FY 2004 State Wildlife Grant (SWG)
Grant Proposal

PROJECT #: T-20 P-1

PROJECT TITLE: Evaluating streams in Illinois based on aquatic biodiversity

NEED:

This project is a "planning grant" to be used to refine Illinois' Comprehensive Wildlife Conservation Plan (CWCP).

In 1984, a Biological Stream Characterization (BSC) Work Group convened to develop a multi-tiered classification of stream biotic integrity based primarily on the attributes of fish communities. Throughout the BSC process, the fish-based Index of Biotic Integrity (IBI) was the predominant stream integrity indicator used (Bertrand et al. 1996), although macroinvertebrates and sportfish composition could be applied when developing a rating. The use of letter grades "A" through "E" for evaluated stream reaches established a means of communicating levels of biotic integrity to diverse stakeholders. The goal of BSC was to update stream ratings on an annual basis and to publish the revised BSC ratings every five years. However, the original stream ratings (Hite and Bertrand 1989) were only updated once by Bertrand et al. (1996); this update included streams sampled through 1993. Although widely used by Department of Natural Resource (DNR) employees and other stakeholders throughout Illinois, the BSC process is limited in scope (i.e., ratings primarily based on fish-based IBI values) and has not been updated routinely to provide current stream ratings.

In 1992, the Illinois Natural History Survey published a list of biologically significant Illinois streams (BSS) for the purpose of concentrating protection efforts on a reasonable number of streams, thereby protecting 100% of the stream-dependent biodiversity (Page et al. 1992). The BSS process expanded on BSC "A" rated streams by adding additional information on endangered and threatened species and on mussel diversity. The report by Page et al. (1992) recognized 132 streams as biologically significant. The BSS process addressed one of the BSC process's shortcomings by attempting to integrate multiple datasets into a stream rating. However, equal weight was given to all data used. For example, the presence of a diverse fish assemblage (i.e., high IBI score) was weighted the same as presence of a single threatened or endangered species. Similar to the BSC process, BSS was not updated on a regular basis; thus only ratings from 1992 exist.

Despite the lack of regular updates, both BSC and BSS processes generated products that are used extensively by local watershed groups, environmental interest groups, municipalities, consultants, as well as state and federal agencies. Thus, there exists considerable interest by a broad group of stakeholders in developing a process that ensures stream ratings can be continually updated, thereby eliminating the reliance on old data. Updated stream ratings generated with integrated aquatic biodiversity information and a process by which ratings could be updated as new data are collected would assist those implementing Illinois' CWCP in the following ways. First, the identification of biologically significant streams would assist in

identifying key habitats and community types that are worthy of protection (required element ii). Second, a tiered approach to rating streams would assist in identifying streams in need of restoration or improved conservation (required element iii). Further, the rating process would identify streams with insufficient data, thereby prioritizing survey efforts. Finally, a process for evaluating streams in Illinois based on aquatic biodiversity would assist in monitoring the effectiveness of proposed conservation actions, as well as allowing resource managers to respond appropriately to new information as it is collected (required element v). To address these needs, we propose this project which has the following objectives.

OBJECTIVES:

1. Determine approach for designating stream ratings.
2. Investigate availability and adequacy of statewide data for use in this process.
3. Overlay data on stream network in a geographic information system (GIS).
4. Identify stream ratings.
5. Document the rating process and generate map of stream ratings.

EXPECTED BENEFITS AND RESULTS:

The primary benefit of this project will be a detailed process by which streams can be evaluated based on their aquatic biodiversity. The updated stream ratings will be displayed on a map, which will be available in hard copy and on the CWCP's website. Although a map of updated ratings will be generated, the process established in this study will allow resource managers to calculate new stream ratings as additional data become available. The ability to continually update stream ratings is critical for the successful implementation of Illinois' CWCP because additional aquatic habitats and communities, which are key to the success of species in greatest need of conservation, may be identified through new survey data. Additionally, the prioritization of streams in need of restoration or improved conservation may be adjusted as new data are collected. Updated ratings will be essential to monitoring the effectiveness of proposed conservation actions. Further, this project will help identify data gaps, thereby helping to prioritize streams in need of survey data.

