

Region SCR County Dane Report Date 1/2005 Classification CW B
 (Fr. Defaul...)

Water Body: Brewery Creek

Discharger: no discharge?

If stream is classified as Limited Forage Fish (LFF) or Limited Aquatic Life (LAL), check any of the following Use Attainability Analysis factors that are identified in the classification report:

- Naturally occurring pollutant concentrations prevent the attainment of use
- Natural, ephemeral, intermittent or low flow conditions or water levels prevent the attainment of the use, unless these conditions may be compensated for by the discharge of sufficient volume of effluent discharges without violating State water conservation requirements to enable uses to be met
- Human caused conditions or sources of pollution prevent the attainment of the use and cannot be remedied or would cause more environmental damage to correct than to leave in place
- Dams, diversions or other types of hydrologic modifications preclude the attainment of the use, and it is not feasible to restore the water body to its original condition or operate such modification in a way that would result in the attainment of the use
- Physical conditions related to the natural features of the water body, such as the lack of a proper substrate, cover, flow, depth, pools, riffles, and the like, unrelated to water quality, preclude attainment of aquatic life protection uses
- Controls more stringent than those required by sections 301(b) and 306 of the Act would result in substantial and widespread economic and social impact

Supporting Evidence in the report (include comments on how complete/thorough data is)

- Biological Data (fish/invert) HBI = 4-5, high # of tolerant fish
- Chemical Data (temp, D.O., etc.)
- Physical Data (flow, depth, etc.)
- Habitat Description
- Site Description/Map
- Other:

Historical Reports in file:

Additional Comments/How to improve report:

- previous poor conditions in Brewery Creek improving
 - 1985-2000 HBI increasing in quality
 - emphasis on benthic invertebrates

FISH AND AQUATIC LIFE DESIGNATED USE FORM
(Attach supporting data sheets)

JAN 21 2005

WATER QUALITY
MANAGEMENT

WATERBODY NAME: Brewery Creek WBIC# 1250200

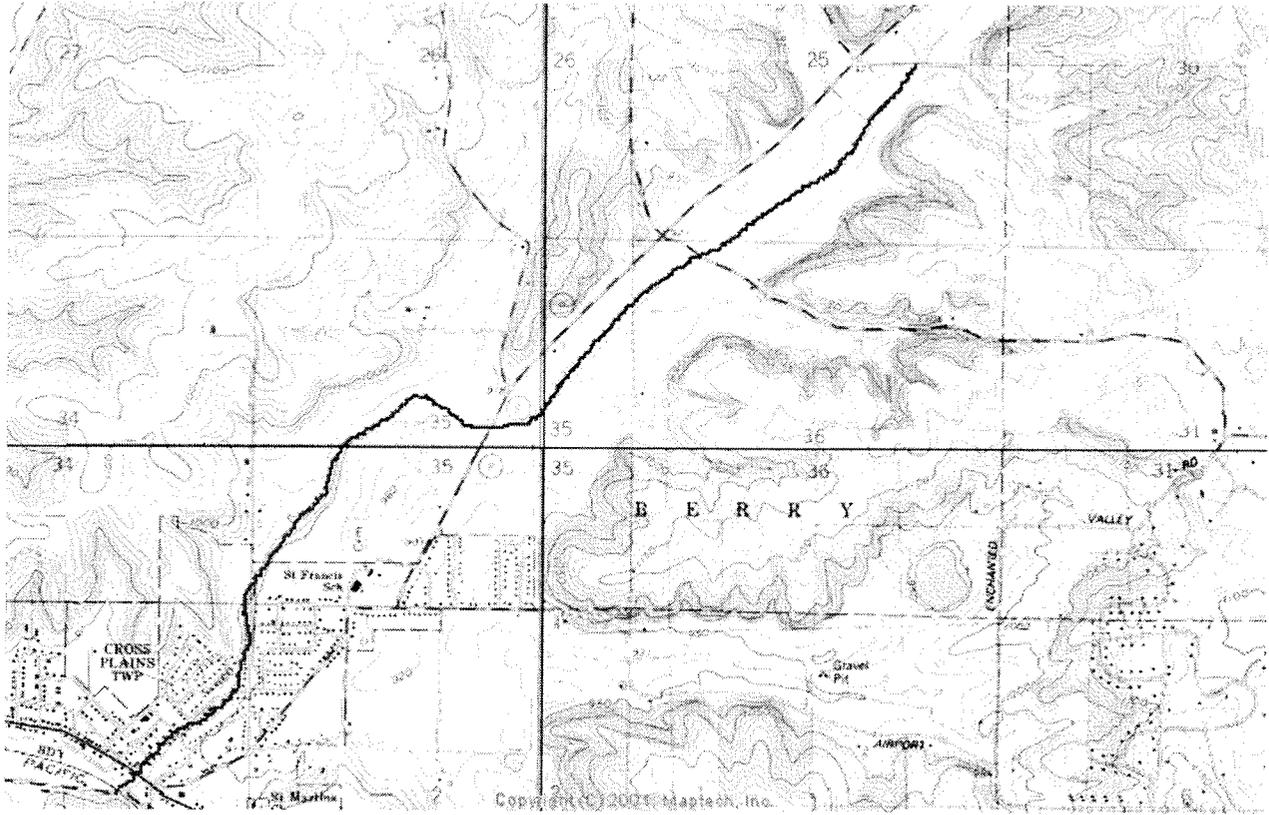
REGION South Central BASIN Lower Wisconsin COUNTY Dane

