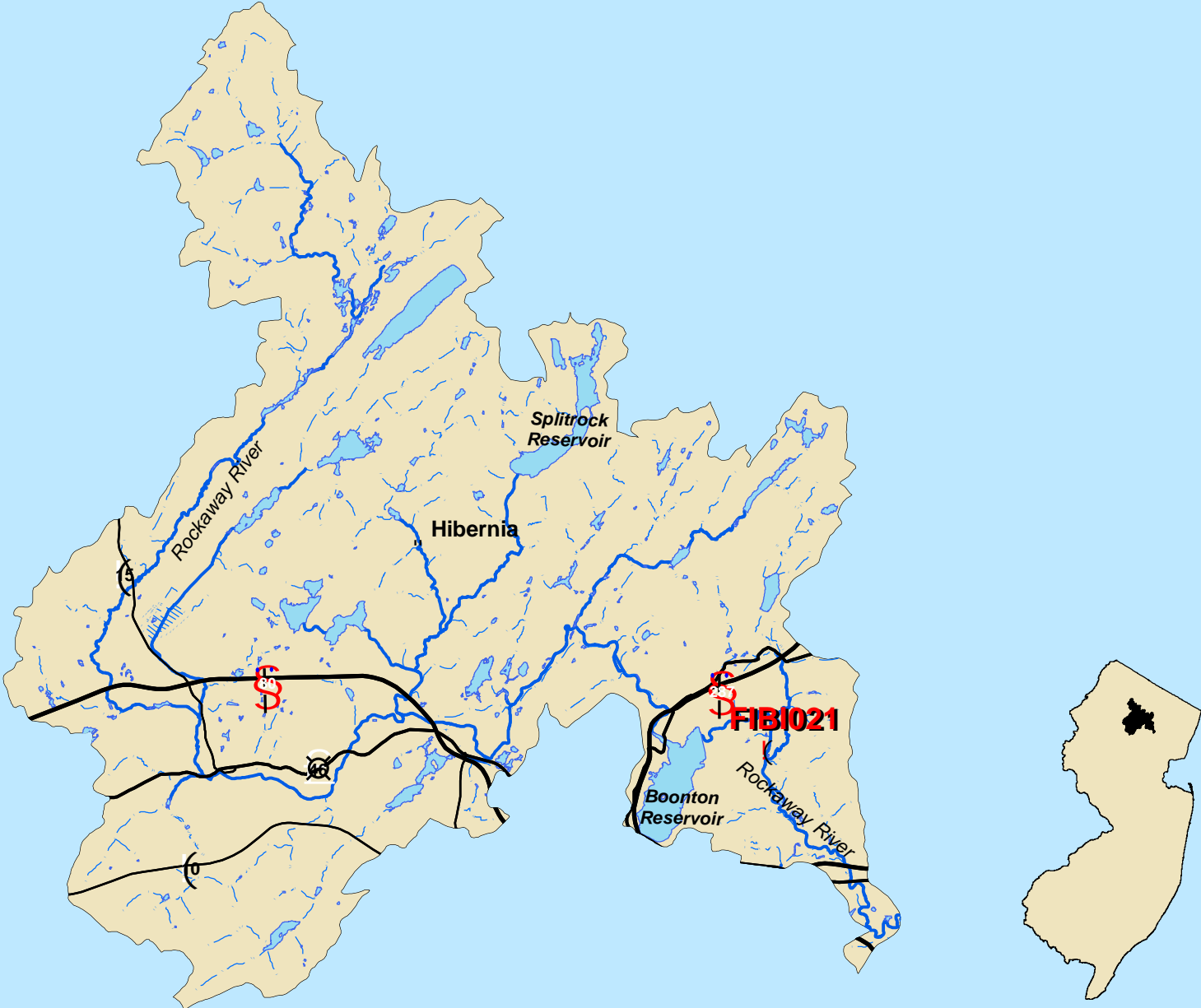
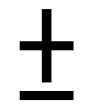
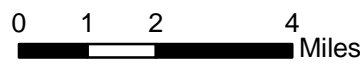


