

State Nonpoint Source Management Program Evaluation  
Framework  
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## **I. Background:**

The development of a program evaluation system is increasingly emphasized for sound governance and as a means to help achieve high levels of public sector performance. Office of Management and Budget Director Daniels, in September 19, 2002 testimony to the House Government Reform and Rules Committees stated: “For far too long the question we seemed to address ‘How much?’ not ‘How well?’, it is time to put the burden of proof for spending where it should be - on the proponent of spending.” Programs will need to generate data to support and justify budget requests. Evaluation systems are needed to provide the necessary data.

Evaluations need to be viewed as a multi purpose tool. First, evaluation findings can be an important input to resource allocation - particularly in the budget process. Second, evaluation helps program managers by revealing the performance of ongoing activities at the project level. It is therefore a feedback tool for management which should lead to revising existing efforts, as well as learning and improvement for future efforts. Third, evaluation findings are an input to accountability mechanisms - so that managers can be held accountable for performance of activities they manage and so that programs can be held accountable for performance. A final use of evaluation findings is in demonstrating the extent which implementation activities are successful.

## **II. Introduction:**

State Nonpoint Source (NPS) management programs are implemented to improve and protect water resources in a variety of ways. Most States use local agencies and organizations to organize, coordinate and implement NPS projects on a watershed basis. Locally lead watershed management projects are more cost-effective, provide basis for integrated solutions and build the social capacity of stakeholders. Creating this vested interest in a watershed is a key to the long term sustainable holistic watershed management. Limited technical and financial resources hinder State Programs’ ability to identify and document water quality problems and respond to requests for assistance to support local watershed projects. Resource allocation decisions are often hampered by a lack of information, poor planning, turf battles or politics and managerial mistakes. A systematic approach would help State NPS Programs overcome these difficulties. A key requirement for this approach to work is an ongoing evaluation process that includes an adaptive management component. It is important that the evaluation process provides the information needed for State NPS Programs to make effective resource and programmatic decisions to achieve water quality goals.

Project selection pressures due to limited resources, excessive demands and misstated program goals and requirements essentially force States to target those projects that will likely show immediate results by addressing the symptoms of the pollution related problems and/or to gain political support for the program. This implementation approach focuses evaluation efforts on documenting only the expenditures and outputs of a project without examining the environment in which the project operates, the processes involved in the project’s development or its long-term impact. Typically, NPS management projects are designed to accomplish specific tasks according to a schedule. The timely completion of the scheduled tasks

is then evaluated, rather than the associated water quality benefits or behavioral changes. Unfortunately, this has led many to think evaluation is synonymous with showing effectiveness or proving the worth of individual projects. State NPS Program evaluations need to go beyond the assessment of administrative accomplishments to be useful and effective. The need to support program-level evaluation and adaptive management has to be addressed annually through the State NPS Program and related projects. The development of structured and systematic state evaluation frameworks is needed to fill this gap.

### III. Expectations:

In accordance with Section 319 (h)2, 8, and 11 and Section 319(1), states must develop an evaluation framework to support the implementation of their NPS Management Programs. Designed correctly, the Evaluation Framework will not only prove what has been accomplished, but also improve performance of the State NPS programs. The framework needs to include both statewide and project-level efforts. Collection of the information listed in Table 1 will enable the State to fulfil the new section 319 requirements provided in Appendix D. The implementation of the framework will occur over a 3 year period starting with the Section 319 2005 grant cycle.

We expect this evaluation framework to:

- Build on existing data collection efforts of the State NPS Programs and its partners,
- Consist of a mix of methods and approaches that are appropriate within each State,
- Support accountability at the program and project level, and
- Provide a mechanism to improve and strengthen the States' implementation approaches at the state wide and project levels.

The Evaluation Framework must provide a **feedback loop** in the State NPS Management Program designed to build on successes, learn from mistakes, and provide a process to identify and modify existing implementation approaches and processes as appropriate. The State Evaluation Framework should consistently support the ongoing collection and analysis of information for use in decision making. Within each State, the level and intensity of the evaluation activities will vary by project and activity. The State Frameworks will require a well-planned strategy for determining the level of evaluation required for various activities and projects. There must be a strong emphasis on a systematic, outcomes - oriented evaluation with linkages' to budget processes at the project level.

Once the level of evaluation (by activity or project) has been established, the evaluation framework must ensure the proper collection of data to support measurement against program/project goals and objectives. Such data include administrative, environmental, and social indicators. Minimum monitoring and

evaluation efforts need to focus on tracking activities, results and follow up. The tracking effort should be able to identify “what is working” and “what is not progressing” in terms of achieving interim milestones and intended results.

The increased emphasis on environmental measures or outcomes will require the NPS Evaluation Framework to be closely integrated with the state’s monitoring and assessment program. The link to the State monitoring and assessment program is vital to demonstrate and measure the environmental impacts of the NPS program, and to provide a focus on gathering and analyzing data which will improve the NPS management processes within each State. The State’s data management system must be modified or expanded to support their Evaluation Framework.

While the intent of this effort is the evaluation of progress for the NPS Program, it is important to remember NPS management is not only about the program or administrative accomplishments. Our objective is to document what the State and its citizens do through of their Section 319 program and **the impact of those actions on the environment**. States must be able to demonstrate this accomplishment as part of their annual NPS program report.

The FY2004 Evaluation Framework submittal must describe how the State will implement the evaluation activities that serve the NPS Program needs and its relationship with the state monitoring and assessment program. State NPS Evaluation framework submittals should include a description of the state level evaluation activities including data/indicators to be to be collected, methods, schedule, data management aspects, analysis and reporting. For the project level: a description of data/indicators to be to be collected on all projects, methods, schedule, data management aspects, analysis and reporting; and the criteria and process for selecting projects for comprehensive evaluation. The design process for the more comprehensive site specific evaluations needs to be included. The State needs to include a description of the feedback loop from the evaluation efforts to the program management efforts. The schedule, with milestones, for fully implementing the Evaluation Framework by the start of FY2009 is also required. The State Framework should contain or reference description of how the state will communicate the results of the evaluation efforts to the public.

