ENVIRONMENTAL PROTECTION AGENCY

40 CFR Part 125

[FRL–7468–6]

RIN 2040–AD62

National Pollutant Discharge Elimination System—Proposed Regulations To Establish Requirements for Cooling Water Intake Structures at Phase II Existing Facilities; Notice of Data Availability

AGENCY: Environmental Protection Agency (EPA).

ACTION: Proposed rule; Notice of data availability.

SUMMARY: On April 9, 2002, EPA published proposed standards for cooling water intake structures at Phase II existing facilities as part of implementing section 316(b) of the Clean Water Act (CWA). This notice presents a summary of significant data EPA received or collected since proposal, a discussion of how EPA is considering using these data in revised analyses supporting the rule, a discussion of some refinements that EPA is considering for the proposed regulatory requirements, and additional information regarding data quality. This notice also provides new information on a broader suite of technology options that may be appropriate for compliance at specific sites. EPA solicits public comment on the information presented in this notice and the record supporting this notice.

DATES: Comments on this notice of data availability and all aspects of the April 9, 2002, proposal must be received or postmarked on or before midnight June 2, 2003.

ADDRESSES: Comments may be submitted electronically, by mail, or through hand delivery/courier. Mail comments to the Water Docket, Environmental Protection Agency, Mailcode: 4101T, 1200 Pennsylvania Ave., NW., Washington, DC 20460, Attention Docket ID No. OW–2002–0049. Follow the detailed instructions as provided in Section I.B. of the **SUPPLEMENTARY INFORMATION** section for additional ways to submit comments.

FOR FURTHER INFORMATION CONTACT: For additional technical information contact Debra D. Hart at (202) 566–6379. For additional economic information contact Lynne Tudor, Ph.D. at (202) 566–1043. For additional biological information contact Dana A. Thomas, Ph.D. at (202) 566–1046. The e-mail address for the above contacts is *rule.316b@epa.gov.*

SUPPLEMENTARY INFORMATION:

Contents

I. General Information

A. How Can I Get Copies of This Document and Other Related Information?

1. *Docket.* EPA has established an official public docket for this action under Docket ID No. OW–2002–0049. The official public docket consists of the documents specifically referenced in this action, any public comments received, and other information related to this action. The official public docket is the collection of materials that is available for public viewing at the Water Docket in the EPA Docket Center, (EPA/DC) EPA West, Room B102, 1301 Constitution Ave., NW., Washington, DC. The EPA Docket Center Public Reading Room is open from 8:30 a.m. to 4:30 p.m., Monday through Friday, excluding legal holidays. The telephone number for the Public Reading Room is (202) 566–1744, and the telephone number for the Water Docket is (202) 566–2426.

2. *Electronic Access.* You may access this **Federal Register** document electronically through the EPA Internet under the "Federal Register" listings at *http://www.epa.gov/fedrgstr/.*

An electronic version of the public docket is available through EPA's electronic public docket and comment system, EPA Dockets. You may use EPA Dockets at *http://www.epa.gov/edocket/* to submit or view public comments, access the index listing of the contents of the official public docket, and to access those documents in the public docket that are available electronically. Once in the system, select "search," then key in the appropriate docket identification number.

Certain types of information will not be placed in EPA Dockets. Information claimed as confidential business information (CBI) and other information whose disclosure is restricted by statute, which is not included in the official public docket, will not be available for public viewing in EPA's electronic public docket. EPA's policy is that copyrighted material will not be placed in EPA's electronic public docket but will be available only in printed, paper form in the official public docket. To the extent feasible, publicly available docket materials will be made available in EPA's electronic public docket. When a document is selected from the index list in EPA Dockets, the system will identify whether the document is available for viewing in EPA's electronic public docket. Although not all docket materials may be available electronically, you may still access any of the publicly available docket materials through the docket facility identified in Unit I.A1. EPA intends to work towards providing electronic access to all of the publicly available docket materials through EPA's electronic public docket.