Rockaway River - FIBI021



| | |
|--|--------------------------------------|
| | FIBI Sampling Location |
| | Small Streams (1st and 2nd Order) |
| | Large Streams (3rd Order and Larger) |

| IBI Ratings | |
|-------------|-----------|
| | Excellent |
| | Good |
| | Fair |
| | Poor |



SUMMARY OF RESULTS – FIBI021

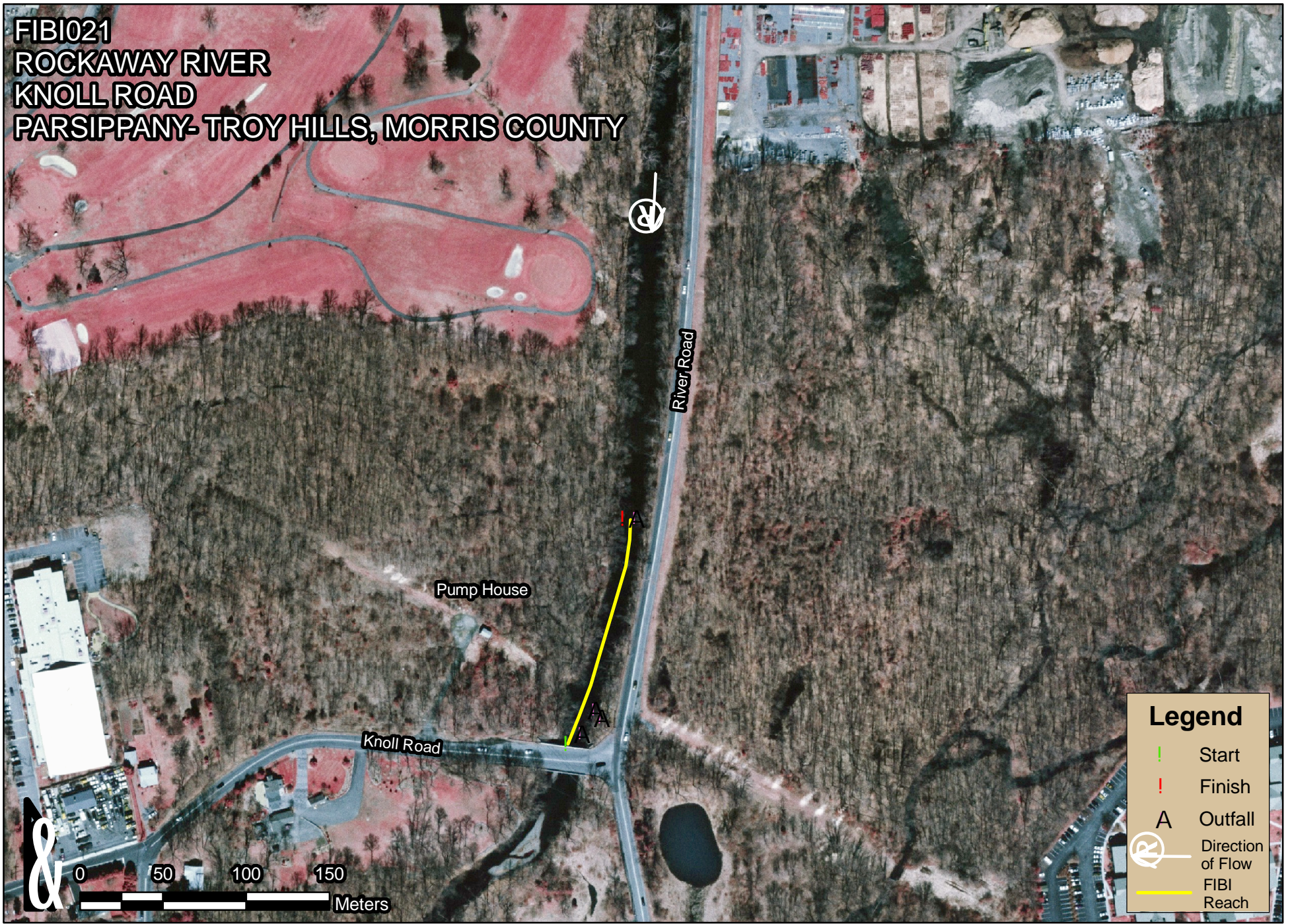


| | |
|---|---|
| 1. Stream Name: | Rockaway River |
| 2. Sampling Date: | 7/20/2006 |
| 3. Sampling Location: | Knoll Road |
| 4. Municipality: | Parsippany-Troy Hills |
| 5. County: | Morris |
| 6. Watershed Management Area: | 6 |
| 7. Contributing Drainage Area (Sq. Mi.): | 121.2 |
| 8. Electrofishing Gear: | Barge |
| 9. FIBI Score and Rating: | Round 1* Fair (34); Round 2 Poor (24) |
| 10. Habitat Score and Rating: | Round 1 Optimal (163); Round 2 Sub-Optimal (121) |
| 11. Fishable Species Present: | Yes |
| 12. Relevant AMNET ¹ Station Data: | |
| Proximity of FIBI station to AMNET station: | 1.4mi downstream AN0251 |
| AMNET Rating: | 1993 – Moderate; 1998 – Moderate; 2003 – Moderate |
| 13. Stream Chemistries: | |
| Dissolved Oxygen (mg/l) | 8.34 |
| Temperature °C. | 20.89 |
| pH | 6.95 |
| Conductivity (µmhos/cm) | 595 |
| 14. Length of Stream Sampled: | 150m |
| 15. Water Clarity: | Clear |
| 16. Average Open Forest Canopy: | 15% |
| 17. Discharge: | 23.6 cfs |
| 18. Substrate: | 35% Gravel/Sand, 40% Cobble, 5% Boulder, 5% Silt, 15% Bedrock |
| 19. Habitat: | 20% Riffle, 65% Run, 15% Pool |
| 20. Snags: | Yes |
| 21. Periphyton: | Moderate |
| 22. Submerged Aquatic Vegetation: | No |
| 23. Outfalls: | 4 |
