

MEETING SUMMARY

WORKING GROUP ON HEALTHY FISH HABITATS:  
CREATING BENCHMARKS FOR SUCCESS

A Workshop in Support of the Development of a National Fish Habitat Plan

Held at the

American Fisheries Society Annual Meeting

August 22<sup>nd</sup>, 2004  
Madison, Wisconsin

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## MEETING SUMMARY

### WORKING GROUP ON HEALTHY FISH HABITATS: CREATING BENCHMARKS FOR SUCCESS

August 22<sup>nd</sup>, 2004

Madison, Wisconsin

#### INTRODUCTION

In late 2003, the Sport Fishing and Boating Partnership Council (SFBPC), recommended that a National Aquatic Habitat Plan be developed to begin addressing the issues causing serious declines in the nation's aquatic species. Concurrently, at their fall 2003 meeting, the state directors of fish and wildlife agencies, acting through the International Association of Fish and Wildlife Agencies (IAFWA), decided to take an active role in shaping the fisheries habitat initiative. In the succeeding months, the SFBPC hosted a series of five stakeholder meetings around the U.S. to obtain general input into the habitat-related needs of potential partners.

Recognizing that a successful habitat initiative must be founded in good science, the SFBPC, IAFWA, and the US Fish and Wildlife Service turned to the American Fisheries Society (AFS) to help tap the needed expertise of the AFS members. Supported in this effort by other federal agencies (including the U.S. Geological Survey and the National Marine Fisheries Service) and the National Fish and Wildlife Foundation, AFS convened a working group of its members in August, 2004 to address broad issues pertaining to the measurement of aquatic habitat condition. This report summarizes the results of that meeting.

#### PURPOSE OF WORKSHOP

The "Working Group On Healthy Fish Habitats: Creating Benchmarks For Success" was designed to be the *initial* meeting of the scientific community to begin establishing a solid scientific foundation for a national fish habitat plan. It is anticipated that the workshop will be the first in a series of events to engage this community in the development and continuing evolution of this initiative. More specifically, the desired outcomes of the session were to identify:

- ◆ The quantitative indicators of habitat health (both quality and quantity of habitat) at various geographic scales (i.e., local, regional, national).
- ◆ The appropriate means to measure habitat condition, including data standards, that may be necessary.

#### PARTICIPANTS

Announcements were made to all AFS members and other interested professionals to participate in the workshop discussions and approximately 125 individuals took part. These included approximately 40 state representatives (representing 20 state agencies), 22 individuals representing 16 universities, 35 federal participants representing 7 federal agencies, and several

Canadian provincial and federal government representatives as well as private sector and NGO representatives.

## PROCESS

The workshop was designed to maximize the participants' ability to contribute their thoughts and ideas within a fairly narrow time span. Approximately two hours were invested in the morning to prepare participants with the basic information necessary to help constructively participate in the breakout groups. Additionally, materials were available for several weeks prior to the meeting via a website specifically created for this purpose ([www.fishhabitat.org](http://www.fishhabitat.org)).

Following these brief presentations, participants were separated into five breakout groups of approximately 23-25 individuals each. These groups were led by a facilitator and were given the charge to address the two primary objectives outlined for the workshop. Breakout facilitators utilized techniques that were unique to each group to solicit and capture the thoughts of the members within their group. Following approximately 4.5 hours in the breakout sessions, the entire group reconvened for wrap-up summaries from each group and from workshop organizers/sponsors. Appendix I outlines the agenda for the day.

## OUTCOMES

Much of the discussion captured in the notes of the breakout sessions understandably relates to the process of each group in reaching conclusions or consensus on the objectives outlined. While this material is valuable as background for understanding the working of the group, the final discussions regarding the quantitative measures of habitat condition contain the information that is desired. Only the components of the breakout sessions regarding identified indicators are reported here.