For public commenters, it is important to note that EPA's policy is that public comments, whether submitted electronically or on paper, will be made available for public viewing in EPA's electronic public docket as EPA receives them and without change, unless the comment contains copyrighted material, CBI, or other information whose disclosure is restricted by statute. When EPA identifies a comment containing copyrighted material, EPA will provide a reference to that material in the version of the comment that is placed in EPA's electronic public docket. The entire printed comment, including the copyrighted material, will be available in the public docket.

Public comments submitted on computer disks that are mailed or delivered to the docket will be transferred to EPA's electronic public docket. Public comments that are mailed or delivered to the Docket will be scanned and placed in EPA's electronic public docket. Where practical, physical objects will be photographed, and the photograph will be placed in EPA's electronic public docket along with a brief description written by the docket staff.

B. How and to Whom Do I Submit Comments?

You may submit comments electronically, by mail, or through hand delivery/courier. Please submit with your comments any references cited in your comments. To ensure proper receipt by EPA, identify the appropriate docket identification number in the subject line on the first page of your comment. Please ensure that your comments are submitted within the specified comment period. Comments received after the close of the comment period will be marked ''late.'' EPA is not required to consider these late comments, however, late comments may be considered if time permits. If you wish to submit CBI or information that is otherwise protected by statute, please follow the instructions in Unit I.C. Do not use EPA Dockets or e-mail to submit CBI or information protected by statute.

1. *Electronically.* If you submit an electronic comment as prescribed below, EPA recommends that you include your name, mailing address, and an e-mail address or other contact information in the body of your comment. Also include this contact information on the outside of any disk or CD ROM you submit, and in any cover letter accompanying the disk or CD ROM. This ensures that you can be identified as the submitter of the comment and allows EPA to contact you in case EPA cannot read your comment due to technical difficulties or needs further information on the substance of your comment. EPA's policy is that EPA will not edit your comment, and any identifying or contact information provided in the body of a comment will be included as part of the comment that is placed in the official public docket, and made available in EPA's electronic public docket. If EPA cannot read your comment due to technical difficulties and cannot contact you for clarification, EPA may not be able to consider your comment.

i. *EPA Dockets.* Your use of EPA's electronic public docket to submit comments to EPA electronically is EPA's preferred method for receiving comments. Go directly to EPA Dockets at *http://www.epa.gov/edocket*, and follow the online instructions for submitting comments. To access EPA's electronic public docket from the EPA Internet Home Page, select ''Information Sources,'' ''Dockets,'' and ''EPA Dockets.'' Once in the system, select ''search,'' and then key in Docket ID No. OW–2002–0049. The system is an ''anonymous access'' system, which means EPA will not know your identity, e-mail address, or other contact information unless you provide it in the body of your comment.

ii. *E-mail.* Comments may be sent by electronic mail (e-mail) to *OW-Docket@epa.gov*, Attention Docket ID No. OW–2002–0049. In contrast to EPA's electronic public docket, EPA's e-mail system is not an ''anonymous access'' system. If you send an e-mail comment directly to the Docket without going through EPA's electronic public docket, EPA's e-mail system automatically captures your e-mail address. E-mail addresses that are automatically captured by EPA's e-mail system are included as part of the comment that is placed in the official public docket, and made available in EPA's electronic public docket.

iii. *Disk or CD ROM.* You may submit comments on a disk or CD ROM that you mail to the mailing address identified in Unit I.B.2. These electronic submissions will be accepted in WordPerfect or ASCII file format. Avoid the use of special characters and any form of encryption.

2. *By Mail.* Send an original and three copies of your comments to the Water Docket, Environmental Protection Agency, Mailcode: 4101T, 1200 Pennsylvania Ave., NW., Washington, DC 20460, Attention Docket ID No. OW–2002–0049.

3. *By Hand Delivery or Courier.* Deliver copies of your comments to: Water Docket, EPA Docket Center, EPA West, Room B102, 1301 Constitution Ave., NW., Washington, DC, Attention Docket ID No. OW–2002–0049. Such deliveries are only accepted during the Docket's normal hours of operation as identified in Unit I.A.1.

