

## **APPENDIX D:**

# **SURVEY APPROACH FOR COMPILATION OF HISTORICAL DATA**

## QUESTIONNAIRE SURVEY FOR EXISTING BIOSURVEY DATA AND BIOASSESSMENT INFORMATION

Ecological expertise and knowledge of the aquatic ecosystems of a state can reside in agencies and academic institutions other than the water resource agency. This expertise and historical knowledge can be valuable in problem screening, identifying sensitive areas, and prioritizing watershed-based investigations. Much of this expertise is derived from biological survey data bases that are generally available for specific surface waters in a state. A systematic method to compile and summarize this information is valuable to a state water resource agency.

The questionnaire survey approach presented here is modified from the methods outlined in the original RBP IV (Plafkin et al. 1989) and is applicable to various types of biological data. The purpose of this questionnaire survey is to compile and document historical/existing knowledge of stream physical habitat characteristics and information on the periphyton, macroinvertebrate, and fish assemblages.

The template questionnaire is divided into 2 major sections: the first portion is modeled after RBP IV and serves as a screening assessment; the second portion is designed to query state program managers, technical experts, and researchers regarding existing biosurvey and/or bioassessment data. This approach can provide a low cost qualitative screening assessment (Section 1) of a large number of waterbodies in a relative short period. The questionnaire can also prevent a duplication of effort (e.g., investigating a waterbody that has already been adequately characterized) by polling the applicable experts for available existing information (Section 2).

The quality of the information obtained from this approach depends on survey design (e.g., number and location of waterbodies), the questions presented, and the knowledge and cooperation of the respondents. The potential respondent (e.g., agency chief, program manager, professor) should be contacted initially by telephone to specifically identify appropriate respondents. To ensure maximum response, the questionnaire should be sent at times other than the peak of the field season and/or the beginning or end of the fiscal year. The inclusion of a self-addressed, stamped envelope should also increase the response rate. A personalized cover letter (including official stationery, titles, and signatures) should accompany each questionnaire. As a follow-up to mailings, telephone contact may be necessary.

Historical data may be limited in coverage and varied in content on a statewide basis, but be more comprehensive in coverage and content for specific watersheds. A clearly stated purpose of the survey will greatly facilitate evaluation of data from reaches that are dissimilar in characteristics. The identification of data gaps will be critical in either case. Regardless of the purpose, minimally impaired reference reaches may be selected to serve as benchmarks for comparison. The definition of minimal impairment varies from region to region. However, it includes those waters that are generally free of point source discharges, channel modifications, and/or diversions, and have diverse habitats, complex substrates, considerable instream cover and a wide buffer of riparian vegetation. Selection of specific reaches for consideration (e.g., range and extent) in the questionnaire survey is ultimately dependent on program objectives and is at the discretion of the surveyor. The questionnaire approach and the following template form allows considerable flexibility. Results can be reported as histograms, pie graphs, or box plots.

Questionnaire design and responses should address, when possible, the:

- ! extent of waterbody or watershed surveyed
- ! condition of the periphyton, macroinvertebrate and/or fish assemblage
- ! quality of available physical habitat
- ! frequency of occurrence of particular factors/causes limiting the biological condition
- ! effect of waterbody type and size on the spatial and temporal trends, if known
- ! likelihood of improvement or degradation based on known land use patterns or mitigation efforts

## BIOASSESSMENT/BIOSURVEY QUESTIONNAIRE

Date of Questionnaire Survey \_\_\_\_\_

This questionnaire is part of an effort to assess the biological condition or health of the flowing waters of this state. Our principle focus is on the biotic health of the designated waterbody as indicated by its periphyton, macroinvertebrate and/or fish community. You were selected to participate in this survey because of your expertise in periphyton, macroinvertebrate, and/or fish biology and your knowledge of the waterbody identified in this questionnaire.

Please examine the entire questionnaire form. If you feel that you cannot complete the form, check here [ ] and return it. If you are unable to complete the questionnaire but are aware of someone who is familiar with the waterbody and/or related bioassessments, please identify that person's name, address, and telephone number in the space provided below:

Contact: Name \_\_\_\_\_  
Address \_\_\_\_\_  
Agency/Institution \_\_\_\_\_  
Phone \_\_\_\_\_ Fax \_\_\_\_\_  
Email \_\_\_\_\_

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This questionnaire is divided into two major sections. Section 1 serves as a screening assessment and Section 2 is a request for existing biosurvey data and/or bioassessment results.

This form addresses the following waterbody:

\_\_\_\_\_ Waterbody

State: \_\_\_\_\_ County: \_\_\_\_\_ Lat./Long.: \_\_\_\_\_ Waterbody code: \_\_\_\_\_

Ecoregion: \_\_\_\_\_ Subcoregion: \_\_\_\_\_ Description of site/reach: \_\_\_\_\_

Drainage size: \_\_\_\_\_ Flow: <1cfs; 1-10cfs; >10cfs \_\_\_\_\_

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Description of data set (i.e., years, seasons, type of data, purpose of survey) \_\_\_\_\_

\_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_

# SECTION 1. SCREENING ASSESSMENT

Using the scale of biological conditions found in the following text box, please circle the rank that best describes your impression of the condition of the waterbody.