Segment Shown on Cross Plains and Black Earth Quad. Maps

Reference Site(s) _____, Attach class. form for reference site/condition.

SEGMENT DESCRIPTION for Segment 1 of 1 (headwater = segment 1)

From: Enchanted Valley Road downstream <u>3.8mi.</u> , km., ft., M.	lat/long 43 08 24.74 89 36 18.79	tn, rng, ¼, ¼, section T. 8 N. - R. 7 E, sw, ne, 25
To: Confluence with Black Earth Creek	lat/long 43 06 41.75 89 38 48.47	tn, rng, ¼, ¼, section T. 7 N. - R. 7 E, sw, ne, 3



DESIGNATED USE INFORMATION:

New Classification X , Standards Review _____, Ref. Site _____, Date field work conducted/completed 1999 - 2003

Current FAL Designated use WWFF (Default) , Date _____ (attach)

Existing FAL Use Based on current data Coldwater Communities B , Date _____

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Recommended Attainable Designated use Coldwater Communities B

Seasonal Designated use(s)/Dates _____

Other Applicable Uses: ORW _____, ERW _____, GL _____, GLS _____, Drinking Water Supply _____,
Recreation _____, Wild Life _____

Submitted By: <u> David W. Maxwell </u>	Date: <u> 1-18-05 </u>
Reviewed By: <u> Greg Seal </u>	Date: <u> 1/18/05 </u>
Approved Basin Leader: <u> [Signature] </u>	Date: <u> 1/18/05 </u>
WQS Sect. Chief, or Designee: _____	Date: _____

Methods

Biological:

Macroinvertebrate communities were sampled Spring and/or Fall beginning in October, 1999. A d-frame net was used to sample riffle habitats at two sites, Highway 14 and Brewery Road. Samples were submitted to the Biomonitoring Lab at UW-Stevens Point for processing and identification. Hilsenhoff (1987) developed the semi-quantitative methodology for sampling and Biotic Index calculation. The Hilsenhoff Biotic Index (HBI) utilizes sensitivity of various aquatic insects and crustaceans to organic pollution. The HBI water quality scale ranges from 0 to 10, with 0 indicating best possible water quality and 10 the worst.

Fish communities were sampled at least once per year beginning in October 1999. A towed barge with two electrodes was used to sample 160 meters of stream above Brewery Road. Lyons et al (1996) developed the sampling methodology and Coldwater Index of Biotic Integrity (IBI) calculation for assessing the environmental health of trout streams. The coldwater IBI is based on variable tolerances of different fish species to environmental degradation and scores range from 0 (worst) to 100 (best). Streams with a combination numerous trout, intolerant species and numerous individuals adapted to cold temperatures score the highest and indicate favorable conditions.