This project builds upon previous federal aid projects such as the stream classification and modeling project (State Wildlife Grant [SWG] T-03-P-001) and cooperative basin survey program (funded by F-67-R). The stream classification will provide a standardized naming convention for stream systems, however no measure of biotic integrity is assumed in the stream types. The results of this project will allow resource managers to evaluate stream ratings in terms of stream types, thereby making it possible to target restoration or protection measures regionally or by stream type. Through the cooperative basin survey program (i.e., F-67-R), IDNR stream biologists collect fish community and habitat data. This project will build upon those data by providing IDNR biologists with a tool for translating the raw data into a rating of

biological integrity, which can then be easily interpreted by the public. Overall this project will benefit the stream resources of Illinois by raising public awareness, promoting stewardship, and supporting restoration efforts.

APPROACH:

This study will be completed by a Research Scientist at the Illinois Natural History Survey located at the IDNR Headquarter's Building in Springfield, whom will work closely with IDNR staff involved in implementing Illinois' CWCP. The roles and responsibilities of Survey and IDNR staff will be identified through a memorandum of understanding.

JOB 1. Determine approach for designating stream ratings.

Previous BSC and BSS processes generated stream ratings statewide through varied approaches. The BSC process instituted a multi-tiered classification of stream biological integrity by assigning letter grades "A" through "E" to evaluated stream reaches. By comparison, the BSS process identified a subset of stream reaches "biologically significant", which meant remaining stream reaches were "not biologically significant" or were not evaluated. We anticipate that the development of a revised stream rating system will generate substantial interest from diverse users including, IDNR staff involved in implementing Illinois' CWCP, IDNR Divisions of Fisheries and Watershed Protection, Illinois Natural History Survey, Illinois Nature Preserves Commission, and the Illinois Environmental Protection Agency. Additional stakeholders include members of "green groups" such as The Nature Conservancy, Sierra Club, and Prairie Rivers. Therefore, the Research Scientist will invite a select group of partners from the Illinois Wildlife Action Plan's Partner list to a meeting at the IDNR Headquarter building in Springfield. During the meeting, the Research Scientist will lead a discussion regarding various rating approaches with the group of potential users, and will subsequently choose an approach that serves the needs of the Department as well as those identified by the other stakeholders.

JOB 2. Investigate availability and adequacy of statewide data for use in this process.

Past BSC and BSS processes relied on datasets such as fish-based IBI scores (Bertrand et al. 1996, Page et al. 1992); occurrences of threatened and endangered fishes, mussels, crayfishes, and vascular plants; and mussel assemblages. In this job, the Research Scientist will investigate the availability and adequacy of these and other datasets (e.g., macroinvertebrates) for use in the current project. Adequacy of datasets will be determined by the Research Scientist and will be based on the geographic extent and quality of collected samples. Quality will be judged based on the representativeness of the samples to the entire community and consistency of sampling protocols. Special emphasis will be placed on data that are routinely collected in an effort to ensure future updating of stream ratings can occur in a timely manner.

JOB 3. Overlay data on stream network in a geographic information system (GIS).

Several stream hydrology datasets are available for Illinois including Illinois Streams Information System (ISIS), Reach File 3 (RF3), and the National Hydrography Dataset (NHD).

Because aquatic faunal data are collected at sites (i.e., points) along the stream network, the stream layer selected as the base will be important in determining the scale at which point data are summarized. A stream classification and modeling system is under development as part of SWG project T-03-P-001 and will be completed by the time this project begins. Therefore, we will investigate the utility of using the valley segments generated as part of the stream classification project, which was built on the NHD, as the spatial unit for summarizing biotic data. If valley segments provide an inadequate scale for summarizing data, then streams from ISIS or RF3 will be used.

JOB 4. Identify stream ratings.

After data are overlain on the stream network, they will be summarized. Depending on the approach decided in Job 1, streams will be assigned a rating based on some compilation of the various datasets. Unlike the previous BSC and BSS processes that identified some high integrity or biologically significant streams based on the presence or score of a single data source, we envision using a combination of data to determine a stream's rating. The exact process will be determined after the range of data are investigated. After initial stream ratings are determined, a group of state experts will be asked to review the ratings as a validation of the process. Based on these reviews, the rating process may be adjusted to address concerns.