## SCALE OF CONDITIONS

- 5 Species composition, age classes, and trophic structure comparable to non (or minimally) impaired waterbodies of similar size in that ecoregion or watershed.
- 4 Species richness somewhat reduced by loss of some intolerant species; less than optimal abundances, age distributions, and trophic structure for waterbody size and ecoregion.
- 3 Intolerant species absent; considerably fewer species and individuals than expected for that waterbody size and ecoregion; trophic structure skewed toward omnivory.
- 2 Dominated by highly tolerant species, omnivores, and habitat generalists; top carnivores rare or absent; older age classes of all but tolerant species rare; diseased fish and anomalies relatively common for that waterbody size and ecoregion.
- 1 Few individuals and species present; mostly tolerant species; diseased fish and anomalies abundant compared to other similar-sized waterbodies in the ecoregion.
- 0 No fish, depauperate macroinvertebrate and/or periphyton assemblages.

(Circle one number using the scale above.)

1. Rank the current conditions of the reach

5      4      3      2      1      0

If impairment noted (i.e., scale of 1-3 given), complete each subsection below by **checking off** the most appropriate limiting factor(s) and probable cause(s). Clarify if reference is to past or current conditions.

## PHYSICOCHEMICAL

### (a.) WATER QUALITY

| Limiting Factor   | Probable Cause   |
|---|--|
| <ul style="list-style-type: none"> <li><input type="checkbox"/> Temperature too high</li> <li><input type="checkbox"/> Temperature too low</li> <li><input type="checkbox"/> Turbidity</li> <li><input type="checkbox"/> Salinity</li> <li><input type="checkbox"/> Dissolved oxygen</li> <li><input type="checkbox"/> Gas supersaturation</li> <li><input type="checkbox"/> pH too acidic</li> <li><input type="checkbox"/> pH too basic</li> <li><input type="checkbox"/> Nutrient deficiency</li> <li><input type="checkbox"/> Nutrient surplus</li> <li><input type="checkbox"/> Toxic substances</li> <li><input type="checkbox"/> Other (specify below)</li> <li style="margin-top: 5px;">_____</li> <li><input type="checkbox"/> Not limiting</li> </ul> | <ul style="list-style-type: none"> <li><input type="checkbox"/> Primarily upstream</li> <li><input type="checkbox"/> Within reach</li> <li style="margin-left: 20px;">Point source discharge</li> <li style="margin-left: 40px;"><input type="checkbox"/> Industrial</li> <li style="margin-left: 40px;"><input type="checkbox"/> Municipal</li> <li style="margin-left: 40px;"><input type="checkbox"/> Combined sewer</li> <li style="margin-left: 40px;"><input type="checkbox"/> Mining</li> <li style="margin-left: 40px;"><input type="checkbox"/> Dam release</li> <li style="margin-left: 20px;">Nonpoint source discharge</li> <li style="margin-left: 40px;"><input type="checkbox"/> Individual sewage</li> <li style="margin-left: 40px;"><input type="checkbox"/> Urban runoff</li> <li style="margin-left: 40px;"><input type="checkbox"/> Landfill leachate</li> <li style="margin-left: 40px;"><input type="checkbox"/> Construction</li> <li style="margin-left: 40px;"><input type="checkbox"/> Agriculture</li> <li style="margin-left: 40px;"><input type="checkbox"/> Feedlot</li> <li style="margin-left: 40px;"><input type="checkbox"/> Grazing</li> <li style="margin-left: 40px;"><input type="checkbox"/> Silviculture</li> <li style="margin-left: 40px;"><input type="checkbox"/> Mining</li> <li><input type="checkbox"/> Natural</li> <li><input type="checkbox"/> Unknown</li> <li><input type="checkbox"/> Other (specify below)</li> <li style="margin-top: 5px;">_____</li> </ul> |

### (b.) WATER QUANTITY

| Limiting Factor   | Probable Cause  |
|---|---|
| <ul style="list-style-type: none"> <li><input type="checkbox"/> Below optimum flows</li> <li><input type="checkbox"/> Above optimum flows</li> <li><input type="checkbox"/> Loss of flushing flows</li> <li><input type="checkbox"/> Excessive flow fluctuation</li> <li><input type="checkbox"/> Other (specify below)</li> <li style="margin-top: 5px;">_____</li> <li><input type="checkbox"/> Not limiting</li> </ul> | <ul style="list-style-type: none"> <li><input type="checkbox"/> Dam</li> <li><input type="checkbox"/> Diversion</li> <li style="margin-left: 20px;">Watershed conversion</li> <li style="margin-left: 40px;"><input type="checkbox"/> Agriculture</li> <li style="margin-left: 40px;"><input type="checkbox"/> Silviculture</li> <li style="margin-left: 40px;"><input type="checkbox"/> Grazing</li> <li style="margin-left: 40px;"><input type="checkbox"/> Urbanization</li> <li style="margin-left: 40px;"><input type="checkbox"/> Mining</li> <li><input type="checkbox"/> Natural</li> <li><input type="checkbox"/> Unknown</li> <li><input type="checkbox"/> Other (specify below)</li> <li style="margin-top: 5px;">_____</li> </ul> |