#### **IV. The Evaluation Framework - An Overview:**

As noted above, evaluation is a necessary process for making NPS management projects more effective and efficient. The process provides a mechanism to document accomplishments, identify management and implementation problems, and provide data on which to base mid-course corrections and program-level modifications.

Successful evaluation requires both the statewide programs and projects to develop clear, meaningful, and measurable objectives and milestones for each individual plan and its implementation. While not every NPS management project needs to have a research level evaluation effort documenting cause-and-effect relationships, some evaluation is

essential for every NPS project. The evaluation design for any given project will depend on a range of considerations including:

- The intended uses of the evaluation as part of the State NPS Program;
- The stakeholders who have an interest in the findings;
- The speed with which the information is needed;
- Technical resources available to support an evaluation; and
- The cost.

As part of the framework development, each State will have to develop its own criteria for determining what level or type of evaluation will be required for individual projects and the program as a whole. The timing and type of evaluation selected needs to be directly linked to its purpose. Specific evaluation methods, techniques and approaches are available for specific purposes and are applicable to the various phases (planning, implementation and post implementation) of the watershed management process. While rigorous frameworks for conducting evaluations are well-documented, many good decisions can be made through an evaluation guided by common sense and practicability. Even with an Evaluation Framework, State NPS programs cannot mechanically follow detailed and prescriptive procedures. Instead the State will need to design monitoring and evaluation efforts based on the specific needs of the overall state program, partners and local sponsors.

Key factors to consider include:

1. Focusing on progress toward intended results and following-up with decisions and action;
2. Ensuring regular reporting from the project level to the State program with partners presenting issues and seeking solutions to problems, as a basis for analysis;
3. Regular monitoring (tracking) checks by project managers to verify and validate progress;
4. Using participatory (volunteer) monitoring mechanisms to ensure commitment, ownership, and follow-up and feedback on performance;
5. Using indicators (Table 1) for improving the performance monitoring systems and developing social, environmental and administrative baselines at both the State and project levels.
6. Incorporating active learning for adaptive management, and generating lessons and sharing them with existing projects;
7. Factoring lessons learned from completed projects into future efforts; and
8. Planning, conducting and using evaluations of intended outcomes and processes for validation of results and approaches, as well as state program supported initiatives to undertake additional, voluntary evaluations when useful.

At a minimum, the State must ensure that all NPS projects (or appropriately grouped projects - for example, several projects implementing aspects of a watershed plan) can document how the project operates administratively. In addition to the administrative indicators (GRTS requirements), the effect of the project on the actions of target audiences (like number or percentage of participants or acres treated), changes in the environment/water quality (condition monitoring), and lessons learned that can be applied to other projects need to be documented. Based upon importance to the overall program or specific demonstration aspects, select projects will be identified for more in-depth social and environmental evaluations in order to replicate the approach in other locations. As noted earlier, State Frameworks will have to provide the process by these types of projects will be selected. At the statewide program level, the Evaluation Framework must also be able to account for the overall impact on target audiences (e.g., behavior changes), estimate changes in the environment as a result of the NPS program (statewide and through case examples), and adaptive management strategies.

In general, States should consider the following observations in the development and implementation of an Evaluation Framework:

- 1) The NPS Program manager has the responsibility to decide what evaluation aspects need to be included in the individual NPS management efforts.
- 2) Evaluation formulation must begin before the individual NPS projects begin and be part of the planning and implementation processes. After the fact (reactive) evaluations usually focus heavily on what was accomplished and not its impact. Reactive evaluations cannot do an adequate job of evaluating how the effort progressed from the beginning to the end or the long-term impact.
- 3) To be useful in decision-making, evaluations must be timely and based upon valid information.
- 4) Evaluation information that truly reflects the program or project's target audience is needed for decision-making purposes. Evaluations that focus on average conditions and average operations are not useful in decision-making since they tend to mask the issues or barriers related to the target audience with more issues from the public at large.
- 5) Hard data generally makes managers more comfortable when used to make decisions. However, hard data is also more expensive and time-consuming to acquire, analyze and report.
- 6) Evaluation results must be presented in easily understandable terms (text, graphs, charts or other statistics).
- 7) For an evaluation to be useful it must be accessible to and accepted by decision-makers, program participants and stakeholders. Acceptance of an evaluation is more likely when the stakeholders are involved throughout the process.

In developing the Evaluation Framework, States should include information on how evaluation levels will be selected and used in project assessments (see Appendix A), evaluation types (see Appendix B), evaluation indicators (Section V) and design (see Appendix A), communication of evaluation results (see Section VII) and the criteria that will be used by the State for determining how these components are applied to specific projects and the NPS program overall.

## **V. Evaluation Indicators:**

The State evaluation framework must utilize administrative, environmental and social indicators at the state and project-level in the ongoing tracking of the State NPS Management Program's implementation. Administrative indicators are activities or actions (a.k.a. "beans") that can be counted. They are usually easy numbers to generate, and are often intended as indirect indicators of the desired condition. Environmental indicators are measurements of water quality, habitat or other natural resource criteria that tell something about the health of the environment. Social indicators track the human dimension of the statewide programs and individual watershed management projects.

In addition to the GRTS requirements, there are a number of possible administrative indicators.