Results

A total of 10 macroinvertebrate samples were collected for this study from October 1999 to October 2002. In Figure 1, HBI values ranged from 4.19 (very good water quality) to 4.76 (good water quality). No significant differences ($P=0.05$) were detected either between sampling sites or before and after development. Results indicate that dissolved oxygen was favorable and that organic pollution was not significant throughout the four-year study period. Hilsenhoff's (1987) interpretation of the empirical results was the degree of organic pollution ranged from "possible slight to some" during the study period.

Fish communities were sampled six times for this study. A total of 10 species were collected and identified at least once. The list includes brown trout, **creekchub**, **fathead minnow**, **golden shiner**, **white sucker**, **yellow bullhead**, black bullhead, brook stickleback, **green sunfish**, and bluegill. The species in bold are considered tolerant to environmental degradation and no intolerant species were found. The high numbers of tolerant individuals ranged from 54% to 78% (Figure 3) was the primary reason IBI scores remained low throughout the entire study. IBI scores of 10 or 20 (Figure 3) were both fall within the "poor" range. Brown trout were relatively abundant in the small stream with numbers ranging from 22 to 46 (Figure 4) and percentages related to other species ranged from 16% to 46%. Brown trout size structure was variable during the study, with greater numbers of juvenile individuals from 1999 through 2001 and greater numbers of adults in 2002 and 2003. Legal size trout (≥ 9 ") ranged from 1 out of 37 in 2001 to 15 out of 26 in 2002 and 15 out of 44 in 2003 (Figure 4). The largest brown trout was 15.75".

Low IBI scores reflected a combination of no intolerant species and general lack of coldwater indicators, with the exception of brown trout, and numerous tolerant individuals. These findings suggest that Brewery Creek lacks some of the habitat characteristics of a good trout stream. While brown trout size structure did change during the study, the overall fish community structure remained the same.

Discussion

Differences in the macroinvertebrate and fish results are related to different metric objectives. The HBI is based on macroinvertebrate tolerances to organic pollution while the coldwater IBI is based on fish tolerances to a wide variety of environmental factors such as temperature and physical habitat. The results in combination suggest that organic loading is not a limiting factor in Brewery Creek but overall habitat is in poor condition.

Beginning in the mid-1980's, Brewery Creek became the focus of water quality evaluation as part of the Black Earth Creek Priority Watershed Project. Historic water quality, macroinvertebrate and limited fisheries data indicated that the stream was significantly impaired. At least one unpublished DNR report had described the stream as a point source affecting Black Earth Creek, Class 1 trout stream. Based on a recent report (Graczyk et al, 2003), best management practices implemented as part of the Priority Watershed Project did not significantly affect total phosphorus or suspended solids concentrations over time, but ammonia levels did decline. This result suggests that organic loading declined and is also reflected by a trend ($R^2 = .58$) of improved HBI scores (Figure 2). While fisheries data from Brewery Creek is limited, surveys performed prior to 1990 suggests the stream was significantly degraded (Figure 3). No trout were found during surveys performed in 1979 or 1989 and IBI scores were 0 or "very poor". Beginning in 1999, significant brown trout numbers were found in every survey beginning and coldwater IBI scores improved slightly. While the overall fish community is still considered unbalanced, the recent fish shocking surveys are consistent with macroinvertebrate collections and suggest improved conditions in Brewery Creek.

The improved conditions in Brewery Creek are beneficial for managing Black Earth Creek trout fisheries. Not only have organic loads declined in Brewery Creek, the small tributary also provides habitat for migrating brown trout and forage populations. During the 4-year study, we observed no setbacks to the improved water quality and fisheries in Brewery Creek as a result of the new subdivision development. A similar evaluation should be conducted on a stream with a more environmentally sensitive and therefore more responsive fish community.