Due to the breadth of expertise involved in this process and geographic regions represented by participants, a wide range of indicators were identified. Determining which of these indicators is suitable for a national initiative is the challenge. All groups established a classification system for variables. The most common of these classifications is adapted and used in this report for summarizing results. This classification scheme consists of placing indicators into one of seven areas: Water Quantity, Water Quality, Physical Attributes (of waters), Biological Attributes, Characteristics of Watersheds, Socioeconomic Parameters, and Miscellaneous.

### *Analysis 1: Common Indicators*

The first analysis of the input from each of the breakout sessions is to summarize the variables that were *suggested* by groups according to their frequency of occurrence across groups. Table 1 summarizes these results. Note that some interpretation was necessary to correctly characterize each variable. This interpretation was made by referring back to the discussion as recorded in the notes and was used to consolidate identical variables that were identified by multiple groups but which were worded in varying ways. Additionally, one group "suggested" more than 80 variables (many of which overlapped with other groups) but considered only twenty-seven

important enough to rank (i.e., the remaining variables did not receive any votes during a subsequent ranking process). Only those twenty-seven were included in this analysis.

As can be seen in Table 1, all five groups tended to converge around a few common variables within each of the seven classifications. This is not to say that variables that were listed by only four or fewer groups are unimportant, but simply highlights the areas of overlap in thinking between groups. Within each classification, the common variables (generally identified by five groups) are:

*Analysis I Variables*

<u>Classification</u>	<u>Variable</u>
Water Quantity	Flow
Water Quality	a) Chemical Parameters (O <sub>2</sub> , pH, temperature, etc.); b) Indices of Sediment/turbidity/solids
Physical Attributes	a) Geomorphology/ Channel Characterization; b) Cover/woody debris
Biological Attributes	Fish stock Assessment (status and trends)
Characteristics of Watersheds	a) Riparian habitat quality (including canopy, land cover, etc.) b) Land Use Patterns.
Socioeconomic Parameters	Fishing participation (2 groups only) Health Advisories/risk assessment (3 groups only)
Miscellaneous	Fluvial Processes (2 groups only)

*Analysis II: Prioritizing Indicators*

Another way of measuring overlap between the groups is to analyze the prioritization that each group placed on certain variables. Three of the five groups conducted some form of prioritization exercise to the specificity needed for this analysis (the other two focused on broader areas that have been termed the “classification” system previously in this report). Generally, this consisted of initially listing parameters without judgment, followed by a ranking exercise designed to sort the variables of greatest importance. Table 2 summarizes the results of each group’s ranking. This listing highlights variables receiving five or more “votes” within the specific group. If the parameters in Table 2 are rearranged to fit within the classifications as discussed above (Table 3), and merged into a single group, the results are similar in many ways to those of Analysis I:

*Analysis II Variables*

<u>Classification</u>	<u>Variable</u>
Water Quantity	Hydrologic/flow indicators; Water volume.
Water Quality	Chemical parameters; Sediment; Clean Water Act indicators.
Physical Attributes	Stream channel characteristics; Habitat Connectivity; Connectivity with fluvial process; Quantity/quality/trends of specific habitat.
Biological Attributes	Fish diversity; Fish community structure (related to recreational fishing); Fish community index (IBI and others); Invertebrate index; Presence/absence of indicator species; Measurement of biological integrity; Spread of undesired invasive species.
Characteristics of Watersheds	Change in land use patterns; Riparian Condition; Watershed integrity.
Socioeconomic Parameters	Risk assessment/public expectation of waterbody.
Miscellaneous	Sustainability; Quantification of changes from benchmark indicators; Absence/presence of specifically outlined conditions.

Note that some variables appear in the summary of Analysis II but not in Analysis I. This is due to the fact that a variable may have been suggested by fewer than five groups (and therefore did not appear in the summary of Analysis I) but it received a high enough score in the ranking process of groups to appear as a priority in one or more groups (Analysis II).

*Combining Results of Analysis I and II*

There is a great deal of overlap in the variables identified through Analysis I (most frequently mentioned variables) and Analysis II (highest ranked variables). It is not completely surprising that the result of Analysis I and Analysis II are similar. In effect, the frequency of occurrence of any given variable across multiple groups is a type of ranking. This overlap does provide some indication, however, that the best expert opinions across groups are similar in nature.