Measuring administrative aspects requires an analysis of inputs and outputs (Levels 1 and 2). (Appendix A provides more detailed information on evaluation levels and Bennett's Hierarchy.) Identifying environmental results requires a focus on outputs and outcomes' data (Levels 6 and 7). Finally, measuring the social aspects requires the NPS Program to clearly identify and quantify inputs, outputs and outcomes (addressing all levels of Davenport's Modified Bennett's Hierarchy {Davenport, 2002}). As noted in the overview, all programs and projects (or appropriate groups of projects) must have milestones or objectives that can be used to determine trends in water quality. The evaluation effort should include use of indicators and measures in developing baselines in all three categories (administrative, social and environmental). Programs and projects need to consider how many indicators are needed, at what level (see Appendix A) and at what time (see Section V). Most NPS efforts require the use of multiple indicators to account for complex processes and the uncertainty regarding individual indicator effectiveness.

It is essential to select indicators and measures that can meaningfully capture key changes - combining what is substantively relevant with what is practical. Critical qualities of indicators include:

- Validity: does the indicator capture the essence of the desired result?;
- Practicality: are data actually available at reasonable cost and effort?;

- Clarity: do stakeholders agree on exactly what is going to be measured?;
- Clear direction: will decision makers be sure whether change is good or bad?;
- and
- Ownership: will stakeholders agree that the indicator makes sense?

The State Evaluation Framework must be reasonable in applying these criteria, since no single indicator will satisfy all criteria equally well. The usefulness of any particular indicator or set of indicators depends upon both timeliness (can the information be collected and provided when needed by the intended users) and what the action implications is of the indicator (e.g., will a change in the indicator lead to a management response). Table 1 is a preliminary list of indicators for States to consider when developing their evaluation frameworks. Please note that while GRTS indicators may not meet all five critical qualities of an indicator they are not debatable or optional. See the latest Section 319 funding guidance for a list of GRTS indicators.

<b>Table 1: Preliminary list of indicators at the project and program levels</b>		
<b>Indicator Type</b>	<b>Level</b>	
	<b>Project</b>	<b>Program</b>
<b>Administrative (inputs)</b>	<ul style="list-style-type: none"> <li>- NPS Project Title</li> <li>-Project Description</li> <li>-Background/Overview of Project</li> <li>-Objectives/Goals</li> <li>-Methods Employed</li> <li>-NPS 319 Funds: Base or Incremental</li> <li>-NPS Project Start Date</li> <li>-NPS Project Completion Date</li> <li>-NPS Category of Pollution: Primary &amp; Secondary</li> </ul>	<ul style="list-style-type: none"> <li>-Number of State Employees (FTEs) by 319(h) Funds under this Grant</li> <li>-Amount of 319(h) Funds Allocated to Sub-State Recipients under this Grant</li> <li>- Number of watersheds at the 14 digit level with projects</li> <li>- Number of NPS 303(d) list waters</li> <li>- Number NPS TMDL being implemented</li> <li>- Number of watershed level monitoring projects (including volunteer monitoring effort)</li> </ul>

	<ul style="list-style-type: none"> <li>-NPS Functional Category: Primary &amp; Secondary</li> <li>-Affects this Type of Waterbody:</li> <li>-NPS Waterbody Type and quantify water resource</li> <li>-303(d)</li> <li>-TMDL Priority</li> <li>-UWA Category</li> <li>-Clean Lakes Information</li> <li>-BMP List</li> <li>-TMDL Information</li> <li>- QA Plan Completed and Approved</li> </ul>	
<b>Environmental Results (Outputs)</b>	<ul style="list-style-type: none"> <li>-Environmental Goals/Achievements (georeference pollutant reduction - stream reach code)</li> <li>-NPS Pollutant Load Reductions</li> <li>-Wetland/Streambank/Shoreline restoration</li> <li>-Social</li> <li>- Numbers of landowners participating</li> <li>- Amount (or%) of Critical Acres Treated</li> <li>- Number of enforceable policies adopted and implemented</li> </ul>	<p><b>Collected from project level information and supplemented with information from State level efforts</b></p> <ul style="list-style-type: none"> <li>- Load reductions for sediment, nutrients</li> <li>- Changes in percent of stream miles, lake acres, wetland acres, coastal miles impaired by categories of NPS pollutants.</li> <li>- Unimpaired Area (for example stream miles, wetland acreage, lake acres, etc.) protected</li> <li>- Behavior changes via capacity building</li> </ul>
<b>Outcomes</b>	<ul style="list-style-type: none"> <li>- Water Quality Improvements (attainment of standards; progress toward) (for selected projects only)</li> <li>- BMPs maintained and operated correctly</li> </ul>	<ul style="list-style-type: none"> <li>- Water Quality Improvements - Streams, lakes, coastal miles, wetlands etc. attaining standards (at watershed or statewide level is acceptable for example 2000 60% of waters impaired by NPS 2020 40% impaired by NPS across the state.)</li> <li>- Sustainable behavior changes</li> <li>- Number of NPS 303(d) listed waters delisted</li> </ul>

The ability to collect information related to the indicators listed in Table 1 requires the State Evaluation Framework to integrate State-level monitoring with project level efforts. This requires a consistent definition of the indicator, for both the NPS and Monitoring & Assessment Programs, to provide for credible and effective assessments and a basis for learning and providing accountability. The NPS management plan's monitoring and evaluation component needs to be able to objectively assess performance based on criteria and indicators. In addition, Evaluation Frameworks must balance results' measurements with the additional needs of an adaptive management approach to program evaluation and improvement. To document whether a program has made progress, there must be a documented baseline condition, especially in terms of environmental and social indicators. At the project and state levels, the basic chemical,

physical, and biological conditions must be determined to track environmental progress, and there must be a social baseline established for both levels. Clearly connecting the different types and sources of data is the role of Framework.

## **VI. Relationship to State Monitoring and Assessment Programs:**

As mentioned earlier, the Evaluation Frameworks must be integrated with state monitoring and assessment programs to provide the focus for the gathering and analyzing environmental data which will improve the States' NPS management processes. The Framework should be developed in conjunction with the long-term state monitoring strategy required in 2004 (Appendix C). All States are required to insure that monitoring data collected under Section 319 (directly or through match activities) is uploaded to the national STORET system warehouse.