| 24. Number of Fish Species Identified: | 18 |
| 25. Total Number of Fish Collected: | 753 |
| 26. Number of Fish With Anomalies: | 18 |
| 27. Other Observations: | Strong sewage smell |

¹ AMNET is the acronym for the DEP's ambient benthic macroinvertebrate monitoring network – a series of 820 monitoring stations located throughout the state's waterways that collects data on the health of bottom dwelling stream fauna which in turn is used to assess general water quality

* Round 1 data was scored prior to the FIBI metric recalibration.

**FIBI021
ROCKAWAY RIVER
KNOLL ROAD
PARSIPPANY- TROY HILLS, MORRIS COUNTY**



Legend

- ! Start
- ! Finish
- A Outfall
- (R) Direction of Flow
- FIBI
- Reach

FIBI021-Rockaway River @ Knoll Road
Date Sampled - 7/20/2006

Excellent Good Fair **Poor**

| | Score |
|--|--------------|
| # of Fish Species | 5 |
| # of Benthic Insectivorous Species (BI) (excluding White Suckers and Bullheads) | 1 |
| # of Trout and Centrarchid Species (excluding Green Sunfish and Bluegill) | 1 |
| # of Intolerant Species (IS) | 1 |
| Proportion of Tolerant Individuals | 3 |
| Proportion of Individuals as Generalists | 1 |
| Proportion of Individuals as Insectivorous Cyprinids | 3 |
| Proportion of Individuals as Trout *whichever gives better score OR Proportion of Individuals as Piscivores (excluding American Eel)* | 1 |
| # of Individuals in Sample (excluding Tolerant Species) | 5 |
| Proportion of Individuals w/disease/anomalies (excluding blackspot) | 3 |
| Total | 24 |

| Stream Rating | |
|----------------------|-----------|
| 45-50 | Excellent |
| 37-44 | Good |
| 29-36 | Fair |
| 10-28 | Poor |

