

practices during the development of restoration projects:

- Documentation of sources and magnitude of uncertainty in expected restoration project performance
- Creation and implementation of an adaptive management plan
- Use of an independent peer review to evaluate restoration proposals

These practices are described in greater detail below. This discussion supplements the discussions and requirements for restoration found in the Phase II proposal.

1. Documentation of Sources and Magnitude of Uncertainty

A clear and thorough documentation of the sources and nature of uncertainty in predictions of a project's ability to meet performance targets is vital to fully evaluating the capabilities of a project and subsequently taking, as necessary, the appropriate steps to prevent or compensate for potential performance shortfalls. Restoration projects in particular require careful documentation because of the uncertainties found in the current state of the art. Documentation of uncertainty must be quantitative wherever possible, qualitative otherwise, and make use of sound statistical techniques. The Agency is considering requiring permittees to submit documentation of uncertainty as part of the information required under proposed § 125.95(b)(5).

Because of the complexity and evolving nature of restoration projects as an environmental management tool, most will have several areas of uncertainty in descriptions of their performance. These areas may include project organism productivity, time lag before full productivity, and comparison of compensatory project performance with adverse environmental impact measurements, among others. The Agency solicits comment on these and other areas of uncertainty in restoration projects and on appropriate methods for their characterization. Sample regulatory language is offered below (new language is in *italics*):

Add to Section 125.95(b)(5):

(ii) A quantification of the combined benefits from implementing design and construction technologies, operational measures and/or restoration measures and the proportion of the benefits that can be attributed to each. This quantification must include: the percent reduction in impingement mortality and entrainment that would be achieved through the use of any design and construction technologies or operational measures you have selected (i.e., the benefits you would achieve through impingement and entrainment reduction); a demonstration of the benefits that could be

attributed to the restoration measures you have selected; a demonstration that the combined benefits of design and construction technologies, operational measures, and/or restoration measures will maintain fish and shellfish at a level comparable to that which would be achieved under § 125.94. If it is not possible to demonstrate quantitatively that restoration measures such as creation of new habitats to serve as spawning or nursery areas or establishment of riparian buffers will achieve comparable performance, you may make a qualitative demonstration that such measures will maintain fish and shellfish in the waterbody at a level substantially similar to that which would be achieved under § 125.94. *To the extent that restoration measures are relied upon, the documentation should include a discussion, and quantification where feasible, of uncertainty associated with the implementation and results of these measures.*

2. Adaptive Management

Under adaptive management, an approach is chosen to address a problem and its effectiveness monitored during its implementation. Information from this monitoring is then used to make adjustments, as necessary, to the approach. Adaptive management is a particularly useful method when the outcome of a chosen approach is uncertain. Because of the uncertainty and evolving nature of restoration projects as an environmental management tool, the Agency is considering requiring permittees who choose to utilize restoration projects to create and implement an adaptive management plan. Permittees would submit this plan to the Director as part of the information required under § 125.95(b)(5).

The adaptive management plan would outline, to the extent possible, the actions a permittee would take should monitoring of project performance indicate deviation of performance from acceptable levels. The plan would describe, quantitatively where possible, the performance levels at which project adjustment would be necessary.

The adaptive management process relies heavily on adequate performance measurement methods and metrics to alert project managers to project deviations from expected performance levels or to indicate that a project is meeting performance goals. It is important for these reasons that project planners choose performance metrics that reflect attainment of project goals (i.e., maintenance of fish and shellfish levels in a waterbody) as accurately and directly as possible. Proxy measurement methods should be used with adequate caution. Project planners should also, where feasible, monitor for information useful for making corrections, as needed, in a project's performance. The Agency is considering requiring that permittees would stipulate performance measurement methods and metrics in their monitoring plan. (See proposed § 125.95(b)(7) (67 FR 17178, 17224)). Sample regulatory language is offered below (new language is in *italics*):

Add to § 125.95(b)(5):

(iii) A plan *utilizing the adaptive management method* for implementing and maintaining the efficacy of the restoration

measures you have selected and supporting documentation to show that the restoration measures, or the restoration measures in combination with design and construction technology(ies) and operational measures, will maintain the fish and shellfish in the waterbody, including the community structure and function, to a level comparable or substantially similar to that which would be achieved through § 125.94(b) or (c).

EPA requests comment on requiring an adaptive management plan for restoration projects.

3. Independent Peer Review

One challenge of successful restoration planning is the coordination of information from a large number of scientific disciplines, particularly hydrology, landscape ecology, and organismal biology. The Agency believes a thorough, multi-disciplinary review of restoration proposals would help to ensure their quality and therefore maximize the probability of project success. The Agency is concerned, however, that thorough review of restoration proposals may place a significant additional burden on the review capacities of permit writers, the majority of whom are trained primarily in the engineering sciences. To aid permit writers in their review of restoration proposals and to aid permittees in ensuring that the full range of pertinent expertise is brought to bear upon project plans, the Agency is considering requiring that the information a facility develops under proposed §§ 125.95(b)(5) and (7) in support of its restoration plan undergo an independent peer review prior to the plan's submission to the Director. EPA is considering whether a facility should be required to choose the members of the peer review panel in consultation with Federal, State, and Tribal fish and wildlife management agencies with responsibility for fish and shellfish potentially affected by the facility cooling water intake structure. The peer reviewers would be scientists who are otherwise independent of the permitting process for the facility and who, as a panel, have the appropriate multi-disciplinary expertise for the review of the restoration proposal. Peer reviewers would be charged with evaluating specific elements of each restoration proposal (e.g., the quantitative or qualitative descriptions of the uncertainty associated with restoration goals and projected outcomes, delays between project initiation and when a restoration program shows measurable success, and the nexus between impingement and entrainment losses and the productivity of the proposed restoration program.). If permittees