The Clean Water Act Section 106(e)(1) requires EPA to make an annual determination of the adequacy of each State monitoring and assessment program prior to the award of grant funds. To be adequate, State monitoring and assessment programs need to support the NPS Program on two levels: statewide and on a watershed level. At the statewide level, States need to improve their capability to determine what percentage of various waterbody types are either impaired or threatened by NPS pollution. At the watershed or project level, there are three types of monitoring needs: problem identification, tracking and effectiveness. States need monitoring and evaluation approaches that will provide useful information on existing efforts and help guide revisions to existing programs and approaches at the project and statewide level. Each State should have a process for determining what type of monitoring is necessary for individual watershed projects.

## **VII. Communicating Results:**

A strong link must be established between the evaluation efforts and the State's outreach efforts. Once the evaluation has been completed and the value of state-level and the NPS watershed management efforts is known, spreading the word is the next step to follow. Evaluation results are of interest to a wide range of stakeholders, including financial supporters (taxpayers), education professionals, environmental interests, media and communication specialists, staff, volunteers, and the targeted and non-targeted public. As part of the overall Evaluation Framework, an outreach component that lays out how the State Program and individual projects will communicate the results of their evaluations to stakeholders and the public needs to be developed. It also must identify who the target audience is for the information and provide the "nuts and bolts" for tailoring the results, summary and analysis to that audience(s). Remember that different mechanisms, such as reports, brochures, graphs, seminars, are needed for different audiences. For example; environmental data should be reported through the

Section 305(b) reports, due no later than April 1 of even numbered years.

Additionally, the State needs to develop or make use of a data management system to support their Evaluation Framework.. STORET must be utilized as the data management system for environmental data. Section 205(j) annual reports of water quality problems and Section 106(e) annual updates of water monitoring data, including data collected related to section 319, may be provided by annually by annually uploading monitoring data to the national STORET warehouse. GRTS is to be used for the administrative data. Most States will have to develop or find a system to manage social data and information.

### **VIII. Summary:**

As described in this document, the State NPS Evaluation Frameworks need to address a full range of evaluation issues, including selecting when, how, why and where various degrees and types of evaluation will take place. In the end, evaluations simply provide a means of accountability and process for learning. In this spirit States must view their Evaluating Frameworks as dynamic and be willing to modify it based upon success and/or failure of initial efforts. An essential aspect of this accountability is the commitment an organization demonstrates to take the appropriate actions to seek out problems and openly report and address them. Region 5 is ready and willing to work with the individual State NPS Programs to develop and implement their Evaluation Frameworks. State NPS Evaluation Frameworks should provide a mechanism for clearly defining how this process will occur at the state and project levels..

The Evaluation Frameworks are due March 1, 2004 (they can be turned earlier). To restate from the "Expectations Section" what is due:

"The March 1, 2004 Evaluation Framework submittal must describe how the State will implement the evaluation activities that serve the NPS Program needs and its relationship with the state monitoring and assessment program. State NPS Evaluation framework submittals should include a description of the state level evaluation activities including data/indicators to be collected, methods, schedule, data management aspects, analysis and reporting. For the project level: a description of data/indicators to be collected on all projects, methods, schedule, data management aspects, analysis and reporting; and the criteria and process for selecting projects for comprehensive evaluation. The design process for the more comprehensive site specific evaluations needs to be included. The state needs to include a description of the feedback loop from the evaluation efforts to the program management efforts. The schedule, with milestones, for fully implementing the Evaluation Framework by the start of FY2009 is also required. The State Framework should contain or reference description of how the state will communicate the results of the evaluation efforts to the public."

**References & Additional Material:**

Beech, R. and A. Drake. 1992. Designing an Effective Communication Program: A Blueprint for Success. National Network for Environmental Management Studies Program, USEPA, Chicago, IL. 133pp.

Bennett, C. 1976. Up The Hierarchy. In Journal of Extension, Vol 4., pp18-26 March/April, U.S.A.

Davenport, T.E. 2002. The Watershed Project Management Guide. CRC Press, Boca Raton, FL

Davenport, T.E. and M. Kelly. 1986. Water Resource Data for Highland Silver Lake Monitoring and Evaluation Project Madison County, Illinois Phase IV. IEPA/WPC/86-001. Illinois Environmental Protection Agency, Division of Water Pollution Control, Springfield, Illinois

Franke, R.H. and J.D. Kaul. 1938. The Hawthorne experiments: First statistical interpretation. American Sociological Review, 43, 623-643.

General Accounting Office (GAO). 1998. Performance Measurement and Evaluation: Definitions and Relationships. GAO/GGD-98-26.  
<http://www.gao.gov/special.pubs/gg98026.pdf>

Hermann, J.L., L.L. Morris and C.T. Fitz-Gibbons. 1987. Evaluator's Handbook. Sage Publications, Inc., Newbury Park, CA. 153pp

Holmes, N. 1991. Post project Appraisals of Conservation Enhancement of Flood Defense Works. Research and development Report 285/1/A. National River Authority, Reading, UK

Joint Committee on Standards for Educational Evaluation. 1981. Standards for Evaluations of Educational Programs, Projects, and Materials. McGraw-Hill, New York, NY

Jordan III, W.R. 1333. Assessing Restoration in four Dimensions. Volunteer Monitor; issue topic: restoration, volume 11, NO 1, Spring 1333. River Network, Portland, OR

Kondolf, G.M. and E.R. Micheli. 1335. Evaluating stream restoration projects. Environmental Management 13(1):1-15

Leeds, C.F., R. Leeds, L.C. Brown and C. Volgstsd. 1335. Ohio Water Quality Projects Evaluation. Ohio State University, Columbus, OH.