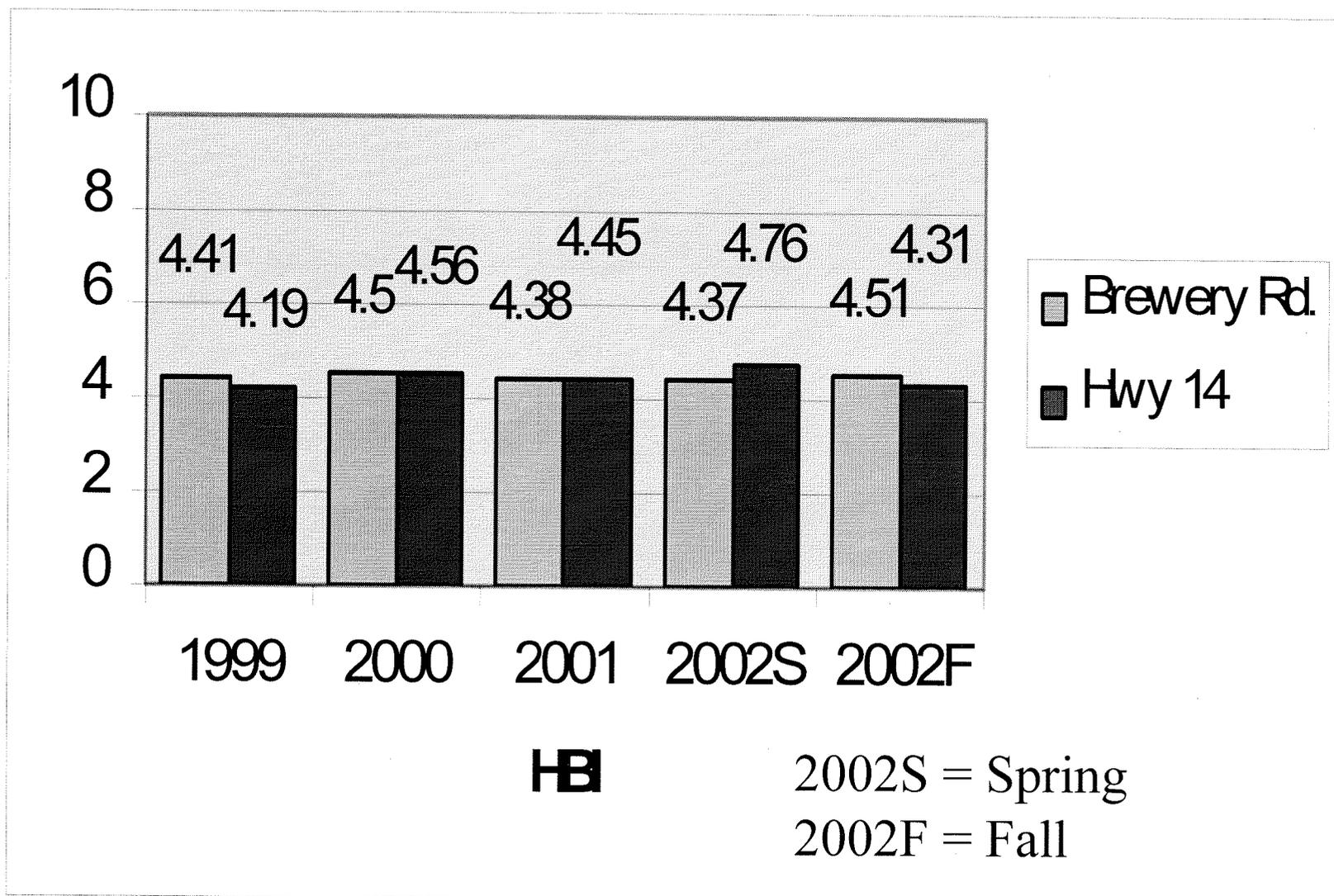
Fago, Don. 1992. Distribution and Relative Abundance of Fishes in Wisconsin. WDNR Tech Bull No. 175.

Graczyk, D.J., J. F. Walker, J.A. Horwath, and R.T. Bannerman. 2002. Evaluation of Effects of Best Management Practices in the Black Earth Creek Priority Watershed, Wisconsin, 1984-1998. USGS Water Resources Investigations Report 03-4163.

Hilsenhoff, William L. 1987. An Improved Biotic Index of Organic Stream Pollution. *The Great Lakes Entomologist*. Vol. 20, No. 1.