JOB 5. Document rating process and generate map of stream ratings.

The process used to combine data and subsequently to rate stream segments will be documented to ensure future updates can occur in a standardized manner. This approach, as well as a map of current stream ratings, will be presented in a final project report. The process and map will be made available on the CWCP website. Although Illinois' CWCP is due before this project will be completed, the information gathered through this effort will be essential for refining the plan. Initially, updated stream ratings may identify additional aquatic habitats and communities that are key to the success of species in greatest need of conservation. Additionally, the prioritization of streams in need of restoration or improved conservation may be adjusted as new data are collected. Updated ratings will be essential to monitoring the effectiveness of proposed conservation actions. Further, this project will help identify data gaps, thereby helping to prioritize streams in need of survey data.

PROJECT SCHEDULE:

	9/05	01/06	04/06	07/06	10/06	01/07	05/07
Job 1.	X	X	X				
Job 2.		X	X	X			
Job 3.				X	X		

Job 4.					X	X	
Job 5.						X	X

The following personnel from IDNR Office of Resource Conservation (ORC), One Natural Resources Way, Springfield, IL 62702 will manage this project:

Joel Cross
Head, Office of Resource Conservation - Watershed Protection Section
phone: (217) 785-8266
email: jcross@dnrmail.state.il.us

Additional staff involved in this project at the same location include:

Ann Marie Holtrop
Illinois Natural History Survey/ IDNR Watershed Protection Section
phone: (217) 785-4325
email: ahogan@dnrmail.state.il.us

Leon Hinz
Illinois Natural History Survey/ IDNR Watershed Protection Section
phone: (217) 785-8297
email: lhinz@dnrmail.state.il.us

Damon Stotts
Illinois Natural History Survey/ IDNR Office of Scientific Research and Analysis
phone: (217) 524-8538
email: dstotts@dnrmail.state.il.us

Steve Pallo
Office of Resource Conservation - Division of Fisheries
phone: (217) 524-4163
email: spallo@dnrmail.state.il.us

Scott Stuewe
Office of Resource Conservation - Division of Fisheries
phone: (217) 785-8263
email: sstuewe@dnrmail.state.il.us

Other staff involved in project include:

Robert Fischer, Ph.D.
Illinois Natural History Survey Adjunct/ Eastern Illinois University
Department of Biological Sciences
Charleston, IL 61920
phone: (217) 581-2817
email: cfruf@eiu.edu

John Epifanio, Ph.D.
Illinois Natural History Survey/ Center for Aquatic Ecology
607 E. Peabody Dr.
Champaign, IL 61820
phone: (217) 244-5059
email: epifanio@inhs.uiuc.edu

Bob Szafoni
Office of Resource Conservation - Division of Habitat Resources
1660 W. Polk Ave.
Charleston, IL 61920
phone: (217) 345-2420
email: bszafoni@dnrmail.state.il.us

Diane Tecic
Office of Resource Conservation - Division of Habitat Resources
4521 Alton Commerce Parkway
Alton, IL 62002
phone: (618) 462-1181

email: dtecic@dnrmail.state.il.us

LITERATURE CITED:

Bertrand, W. A., R. L. Hite, and D. M. Day. 1996. Biological stream characterization (BSC): Biological assessment of Illinois stream quality through 1993. Illinois Environmental Protection Agency, Bureau of Water, Springfield, IL. IEPA/BOW/96-058.

Hite R. L., and W. A. Bertrand. 1989. Biological stream characterization (BSC): A biological assessment of Illinois stream quality. Special Report #13 of the Illinois State Water Plan Task Force. IEPA/AC/89-275.

Page, L. M., K. S. Cummings, C. A. Mayer, S. L. Post, and M. E. Retzer. 1992. Biologically significant Illinois streams: An evaluation of the streams of Illinois based on aquatic biodiversity. Illinois Natural History Survey, Center for Biodiversity, Champaign, IL. Technical Report 1992(1).