HABITAT ASSESSMENT FOR HIGH GRADIENT STREAMS Rockaway River (FIBI021) – 7/20/06

| | Condition Category | | | | | | | | | | | | | | | | | | | | |
|--|---|----|----|----|----|--|----|----|----|----|---|---|---|---|---|---|---|---|---|---|---|
| | Optimal | | | | | Suboptimal | | | | | Marginal | | | | | Poor | | | | | |
| 1. Epifaunal Substrate /Available Cover | Greater than 70% of substrate favorable for epifaunal colonization and fish cover; mix of snags, submerged logs, undercut banks, cobble or other stable habitat and at stage to allow full colonization potential (i.e., logs/snags that are <u>not</u> new fall and <u>not</u> transient). | | | | | 40-70% mix of stable habitat; well-suited for full colonization potential; adequate habitat for maintenance of populations; presence of additional substrate in the form of newfall, but not yet prepared for colonization (may rate at high end of scale). | | | | | 20-40% mix of stable habitat; habitat availability less than desirable; substrate frequently disturbed or removed. | | | | | Less than 20% stable habitat; lack of habitat is obvious; substrate unstable or lacking. | | | | | |
| SCORE 13 | 20 | 19 | 18 | 17 | 16 | 15 | 14 | 13 | 12 | 11 | 10 | 9 | 8 | 7 | 6 | 5 | 4 | 3 | 2 | 1 | 0 |
| 2. Embeddedness | Gravel, cobble, and boulder particles are 0-25% surrounded by fine sediment. Layering of cobble provides diversity of niche space | | | | | Gravel, cobble, and boulder particles are 25-50% surrounded by fine sediment. | | | | | Gravel, cobble, and boulder particles are 50-75% surrounded by fine sediment. | | | | | Gravel, cobble, and boulder particles are more than 75% surrounded by fine sediment. | | | | | |
| SCORE 9 | 20 | 19 | 18 | 17 | 16 | 15 | 14 | 13 | 12 | 11 | 10 | 9 | 8 | 7 | 6 | 5 | 4 | 3 | 2 | 1 | 0 |
| 3. Velocity/Depth Regimes | All 4 velocity/depth regimes present (slow-deep, slow-shallow, fast-deep, fast-shallow). (slow is <0.3 m/s, deep is >0.5 m) | | | | | Only 3 of the 4 regimes present (if fast-shallow is missing, score lower than if missing other regimes). | | | | | Only 2 of the 4 habitat regimes present (if fast-shallow or slow-shallow are missing, score low). | | | | | Dominated by 1 velocity / depth regime (usually slow-deep). | | | | | |
| SCORE 14 | 20 | 19 | 18 | 17 | 16 | 15 | 14 | 13 | 12 | 11 | 10 | 9 | 8 | 7 | 6 | 5 | 4 | 3 | 2 | 1 | 0 |
| 4. Sediment Deposition | Little or no enlargement of islands or point bars and less than 5% (<20% for low-gradient streams) of the bottom affected by sediment deposition. | | | | | Some new increase in bar formation, mostly from gravel, sand or fine sediment; 5-30% (20-50% for low-gradient) of the bottom affected; slight deposition in pools. | | | | | Moderate deposition of new gravel, sand or fine sediment on old and new bars; 30-50% (50-80% for low-gradient) of the bottom affected; sediment deposits at obstructions, constrictions, and bends; moderate deposition of pools prevalent. | | | | | Heavy deposits of fine material, increased bar development; more than 50% (80% for low-gradient) of the bottom changing frequently; pools almost absent due to substantial sediment deposition. | | | | | |
| SCORE 10 | 20 | 19 | 18 | 17 | 16 | 15 | 14 | 13 | 12 | 11 | 10 | 9 | 8 | 7 | 6 | 5 | 4 | 3 | 2 | 1 | 0 |
| 5. Channel Flow Status | Water reaches base of both lower banks, and minimal amount of channel substrate is exposed. | | | | | Water fills >75% of the available channel; or <25% of channel substrate is exposed. | | | | | Water fills 25-75% of the available channel, and/or riffle substrates are mostly exposed. | | | | | Very little water in channel and mostly present as standing pools. | | | | | |
| SCORE 19 | 20 | 19 | 18 | 17 | 16 | 15 | 14 | 13 | 12 | 11 | 10 | 9 | 8 | 7 | 6 | 5 | 4 | 3 | 2 | 1 | 0 |
| 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 11 | 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 10 | 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 by facing downstream. | 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 6 (LB) | Left | 10 | 9 | | | 8 | 7 | 6 | | | 5 | 4 | 3 | | | 2 | 1 | 0 | | | |
| SCORE 7 (RB) | Right | 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 6 (LB) | Left | 10 | 9 | | | 8 | 7 | 6 | | | 5 | 4 | 3 | | | 2 | 1 | 0 | | | |
| SCORE 5 (RB) | Right | 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 2 (LB) | Left | 10 | 9 | | | 8 | 7 | 6 | | | 5 | 4 | 3 | | | 2 | 1 | 0 | | | |
| SCORE 9 (RB) | Right | 10 | 9 | | | 8 | 7 | 6 | | | 5 | 4 | 3 | | | 2 | 1 | 0 | | | |