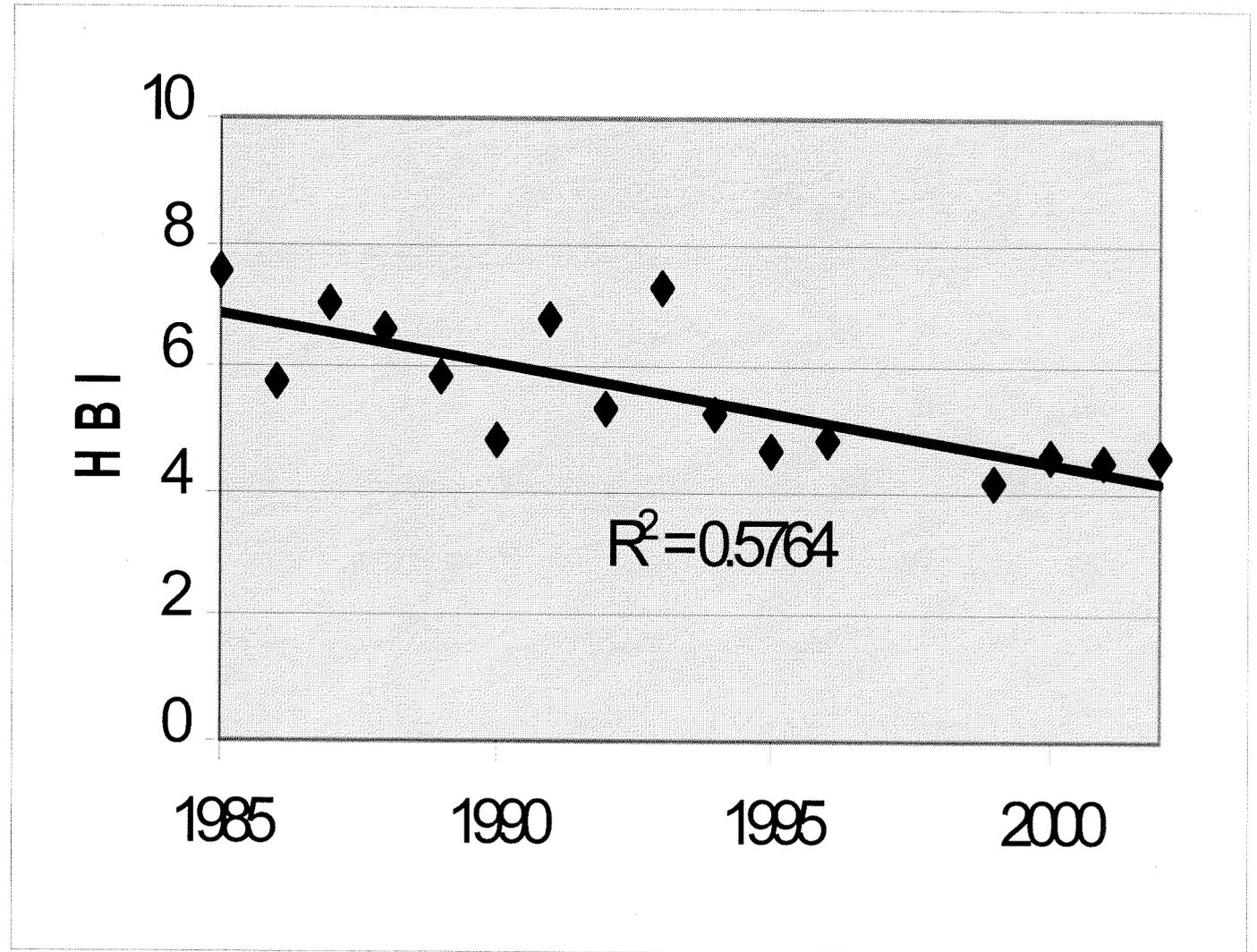
Lyons, John, Lizhu Wang, and Timothy D. Simonson. 1996. Development and Validation of an Index of Biotic Integrity for Coldwater Streams in Wisconsin. *North American Journal of Fisheries Management*. 16:241-256.