C. How Should I Submit CBI to the Agency?

Do not submit information that you consider to be CBI electronically through EPA's electronic public docket or by e-mail. Send information claimed as CBI by mail only to the following address, Office of Science and Technology, Mailcode 4303T, U.S. Environmental Protection Agency, 1200 Pennsylvania Ave., NW., Washington, DC 20460, Attention: Debbi Hart/Docket ID No. OW–2002–0049. You may claim information that you submit to EPA as CBI by marking any part or all of that information as CBI (if you submit CBI on disk or CD ROM, mark the outside of the disk or CD ROM as CBI and then identify electronically within the disk or CD ROM the specific information that is CBI). Information so marked will not be disclosed except in accordance with procedures set forth in 40 CFR Part 2.

In addition to one complete version of the comment that includes any information claimed as CBI, a copy of the comment that does not contain the information claimed as CBI must be submitted for inclusion in the public docket and EPA's electronic public docket. If you submit the copy that does not contain CBI on disk or CD ROM, mark the outside of the disk or CD ROM clearly that it does not contain CBI. Information not marked as CBI will be included in the public docket and EPA's electronic public docket without prior notice. If you have any questions about CBI or the procedures for claiming CBI, please consult the person identified in the **FOR FURTHER INFORMATION CONTACT** section.

II. Purpose of This Notice

On April 9, 2002, EPA published proposed standards for cooling water intake structures at Phase II existing facilities (67 FR 17122). EPA received voluminous comments and data submissions during the 120-day public comment period on the proposal. However, many commenters, including both industry and environmental groups, requested additional time to review the proposal and the supporting record and to prepare further comments. Therefore, EPA is reopening the comment period on all aspects of the April 9, 2002, proposal. In addition, following publication of the proposal, EPA collected more data and revised several methodologies related to costing and benefits estimations. This notice makes these new data available for comment and discusses the relevance of these data to the analyses conducted by EPA. Thus, EPA also solicits public comment on the information presented in this notice and the record supporting this notice.

EPA notes that all options and issues discussed in its proposal are still under consideration for the final rule. This notice merely makes new information available for public review that the Agency will consider in making decisions for the final rule.

Summary of Proposed Rule for Existing Facilities

The proposed rule would implement section 316(b) of the Clean Water Act (CWA) for certain existing power producing facilities that employ a cooling water intake structure and that withdraw 50 million gallons per day (MGD) or more of water from rivers, streams, lakes, reservoirs, estuaries, oceans, or other waters of the U.S. for cooling purposes. The proposed rule constitutes Phase II in EPA's development of section 316(b) regulations and would establish national requirements applicable to the location, design, construction, and capacity of cooling water intake structures at these facilities. The proposed national requirements, which would be implemented through National Pollutant Discharge Elimination System (NPDES) permits, would minimize the adverse environmental impact associated with the use of these structures.

The proposed rule would establish location, design, construction, and capacity requirements that reflect the best technology available for minimizing adverse environmental impact from the cooling water intake structure based on waterbody type and the amount of water withdrawn by a facility. The Environmental Protection Agency (EPA) proposed to group surface water into five categories—freshwater rivers and streams, lakes and reservoirs, Great Lakes, estuaries and tidal rivers, and oceans—and establish requirements for cooling water intake structures located in distinct waterbody types. In general, the more sensitive or biologically productive the waterbody type, the more stringent the requirements proposed as reflecting the best technology available for minimizing adverse environmental impact. Proposed requirements also vary according to the percentage of the source waterbody withdrawn and facility utilization rate.

A facility may choose one of three options for meeting best technology available requirements under the proposed rule. These options are (1) demonstrating that the facility's existing design and construction technology, operational measures, and/or restoration currently meets specified performance standards; (2) selecting and implementing design and construction technologies, operational measures, or restoration measures that meet specified performance standards; or (3) demonstrating that the facility qualifies for a site-specific determination of best technology available because its costs of compliance are significantly greater than either (1) the costs considered by the Agency during the development of the rule, or (2) a site-specific determination of the benefits of compliance with the proposed performance standards. The proposed rule also provides that facilities may use restoration measures in addition to or in lieu of other technology measures to meet the performance standards established in the rule or on a site-specific basis.