*Combined Variables from Analysis I and II*

<u>Classification</u>	<u>Variable</u>
Water Quantity	Hydrologic/flow indicators; Water volume; Water Flow.
Water Quality	Chemical parameters; Sediment, turbidity, and solids Clean Water Act indicators.
Physical Attributes	Stream channel characteristics; Habitat Connectivity; Connectivity with fluvial process; Quantity/quality/trends of specific habitat; Cover/woody debris.
Biological Attributes	Fish diversity/fish stock assessment (status and trends); Fish community structure (related to recreational fishing); Fish community index (IBI and others); Invertebrate index; Presence/absence of indicator species; Measurement of biological integrity; Spread of undesired invasive species.
Characteristics of Watersheds	Change in land use patterns; Riparian Condition; Watershed integrity.
Socioeconomic Parameters	Fishing participation; Risk assessment/health advisories/public expectation.
Miscellaneous	Sustainability; Quantification of changes from benchmark indicators; Absence/presence of specifically outlined conditions; Fluvial processes.

DISCUSSION

The indicators provided in this workshop are broad in nature. The specific quantitative measurements (i.e., levels, thresholds, etc.) that would be applied to describe “healthy” habitats versus “nonhealthy” habitats still need to be determined. Concurrently, the precise definition of each indicator must also be refined.

By combining and reviewing the overall results of the “most common” variables and “prioritized” variables, it is evident that no single classification of variables will provide the universal descriptor of habitat condition. The variables highlighted range from in-water measures (i.e., chemical parameters, etc.) to broad scale watershed measures (i.e., land use parameters). They include biotic measures (i.e., fish population indices) and abiotic measures (i.e., channel morphology) as well as anthropogenic measures (i.e., fishing participation, public expectations, etc.). This diversity of indices inevitably leads to a holistic concept of applying multiple “indicators of habitat condition.” Such a combination should include elements from each

of the classifications (water quality, water quantity, watershed attributes, etc.). Under this classification system, the condition of fish habitats will be described by a matrix of elements that relate not only to in-water habitat but to the overall condition of the watershed of concern. The scale at which these watersheds are described can be outlined within the scope of a national framework.

With broad geographic representation in this workshop, the detail of input did not enable the determination of the applicability (or lack thereof) of each indicator within different geographic regions of the country. Despite this, the indicators that did emerge as “common” or “prioritized” are, for the most part, applicable across a broad spectrum of habitats. This is precisely the level of information that a national framework for a fish habitat plan would need.

From this broad framework, geographically-specific sub-plans (at the regional, watershed, state, or local scales, for example) could be developed, customizing and refining each of the indicators to their specific area. For example, each parameter could be assigned a minimum (or limiting) score or criteria. Only by meeting the minimum in each can “healthy” conditions be assigned. Evaluation of multiple parameters could provide an overall, watershed-based characterization of healthy/unhealthy/threatened status (or similar categorization). The figure below provides a hypothetical example of how an analysis of a waterbody may appear using a green (“healthy”), yellow (moderate) or red (unhealthy) ranking system on the variables identified in this workshop. The threshold levels that each variable would need to meet in order to be assigned to one of the condition categories (red, yellow, green) would need to be determined through further analysis, as would the definitions used to describe the overall condition of the waterbody under various combinations of the variable conditions.