Figure 1: Brewery Creek Macroinvertebrate Results

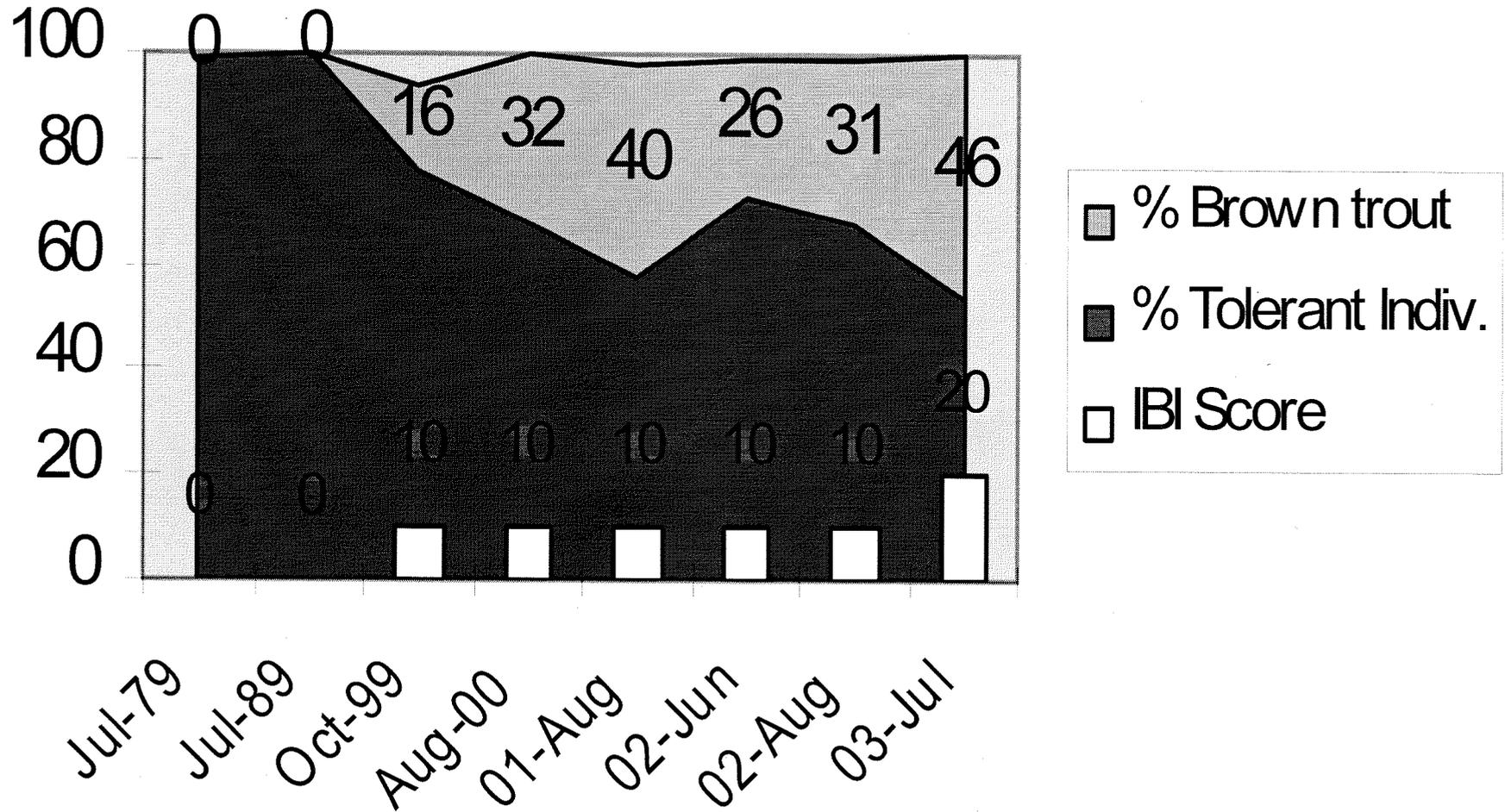


**Figure 2: Brewery Creek at Highway 14.
Macroinvertebrate Results**

1985	7.58
1986	5.77
1987	7.01
1988	6.57
1989	5.85
1990	4.83
1991	6.76
1992	5.35
1993	7.33
1994	5.25
1995	4.67
1996	4.81
1997	
1998	
1999	4.19
2000	4.56
2001	4.45
2002	4.54



**Figure 3: Brewery Creek Fish Shocking Results
1979 (Fago), 1989 (WDNR-SCR)**



**Figure 4: Brewery Creek above Brewery Road
Numbers of brown trout caught and % legal size**