## BIOLOGICAL/HABITAT

(Check the appropriate categories)

| (a.) Limiting Factor                           | HABI | PERI | MACR | FISH |
|--|------|------|------|------|
| Insufficient instream structure                |      |      |      |      |
| Insufficient cover                             |      |      |      |      |
| Insufficient sinuosity                         |      |      |      |      |
| Loss of riparian vegetation                    |      |      |      |      |
| Bank failure                                   |      |      |      |      |
| Excessive siltation                            |      |      |      |      |
| Insufficient organic detritus                  |      |      |      |      |
| Insufficient woody debris for organic detritus |      |      |      |      |
| Frequent scouring flows                        |      |      |      |      |
| Insufficient hard surfaces                     |      |      |      |      |
| Embeddedness                                   |      |      |      |      |
| Insufficient light penetration                 |      |      |      |      |
| Toxicity                                       |      |      |      |      |
| High water temperature                         |      |      |      |      |
| Altered flow                                   |      |      |      |      |
| Overharvest                                    |      |      |      |      |
| Underharvest                                   |      |      |      |      |
| Fish stocking                                  |      |      |      |      |
| Non-native species                             |      |      |      |      |
| Migration barrier                              |      |      |      |      |
| Other (specify) _____                          |      |      |      |      |
| Not limiting                                   |      |      |      |      |

**Key:**

HABI - Habitat

PERI - Periphyton

MACR - Macroinvertebrates

FISH - Fish

| <b>(b.) Probable Cause</b>       | <b>HABI</b> | <b>PERI</b> | <b>MACR</b> | <b>FISH</b> |
|----------------------------------|-------------|-------------|-------------|-------------|
| Agriculture                      |             |             |             |             |
| Silviculture                     |             |             |             |             |
| Mining                           |             |             |             |             |
| Grazing                          |             |             |             |             |
| Dam                              |             |             |             |             |
| Diversion                        |             |             |             |             |
| Channelization                   |             |             |             |             |
| Urban encroachment               |             |             |             |             |
| Snagging                         |             |             |             |             |
| Other channel modifications      |             |             |             |             |
| Urbanization/impervious surfaces |             |             |             |             |
| Land use changes                 |             |             |             |             |
| Bank failure                     |             |             |             |             |
| Point source discharges          |             |             |             |             |
| Riparian disturbances            |             |             |             |             |
| Clear cutting                    |             |             |             |             |
| Mining runoff                    |             |             |             |             |
| Stormwater                       |             |             |             |             |
| Fishermen                        |             |             |             |             |
| Aquarists                        |             |             |             |             |
| Agency                           |             |             |             |             |
| Natural                          |             |             |             |             |
| Unknown                          |             |             |             |             |
| Other (specify) _____            |             |             |             |             |

**Key:**



HABI - Habitat  
MACR - Macroinvertebrates

PERI - Periphyton  
FISH - Fish

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**SUMMARY: ASPECT OF PHYSICOCHEMICAL OR BIOLOGICAL CONDITION  
AFFECTED**

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- Water quality
- Water quantity
- Habitat structure
- Periphyton assemblage
- Macroinvertebrate assemblage
- Fish assemblage
- Other (specify) \_\_\_\_\_

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## SECTION 2. AVAILABILITY OF DATA

Please complete this section with applicable response(s) and fill in the blanks with appropriate information based on your knowledge of available biosurvey and bioassessment information.

Reach characterized by:

- |  |                                     |                                      |
|--|-------------------------------------|--------------------------------------|
| <input type="checkbox"/> Stream habitat surveys    |                                     |                                      |
| <input type="checkbox"/> Periphyton surveys        | assemblage <input type="checkbox"/> | key species <input type="checkbox"/> |
| <input type="checkbox"/> Macroinvertebrate surveys | assemblage <input type="checkbox"/> | key species <input type="checkbox"/> |
| <input type="checkbox"/> Fish surveys              | assemblage <input type="checkbox"/> | key species <input type="checkbox"/> |

Sampling gear(s) or methods

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Sampling frequency (spatial and temporal)

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Data analysis/interpretation based on:

- Tabulated data   
Graphical data   
Multivariate analyses.   
Multimetric approach.

Electronic file available:

Format \_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_

Statistical routines include:

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Metrics include:

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