Margerum, R.D. 2001. Organizational Commitment to Integrated and Collaborative Management: Matching Strategies to Constraints. Environmental Management Vol 28, No.4 pp 421-431. Springer-Verlag New York

Shepard, R.L. 2001. Locally led conservation: what it means, how it works and the role of conservation professionals. SWCS Annual Conference, Myrtle Beach, South Carolina

Shepard, R.L. 1999. Creating a Report. The Human Dimensions of Watershed Management, An Interactive Workshop. 1333 International Symposium on Society and Resource Management, Brisbane, Australia

Shepard, R. and C. Neiswender. 2002. A Process For Determining Appropriate Impact Indicators For Watershed Projects. University Of Wisconsin, Madison, WI.

USEPA. 1333b. Evaluation of Experimental Rural Clean Water Program. EPA-841-R-33-005. USEPA, Office of Water, Washington, DC

Williams, H.S. 1331. Learning vs. Evaluation. Innovating, Vol.1, No. 4. The Rensselaerville Institute, Rensselaerville, NY

## **APPENDIX SECTION**

### **A. Evaluation Levels**

A holistic perspective is needed when monitoring the performance of a NPS management effort. Still, monitoring should be focused on the fewest possible measurements or indicators that most efficiently demonstrate the status of the project or overall program while providing the necessary information to support an adaptive management component. There are many different evaluation approaches available for NPS project evaluation and each has different strengths and weaknesses. Before deciding on specific evaluation approaches and techniques, it is important to think about how the project or NPS Program will achieve results, what these results will mean, and how they will be used. This provides a basis for focusing on the most effective evaluation types or “levels” and narrows the later choice of approaches.

Typically most projects follow a natural progression from inputs (resources allocated) to outcomes or results (environmental or other benefits). This progression from inputs to results has been characterized in “Bennett’s Hierarchy of Evidence for Program Evaluation.” (Bennet 1976). Since the focus of most watershed management efforts relies on changing people’s behavior to achieve and maintain the environmental improvements over time, the evaluation hierarchy must also consider assessments beyond project-specific funding periods.

Davenport's Modified Bennett's Hierarchy of Evidence (Davenport, 2002) is presented in Table A1 provide a way of organizing an evaluation for NPS projects.

This modified hierarchy reverses the order of "changes in behavior" and "results". The modification, acknowledging the lag time between implementation and environmental changes, shifts the focus of the evaluation to long term behavior changes occurring after the planned management activities have been completed. The levels of the modified hierarchy can be correlated with the program logic model approach to evaluation. The first three components (inputs through target audiences) of the Hierarchy of Evidence are project inputs and deal with implementation; the next three components (reactions through results) can be classified as project outputs; and Level 7, Behavior and Resulting Environmental Change, Measures Outcomes.

<b>Table A1: Davenport's Modified Bennett's Hierarchy for watershed management effort (Davenport, 2002).</b>		
<b>Level</b>	<b>Component</b>	<b>Description</b>
7	Behavior and Resulting Environmental Change	Participants' behavior change through the project social capacity building and implementation process. While achieving stakeholder behavior change is the first requirement, the evaluation team needs to know if it is sustained and if the behavior change had the desired impact.
6	End Results (linked to funding period)	Results related to the project's goal(s) and objective(s) developed when the original activities were planned. End results also include unanticipated impacts documented by evaluation efforts.
5	KASA Changes	The knowledge, awareness, skills and ability (KASA) of the target audience(s) members that are needed to induce a behavior change and have an impact on the environment.
4	Reactions	The target audience's response toward the proposed and implemented activities.
3	Target Audience(s)	The stakeholder groups targeted for the various aspects of the watershed management effort.
		Event occurrences or actions that are done to

2	Activities	implement the effort are included in this categories such as planning, monitoring and public involvement.
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1	Inputs	Project resources that are used to carry out the work are considered inputs. At a minimum this includes: funds, paid staff, volunteers, office space and supplies.

Generally, external accountability increases as the level of evaluation increases while internal **administrative performance** accountability follows the reverse trend. Evaluation efforts must reflect a balance between external and internal accountability. A good project evaluation plan must be able to provide the information to answer questions at the beginning, at mid-course, after administrative closure, and continuing through post-project effects.

Evidence of a NPS project's impact becomes stronger as the evaluation components ascend the hierarchy. The two lowest levels (inputs and activities) provide little or no measure of participant benefit or environmental improvement. If the main focus of the evaluation is to increase the project's administrative performance, it is important to apply more evaluation techniques at the three lower levels. A true assessment of NPS management effectiveness requires evaluations to be conducted at the upper levels of the hierarchy. Evaluations covering levels four (reactions) and five (KASA) provides an indication of whether or not the implementation approaches are acceptable and working. KASA changes, in particular, give an indication of the potential for on-the-ground adoption of management approaches promoted by the NPS project or program. Level 6, the end results evaluation, are surrogates for water quality improvement (e.g., estimated loadings reductions), establishing benchmarks for water quality, and completing the implementation plan.

Finally, Level 7 is specifically designed to allow evaluators to determine if the necessary operations and maintenance (O&M) is occurring after the initial implementation period (in many cases the project funding period) and if water quality has improved. It also takes into account specific aspects of measuring social indicators; for example, providing a mechanism for assessing the "Hawthorne effect." The Hawthorne effect loosely para-phrased, occurs when participants respond favorably to project or program inducements (for example positive behavior change or implementation of BMPs) solely because of the project attention rather than being committed to change. Once the special attention has faded, participants revert to their previous behavior or stop maintaining BMPs.

All NPS management efforts will have objectives at several levels of the hierarchy and the State Framework will guide the choices that must be made at the project as

to what will be measured. The degree of complexity involved in any evaluation naturally has a tremendous impact upon cost, data collection requirements and usability. Evaluations that utilize the higher levels of the hierarchy are more expensive because of increased data collection requirements and time needed to obtain results. Additional expertise is required to design evaluations, analyze data, to separate external influences from an actual project or program impacts, and provide feedback. Despite this added cost, in-depth evaluations of demonstration and pilot efforts usually pay for themselves through increased efficiency and effectiveness of future efforts based upon the results.