EPA expects that the proposed regulation would minimize adverse environmental impact, including substantially reducing the harmful effects of impingement (organisms trapped against intake screens or other barriers at the entrance of cooling water intake structures) and entrainment (organisms drawn into a cooling water intake structure), at existing facilities over the next 20 years. As a result, the Agency anticipates that the proposed rule would help protect ecosystems in proximity to cooling water intake structures. The proposal would help preserve aquatic organisms, including threatened and endangered species, and the ecosystems they inhabit in waters used for cooling purposes by existing power producing facilities. EPA considered the potential benefits of the proposed rule and discussed these benefits in both quantitative and non-quantitative terms. Benefits, among other factors, are based on a decrease in expected mortality or injury to aquatic organisms that would otherwise be subject to entrainment into cooling water systems or impingement against screens or other devices at the entrance of cooling water intake structures. Benefits may also accrue at multiple ecological scales including population, community, or ecosystem levels.

In addition to the proposed regulatory requirements, EPA also invited comments on a number of other regulatory alternatives. The Agency will continue to consider all of these regulatory alternatives when making decisions on a final rule.

III. Major Changes to Assumptions Used in EPA's Analyses

Based on comments received, additional information made available, and the results of subsequent analyses, EPA is considering a number of revisions to the assumptions that were used in developing the engineering costs, the information collection costs, the economic analyses, and the benefits analyses. These new assumptions are presented below and were used in the current analyses, the results of which are presented in this Notice of Data Availability (NODA). EPA requests comment on each of these revised assumptions.

1. Number of Phase II Facilities

Since proposal, EPA verified design flow information for facilities that had been classified as either Phase II or Phase III facilities. This verification resulted in the following changes: five facilities that were classified as Phase II facilities at proposal have been reclassified as Phase III facilities. Conversely, six facilities that were classified as Phase III facilities at proposal have been reclassified as Phase II facilities. As a result, the overall number of Phase II facilities increased from 539 to 540 facilities.[1] For the NODA, all cost and economic analyses are based on the updated set of Phase II facilities.

2. Technology Costs

EPA used new information to revise the capital and operation and maintenance (O&M) costs for several compliance technologies, including those used as the primary basis for the proposed regulatory option. Overall, the cost updates resulted in the following changes. For the preferred option (discussed above at Section II), total capital costs increased by 66 percent and total O&M costs increased by 48 percent. For the waterbody/capacity-based option, which would set performance standards for impingement mortality and entrainment reduction based on closed-cycle, recirculating cooling for some facilities and technologies such as fine-mesh screens and fish-return systems for others, total capital costs increased by 40 percent (net of existing condenser cost savings), while total O&M costs decreased by 13 percent. These comparisons are based on the raw costs, adjusted to year-2002 dollars, which have not been discounted or annualized.[2]

[1] Note that these numbers are unweighted. On a sample-weighted basis, the number of Phase II facilities increased from 550 to 551.

[2] Based on additional research between the proposal and the NODA, some facilities also experienced a change in their projected compliance response. This change, together with the increase in in-scope Phase II facilities, may have contributed to the change in total compliance costs. See section IV of the NODA preamble for more information.

The revised costing assumptions are discussed in detail below. EPA notes that the proposed rule includes a compliance option that allows site-specific flexibility in cases where compliance costs for a particular facility significantly exceed those estimated in the analysis for the final rule. EPA is currently considering whether the final rule should provide additional guidance on how to conduct this comparison, including how best to use the costing information in the rule record. EPA requests comment on its costing methodology; its relationship to the proposed site-specific, cost-cost comparison provisions; and what additional guidance, if any, EPA should provide on implementation of these provisions.

3. Permitting and Monitoring Costs

At proposal, the single most costly permitting activity was the ''Impingement Mortality and Entrainment Characterization Study,'' a required element of the ''Comprehensive Demonstration Study.'' *See* proposed § 125.95(b). The proposed rule did not require facilities with cooling towers to conduct these studies but, inadvertently, EPA included costs for the Impingement Mortality and Entrainment Characterization Study in its cost estimates for facilities projected to have cooling towers in the base case (*i.e.*, those projected to have cooling towers in the absence of the rule). EPA also applied costs for this study to facilities that EPA projected to install cooling towers under certain regulatory options. For the NODA analysis, EPA did not include the cost of the Impingement Mortality and Entrainment Characterization Study for facilities projected to have cooling towers in the base case or the waterbody/capacity-based option.