Hypothetical Waterbody Assessment

<u>Classification</u>	<u>Indicator Status</u>		
	<u>Green</u>	<u>Yellow</u>	<u>Red</u>
<b>Water Quantity</b>			
Hydrologic/flow indicators;	X		
Water volume;	X		
Water Flow	X		
<b>Water Quality</b>			
Chemical parameters;		X	
Sediment/turbidity			X
Clean Water Act indicators.		X	
<b>Physical Attributes</b>			
Stream channel characteristics;	N/A		
Habitat Connectivity;	X		
Connectivity with fluvial process;	X		
Quantity/quality/trends of specific habitat;		X	
Cover/woody debris.		X	
<b>Biological Attributes</b>			
fish stock status and trends		X	
Fish community structure (related to recreational fishing);		X	
Fish community index (IBI and others);		X	
Invertebrate index;			
Presence/absence of indicator species;	X	X	
Measurement of biological integrity;	X		
Spread of undesired invasive species.	X		
<b>Characteristics of Watersheds</b>			
Change in land use patterns		X	
Riparian Condition;			X
Watershed integrity.		X	
<b>Socioeconomic Parameters</b>			
Fishing participation;	X		
Risk assessment/public expectation of waterbody.		X	



## CONCLUSION

As emphasized throughout the workshop, the discussion initiated at that meeting was a beginning, not an end, to the process. The input provided by workshop participants will help to form a solid basis for the development of indicators of fish habitat health that can be used within a framework of a national fish habitat plan.

If development of a national fish habitat plan conceptually follows the path used for developing the North American Waterfowl Plan, then a permanent scientific advisory capability will be integrated within the process. As science and the scientific community's understanding of factors that impact aquatic habitat advances, these changes can be reflected in an ever-evolving plan. The input received during the "*Working Group on Healthy Fish Habitats: Creating Benchmarks for Success*" provides a solid basis for the initial integration of science into a national framework.

## ACKNOWLEDGEMENTS

Financial and logistical support for this workshop were provided by The U.S. Fish and Wildlife Service, International Association of Fish and Wildlife Agencies, American Fisheries Society, Sport Fishing and Boating Partnership Council, National Fish and Wildlife Foundation, and Bass Pro Shops. We are grateful to the members of the workshop steering committee for their direction and support:

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The organizers and sponsors would also like to thank the facilitators and recorders who participated in this workshop, including: Dave Case and Gwen White of DJ Case Associates; Jacob Faibisch of the IAFWA Management Assistance Team; Chris Horsch and Todd Jones of the U.S. Fish and Wildlife Service's National Conservation Training Center; Jason Goldberg And Mike Weimer of the U.S. Fish and Wildlife Service's Fish and Wildlife Management Assistance Branch, and; Katrina Mueller and Andrea Gray of Michigan State University.

We are most grateful to the participants, and their supporting organizations, who donated their time, energy, and expert input to the successful outcome of this workshop.

Table 1. Number of groups suggesting each criterion

	<u>FIVE</u> Water Flow	<u>FOUR</u>	<u>THREE</u>	<u>TWO</u>	<u>ONE</u> Water Depth
<b>WATER QUANTITY</b>					"Run of river" or natural stream flow  Water volume  Water withdrawals
<b>WATER QUALITY</b>	Chemical Parameters (O2, pH, temperature, etc.)  Indices of Sediment/ turbidity/solids		% impaired surface waters (303d)  Clean Water Act criteria	Nutrient levels  Toxins	% organic matter in sediments  Pollution levels  Bacterial counts  Salinity regimes
<b>PHYSICAL ATTRIBUTES</b>	Geomorphology/ Channel Characterization  Cover/woody debris	Connectivity (fish passage)			Habitat Complexity  Essential Fish Habitat Measures
<b>BIOLOGICAL</b>	Fish stock Assessment (status and trends)	IBI or other indices  Undesired invasive species	Fish Distribution  Fish community structure  Sustainable populations/natural reproduction	Fish health characteristics	Seasonal Abundance  Fish Diversity  Biological/Genetic Integrity  Trophic state of lakes

Table 1 (continued)