## **APPENDIX B: Evaluation Types**

The evaluation framework will utilize a combination of evaluation types to evaluate Program and projects' social, environmental and administrative aspects accurately. We encourage States to utilize the four types of evaluations, discussed below: Formative, Process, Outcome, and Impact.

1) Formative Evaluation (prior)- A formative or context evaluation is undertaken to test approaches, materials and ideas early on in the process. Usually, formative evaluations address aspects of Levels 2-5 in the modified Bennett's Hierarchy. In

some ways, a formative evaluation is similar to a needs assessment. The principal difference between the traditional formative evaluation and a needs assessment is the type of decision that arises from the outcomes. Needs assessments are utilized in the allocation of resources to meet priority needs. Formative evaluations are utilized to improve implementation approaches and supporting materials prior to initiation of the project.

For example, formative evaluations are utilized to understand the target audience before a project is implemented. The evaluation may consider what knowledge, awareness, skills and abilities (KASA) exist or may focus on ensuring that the appropriate target audience is selected based upon project goals and objectives. These early evaluation activities often increase community participation.

This “pre-implementation” assessment should be used to document the context in which a program or project is operating. In this case, formative evaluation is especially critical if the State Program will attempt to replicate the management approach elsewhere. Often times, “successful” approaches are difficult to replicate because specific contextual factors regarding social, political, and environmental issues that facilitated the approach’s success were not understood or documented during the evaluation process. In this light, the evaluation might document such things as:

- The level of community awareness of the water quality problem (e.g., the issue has been extensively covered in the media);
- Economic issues that play a role (e.g., general standard of living in the community);
- Political issues that foster or hinder progress (e.g., local ordinances); and/or
- Environmental factors (e.g., watershed soil types, land use, or ecoregion characteristics).

These can be important in deciding where the successful approach should be replicated. The evaluation may also identify locations that may not be suitable for a specific approach due to contextual factors. State NPS Programs and projects alike need to have a process for including information from such formative evaluations as part of their overall evaluation and adaptive management approach. State NPS Programs need this contextual information in order to improve project selection and assistance.

2) Process Evaluation (during)- This form of evaluation assesses the extent to which the project is operating as intended (GAO, 1998). While this type of evaluation is

sometimes considered part of a formative evaluation, for NPS watershed management purposes it is considered a stand-alone type that focuses on the tracking of activities (outputs) and expenditures (inputs): Levels 1 and 2 in the modified Bennett's Hierarchy (Appendix A). Agencies often refer to process evaluation as "bean counting." Process evaluations should focus on whether the project is going in the right direction, not as the ultimate evaluation measure of the project. The value of this type of evaluation depends to a large degree on whether the monitoring efforts provide a timely indication of progress as measured against interim milestones.

Process evaluation is necessary to support specific aspects of an adaptive management approach. Documenting failure to achieve interim milestones does not automatically imply failure of the overall management effort, but instead offers an opportunity to better understand the challenge the project faces and provides the basis to modify the activities to achieve the long-term goal.

The State Frameworks need to support the development of a set of statewide and project milestones to measure the progress of specific activities. The State NPS Program need to acknowledge and operate on the idea that implementation sometimes requires trial and error over time to learn how stakeholders and the water resource will respond to implementation efforts. State programs should work with projects to modify their management approaches when milestones are not achieved (keeping in mind that modified approaches must be part of the NPS Management Plan). Any changes that are instituted should be documented and future evaluations should consider whether the new approach is improving progress. The ultimate goal of this type of evaluation process is to improve the ongoing implementation effort so it achieves the overall goal.

A drawback to utilizing a process evaluation in NPS management efforts is the inability of process evaluations to determine the cause of the problem (lack of implementation) and the lag time associated with reporting of accomplishments and environmental results. Although it is important to identify when progress is not being made so that resources are not wasted, the State and its partners must also allow sufficient time for a proposed approach to take effect.

3) Outcome Evaluation (end of project)- An outcome or "summative" evaluation assesses the extent to which a NPS management project achieved its goals and objectives by measuring the immediate or short-term results associated with a project. This evaluation type addresses Level 6 in the modified Bennett's Hierarchy (Table A1). In general, the question, "What happened for the money spent?" gets answered as part of this evaluation. Outcome evaluations are often used to

demonstrate the effectiveness of the project(s) (or program) in the short-term and to help make the case for continued funding or for expansion/replication.

An outcome evaluation usually requires data from the entire project period so that changes associated with implementation can be measured and documented. While documenting the individual activities is important, it is the overall environmental results that really count. In this phase, however, the evaluation framework relies on “reasonable probability” instead of “cause-and-effect” in determining results. The project manager needs to feel comfortable that the results can be verified with a reasonable probability that the activities will have the expected long-term impacts.

Information that may be gathered as part of an outcome evaluation includes whether and to what extent the intended audience was reached, if and how behavior changed, loading reduction estimates, water quality measurements, or other measurements of how well progress objectives were achieved. While changes in the environmental condition locally should ultimately have an impact at the larger watershed scale, using such information the NPS program or project can document that the individual results are going in the right direction. Outcome evaluations have an important role to play in verifying the achievement of program or project milestones and in explaining what worked, what did not work and why.

4) Impact Evaluation (3 - 5 years later)- Impact evaluation is a form of outcome evaluation that assesses the net effect of a project by comparing project outcomes with an estimate of what would have happened in the absence of the project. This form of evaluation addresses Level 7 in the modified Bennett’s Hierarchy (Table A1) and is employed when external factors are known to influence the outcomes. It is used to isolate the project’s contribution to achievement or non-achievement of its milestones and objectives (GAO, 1998). For example, some questions that might be addressed include:

- Did the program or project achieve the intended goal (has the targeted audience maintained the desired behavior change; have water quality improvements been achieved and/or maintained?);
- Were there unintended positive or negative impacts associated with the program or project?; and
- Can the changes be explained by the program or are they the result of other factors? It also helps explain why a project has been implemented the way it has, and why certain outcomes have been achieved and others have not.