HABITAT SCORE

121

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

FIBI021-R2

Rockaway River

07/20/2006

| Common Name | Scientific Name | Abundance | Size Range (inches) |
|-----------------------|-----------------------------------|------------------|----------------------------|
| Tessellated Darter | <i>Etheostoma olmstedii</i> | 228 | - |
| White Sucker | <i>Catostomus commersoni</i> | 168 | - |
| Blacknose Dace | <i>Rhinichthys atratulus</i> | 130 | - |
| Redbreast Sunfish | <i>Lepomis auritus</i> | 93 | 2.1 - 5.1 |
| Yellow Bullhead | <i>Ameiurus natalis</i> | 46 | 3.5 - 8.3 |
| Green Sunfish | <i>Lepomis cyanellus</i> | 28 | 1.7 - 4.4 |
| Banded Killifish | <i>Fundulus diaphanus</i> | 20 | - |
| Satinfin Shiner | <i>Cyprinella analostana</i> | 15 | - |
| Creek Chub | <i>Semotilus atromaculatus</i> | 9 | - |
| Alewife | <i>Alosa pseudoharengus</i> | 6 | - |
| Eastern Mudminnow | <i>Umbra pygmaea</i> | 2 | - |
| Western Mosquito Fish | <i>Gambusia affinis</i> | 2 | - |
| Yellow Perch | <i>Perca flavescens</i> | 1 | 3.3 - 3.3 |
| Spottail Shiner | <i>Notropis hudsonius</i> | 1 | - |
| Smallmouth Bass | <i>Micropterus dolomieu</i> | 1 | 2.5 - 2.5 |
| Redfin Pickerel | <i>Esox americanus americanus</i> | 1 | 6.3 - 6.3 |
| Bluegill | <i>Lepomis macrochirus</i> | 1 | 4.8 - 4.8 |
| American Eel | <i>Anguilla rostrata</i> | 1 | - |

Species Identified at Rockaway River (FIBI021)
(Not to Scale)



White Sucker



Blacknose Dace



Tessellated Darter



Yellow Bullhead

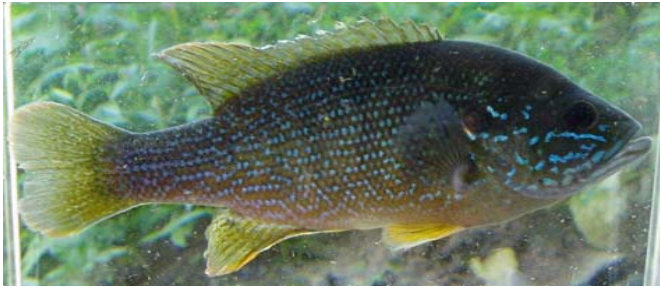


Satinfin Shiner



Redbreast Sunfish

Species Identified at Rockaway River (FIBI021)
(Not to Scale)



Green Sunfish



Redfin Pickerel



Creek Chub



Smallmouth Bass



Banded Killifish



Eastern Mudminnow

Species Identified at Rockaway River (FIBI021)
(Not to Scale)



Western Mosquitofish



American Eel



Spottail Shiner



Bluegill



Yellow Perch



Alewife