	<u>FIVE</u>	<u>FOUR</u>	<u>THREE</u>	<u>TWO</u>	<u>ONE</u>
<b>BIOLOGICAL (continued)</b>					Aquatic vegetation Invertebrate community Chlorophyll Presence/absenc e of indicator species
<b>WATERSHED ATTRIBUTES</b>	Riparian habitat quality (including canopy, land cover, etc.)		Impervious surface/shoreline development	Road density/crossings, etc.	Landscape fragmentation
	Land use patterns		Human population		Watershed Management practices
<b>SOCIO- ECONOMIC</b>			Health advisories/Risk assessment/publi c perception	Attitudes and behaviors of shoreline property owners. Fishing participation	Economic benefit.  Fishing rates/success  Fishkill frequency  Miles/acres pf fishable waters.
<b>MISCELLANEOUS ATTRIBUTES</b>				Fluvial processes	"Unaltered state"/baseline indicators  Basin-wide Assessments

Table 2. Indicators of habitat condition highlighted (or ranked) by individual breakout groups (in order of ranking where applicable).

<b>Group 2</b>	<b>Group 3</b>	<b>Group 4</b>
Change in land use patterns	Riparian Condition	Measurement of biological integrity
Quantification of changes from benchmark indicators.	Chemical parameters	Hydrologic/flow indicators
Risk assessment/public expectation of waterbody.	Fish diversity	Sustainability
Clean Water Act indicators	Watershed integrity	Fish community structure (related to recreational fishing)
Absence/presence of specifically outlined conditions	Stream channel characteristics	Spread of undesired invasive species
Water volume	Invertebrate index	Connectivity with fluvial process
Habitat Connectivity	Presence/absence of indicator species	Quantity/quality of specific habitat (marine)
IBI or other metrics	Fish community index	
Sediment	Status/trends of important aquatic habitats	

Table 3 Indicators of habitat condition highlighted (or ranked) by individual breakout groups and sorted by broad classifications.

	<u>GROUP 2</u>	<u>GROUP 3</u>	<u>GROUP 4</u>
<b>WATER QUANTITY</b>	Water Volume		Hydrologic flow indicators
<b>WATER QUALITY</b>	a)Sediment; b)Clean water Act	Chemical Parameters	
<b>PHYSICAL ATTRIBUTES</b>	Habitat Connectivity	a) Stream channel characteristics; b) Status/trends of important aquatic habitats	a)Connectivity with fluvial process; b) Quality/quantity of specific habitat (marine)
<b>BIOLOGICAL</b>	IBI or other metrics	a) Fish Diversity; b) Invertebrate index; c) Presence or absence of indicator species; d) Fish community index	a) Measurement of biological integrity; b) Fish community structure (related to recreational fishing); Spread of undesired invasive species
<b>WATERSHED ATTRIBUTES</b>	Change in land use	a) Riparian Condition; b) Watershed integrity	
<b>SOCIO-ECONOMIC</b>	a) Risk Assessment/public perception		
<b>MISCELLANEOUS</b>	Changes in benchmark indices; Presence/absence of specific conditions		Sustainability

## APPENDIX A

### AGENDA

#### **Working Group on Healthy Fish Habitats: Creating Benchmarks for Success**

Sunday, August 22nd, 2004

8:00 am-2:45 pm

Monona Terrace Conference Center

Hall of Ideas F-G

Madison, Wisconsin

- 7:30 Coffee and donuts
- 8:00 Welcome and Introductions
- Meeting Logistics
  - Historical Perspective: How Did We Get Here?
  - Report on Findings of Stakeholder Roundtables
- 8:30 The Science of Hope: Benchmarking for a Fish Habitat Initiative
- Paul Quinnett, Author, (Invited)
- *Pavlov's Trout: The Incomplete Psychology of Everyday Fishing*
  - *Fishing Lessons: Insights, Fun, and Philosophy from a Passionate Angler*
  - *Darwin's Bass: The Evolutionary Psychology of Fishing Man*
- 9:00 Framing the Issue: What Needs to be addressed?
- Stan Moberly (invited)
- 9:30 Form Breakout groups
- 9:45 Break
- 10:00 Regroup in Breakout groups
- 12:00 Box Lunches provided
- Continue Breakout Sessions
- 2:15 Convene – large group
- Brief comments from Gus Rassam (AFS) and Greg Watson (NFWF)
  - Report Out: Roll-up issues
- 2:45 Adjourn

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