Impact evaluation is the most difficult type of evaluation to complete. It measures the longer-term impacts of a management approach. This type of evaluation is extremely important for pilot and demonstration activities that the State will want

to promote in the future and for determining the impact of the State NPS Program overall. A multi-dimensional approach is needed when conducting an impact evaluation of a NPS watershed project. The multi-dimensional approach requires that social, environmental and administrative aspects of an individual project be tracked. The State NPS Framework needs to describe how and why certain projects or aspects of the program will be selected for this more intensive evaluation technique. The State criteria, for example, might include whether the results from a specific project will likely have wide-scale applicability to other areas, or sufficient portions of a watershed's critical area have been addressed to result in measurable water quality improvements. Very few projects are expected to get this type of evaluation.

## APPENDIX C: State Monitoring Program Reviews

Clean Water Act §106(e)(1) and 40 CFR Part 35.168(a) provide that EPA may award Section 106 funds to a state only if the state has provided for or is carrying out as part of its program the establishment and operation of appropriate devices, methods, systems, and procedures necessary to monitor and to compile and analyze data on the quality of navigable waters in the State, and provision for annually updating the data and including it in the section 305(b) report. Accordingly, before EPA awards a State a Section 106 grant, EPA must determine that a State is meeting these requirements. The purpose of this document is to define the elements of a state water monitoring program for purposes of EPA's determination as to whether a State programs meets the prerequisites of Section 106(e)(1) of the Clean Water Act. EPA expects that State water monitoring programs will evolve over the next 10 years so that all States will have a common foundation of water monitoring. EPA expects most States will employ an iterative process to fully achieve all elements, and EPA will work with States to identify annual monitoring milestones. A program will be considered adequate for Clean Water Act §106(e)(1) determinations in 2003 if, in addition to submission of the State's final 305(b) report as previously explained in the FY2001 Clean Water Act Section 106 Grant Guidance issued by EPA, a state has a Comprehensive Monitoring Program Strategy in place [see Section II, Part A below] or commits to complete development of such a strategy prior to award of the next award or amendment of the current Section 106 grant monies.

States will need to develop, over time, a monitoring program addressing the 10 elements summarized below and described in greater detail in the full text of this document. The first of these elements, to be completed during FY2004, is a long-term state monitoring strategy. These strategies will be State specific, be designed from the monitoring capabilities each State already has, and incorporate a time frame not to exceed 10 years for completion of implementation of the strategy. EPA expects to require state monitoring programs to include all ten of the elements described below as late as within the next ten years as a prerequisite to receiving CWA 106 funds.

The 10 elements are:

### *A. Monitoring Program Strategy*

The State comprehensive monitoring program strategy describes how the State implements a monitoring program that serves its water quality decision needs; addresses all State waters, including all waterbody types; and contains or references a description of how the State addresses each of the remaining nine elements. The State comprehensive monitoring program strategy should contain or reference a description of how the State plans to addresses each of the remaining nine elements.

### *B. Monitoring Objectives of the Act*

A statement of monitoring objectives is required, consistent with the Clean Water Act, applicable to all navigable U.S. waters in the State, including streams, rivers, lakes, the Great Lakes, reservoirs, estuaries, coastal areas, wetlands, and groundwater. For example, monitoring objectives could include determination of water quality status and trends,

identification of impaired waters, identification of causes and sources of water quality problems, implementation of water management programs, and evaluation of program effectiveness.

#### *C. Monitoring Design*

The State has a comprehensive monitoring program design and rationale for selection of monitoring sites. Statewide designs may incorporate several approaches (e.g., fixed station, intensive and screening-level monitoring, rotating basin, judgmental and probability design) to meet decision needs.

#### *D. Recommended Core and Supplemental Water Quality Indicators*

A core set of monitoring indicators (e.g., water quality parameters) includes physical/habitat, chemical/toxicological, and biological/ecological endpoints as appropriate to assess attainment with applicable water quality standards throughout the State. A process exists for identifying supplemental indicators to monitor when there is a reasonable expectation that a specific pollutant may be present in a watershed or to support a special study such as screening for potential pollutants of concern.

#### *E. Quality Assurance*

Quality management plans and quality assurance program/project plans are established, maintained, and peer reviewed in accordance with EPA policy to ensure the scientific validity of monitoring and laboratory activities, and to ensure that State reporting requirements are met.

#### *F. Data Management*

An accessible electronic data system for water quality, fish tissue, toxicity, sediment chemistry, habitat, and biological data, with timely data entry (following appropriate metadata and State/Federal geolocational standards) and public access is used to manage data. EPA will require States to directly or indirectly use the new STORET system.

#### *G. Data Analysis/Assessment*

A methodology for evaluating monitoring results is used to determine whether a water is attaining water quality standards (see Sections 305(b), 303(d) and the November 19, 2001, Integrated Reporting Guidance), based on the various appropriate types of data (chemical, physical, biological, land use) from various sources (including Discharge Monitoring Report information).

#### *H. Reporting*

Timely submittal of water quality reports and lists under Sections 305(b), 303(d), 314 of the Clean Water Act and Section 406 of the Beaches Act is required. Section 303(d) lists and Section 305(b) reports, including Section 314 Lakes Assessments, are due no later than April 1 of even-numbered years. To remain eligible for Section 106 grants, states need to make provision for submitting annual updates of water quality information. Such provision may be satisfied by annually updating 305(b) assessment information or by annually uploading monitoring data to the national STORET warehouse. EPA issued "2002 Integrated Water Quality Monitoring and Assessment Report Guidance" on November 19, 2001, for integration and consistency in the development and submission of Section 305(b) water quality reports and Section 303(d) impaired waters lists.

#### *I. Periodic Review of State Monitoring Programs*

Periodic reviews by the state, and with appropriate EPA involvement of each aspect of the state monitoring program are necessary to determine how well the program serves its water quality decision needs for all navigable U.S. waters in the State, including all waterbody types. This will involve auditing the monitoring program to determine how well each of the elements is addressed and determining how needed changes and additions are incorporated into future monitoring cycles.

*J. General Support and Infrastructure Planning*

Identification of current and future resource needs to fully implement the state's monitoring programs strategy. This needs assessment should describe funding, staff, training, laboratory resources, and upcoming improvements.

Appendix D:

Results Work Group – draft measures as of 8/30/03

Redline = note to Results Work Group – not put into PART.

1) 250 primarily NPS-impaired waters impaired as of 1998 will partially or fully attain designated uses by 2008, and 700 primarily NPS-impaired waters impaired as of 1998 will partially or fully attain designated uses by 2012 (track progress with each reporting cycle, every 2 years).

[These numbers came from the state survey the Remediation subgroup did to state NPS coordinators, sent via email on May 12. “Partially attaining” uses means that a waterbody has met some uses, but has not met others.].

2) 1600 waters will show improvement at least in part due to NPS management actions by 2008, and 2500 waters will show improvement at least in part because of NPS management actions by 2012, using a 1998 baseline (track progress annually).

[These numbers came from the state survey the Remediation subgroup did to state NPS coordinators, sent via email on May 12].

3) Through 319h-funded projects, nitrogen loadings will be reduced by 329,000 pounds annually; phosphorus loadings will be reduced by 110,000 pounds annually; and sediment loadings will be reduced by 22,000 tons annually.

[These numbers came from several projects we had from a few states that reported dollars spent and load reduction estimates for their projects (info not from GRTS). I told OMB that we would have to reconsider these targets next year after we had more comprehensive numbers from 319h projects in GRTS. We were forced to put a target in now because OMB penalizes for not having targets. That might sound silly, but there you have it].

4) EPA will annually track the number of watershed-based plans, and river miles/lake acres/estuary square miles covered by such plans, supported under Section 319h since the beginning of FY 2002, that are under development and the number of watershed-based plans, and river miles/lake acres/estuary square miles covered, where watershed-based plans are being implemented. This measure has no target since in the draft EPA Strategic Plan (done in accordance with GPRA for the whole Agency), where it is articulated, it has no target (there currently is no plan to have a target for this measure in the final Plan). The language for the measure is verbatim from the last draft of the Strategic Plan, and therefore is subject to change.

[The above is what I wrote into the PART. The wording in the latest draft Strategic Plan reads: "The number of watershed-based plans (and water miles/acres covered), supported under State Nonpoint Source Program (section 319) since the beginning of FY 2002 that are under development and the number of watershed-based plans, (and water miles/acres covered), where watershed based plans are being implemented." OW insisted on counting number of plans along with waterbody area covered by plans. "Watershed-based plans" to be counted are ONLY those plans that meet the criteria laid out in our grants guidelines].

5) The dollar figure per waterbody mile covered by watershed-based plans will not exceed \$X (to be announced). This is what we turned in on the PART as our efficiency measure. However, we also wrote the following:

**\*\* Please note:** we would like to talk to OMB about substituting a "program administrative" efficiency measure for the one currently listed. OMB is apparently willing to accept such efficiency measures for other programs (such as "percent fund utilization" for DWSRF). An example for the NPS program might be "percentage of dollars expended for implementation activities will not fall below 80%, excepting agriculture (the agriculture exception is because we are trying to leverage more of our agriculture funds for planning and monitoring, in light of the Farm Bill money available for implementation). We had previously been told that we could not have this type of efficiency measure, but in light of the apparent acceptance of such an approach for other programs, we would like OMB to reconsider allowing the NPS program being allowed to do the same thing. This is especially true because watershed-based plan development costs will necessarily vary according to the size, stressors, and land uses in the watershed being planned for. Therefore, our current efficiency measure, while doable, is not unproblematic.

[The Prevention Group had a call on July 9 about the efficiency measure issue. We are going to ask OMB to substitute the following for the efficiency measure above:

“Total 319h dollars targeted through the use of watersheds-based plans or place and issue-based plans will equal or exceed total incremental dollars by 2012” (i.e. targeted implementation \$/incremental \$  $\geq 1$ ).]

6) By 2008, at least xx watershed-based plans covering xxx river miles/lake acres/estuary square miles and supported under Section 319h since the beginning of FY 2002 will have completed implementation. The targets for this measure are still under negotiation between the states and EPA through the draft Strategic Plan. The language for the measure is verbatim from the last draft of the Strategic Plan, and therefore is subject to change.

[The above is what I turned in for the PART – no targets were provided. The measure in the latest version of the Draft Strategic Plan reads differently, and has draft targets:

“By 2008, at least 50 watershed based plans (covering 5,000 miles), supported under State Nonpoint Source Programs (section 319) since the beginning of FY 2002 will have been substantially implemented.”

We will have to interpret what "substantially implemented" really means. OW wanted to use the wording “substantially implemented” instead of “completed implementation” because of the issue of adaptive management of watersheds. Under such an approach, a state may never actually “complete” implementation. With respect to what "substantially implemented" means, I have proffered the opinion to our own management that if the “original” (i.e. pre-adapted) plan has been implemented, then we should count this plan as having been “substantially implemented” for purposes of counting against this measure.].

7) 400 issue- and place-based plans will be developed by the end of FY 2004.

[The Prevention group has come up with a very short document explaining what such plans are – the criteria are less stringent than those for watershed-based plans, and therefore can encompass many more types of state and local plans already being developed. Furthermore, such plans need not have a focus on remediation, as watershed-based plans have].