4. Net Installation Downtime for Compliance Technologies Other Than Recirculating Cooling Towers

In the analysis for the proposed rule, EPA made the assumption that compliance technologies other than recirculating cooling towers would not require facility downtime for installation. EPA has since revised this assumption. EPA expects additional unscheduled downtimes of between two and eight weeks for the installation of the various non-recirculating compliance technologies.

5. Net Installation Downtime and Other Site-Specific Factors for Recirculating Cooling Towers

To support the proposed Phase II rule, EPA assumed that each projected cooling system conversion would require a net downtime of four weeks. This estimate was based on information that had been previously available to EPA on the downtime needed for fossil-fuel and nuclear power plants. Just prior to proposal, EPA received additional technical information on the amount of operational downtime needed during cooling system conversions from once through to closed-cycle, recirculating with cooling towers at nuclear power plants (*see* DCN 4–2529). For the new analyses, EPA is incorporating the new information which suggests that cooling system conversions at nuclear power plants may take seven months. To the extent that conversions at nuclear power plants take less time to complete, costs for this factor would be lower.

For non-nuclear power plants, EPA's cost estimates at proposal assumed four weeks downtime for the retrofit of wet cooling towers at existing power plants. The Agency requests comment on whether more or less downtime may be required at some plants due to site-specific factors and, if so, whether EPA should use a different estimate of downtime in analyzing the costs of this regulatory option.

6. Energy Penalties

For the proposed Phase II rule, the average annual energy penalty, by region and fuel type, was applied to each facility upgrading to a closed-cycle, recirculating cooling system. Based on comments received, EPA has changed the energy penalty assumption to attempt to account for seasonal, peak effects. For the new analyses, the energy penalty applied is the greater of the peak-summer penalty or the average annual penalty for each facility projected to convert their cooling systems to a closed-cycle, recirculating cooling system. EPA notes that the approach used at proposal might have understated potential impacts of the energy penalty on generating capacity. Conversely, using the greater of the peak summer penalty and the average annual penalty might overestimate potential impacts of the energy penalty on generating capacity. EPA has adopted the latter approach in order to ensure that impacts are not underestimated.

7. Capacity Utilization Rates

For the proposed Phase II rule, the 15 percent capacity utilization determination was based on the generation and capacity of the entire facility, including steam electric and non-steam generators. EPA believes that utilization of the steam electric part of a facility better reflects a facility's potential for adverse environmental impact because only the steam electric generators use cooling water. As discussed at Section XI below, EPA is considering refining its regulatory definition for ''capacity utilization rate'' at the proposed § 125.93 to reflect use of the steam electric part of a facility. For the NODA, EPA is using the capacity utilization of only the steam electric generators at Phase II facilities so that its updated economic analyses include this potential refinement.

In addition, at proposal, EPA used the average capacity utilization based on EIA data for 1995 to 1999. This utilization rate was often different from the rate based on the ''IPM base case results'' EPA used to support its estimates of the economic impacts of the rule (see section V for additional description of EPA's economic analysis methodology. For the NODA analyses, EPA used projected capacity utilization rates for 2008 (the first model-run year in EPA's economic analysis), in order to ensure internal consistency in the analysis. For many facilities, this resulted in a lower capacity utilization rate in the baseline. As a result, the compliance requirements and compliance costs for these facilities may be lower, depending on the waterbody type from which they withdraw and the impingement mortality and entrainment technologies they already have in place in the baseline. Facilities with lower projected compliance costs than under the previous assumption may also have lower projected impacts in the analysis, depending on the magnitude of the cost differential and the facilities' operating characteristics in the baseline (*e.g.*, a change in cost for marginal units would have a greater effect than for units that generate electricity well below the cost of the marginal unit). EPA requests comment on this change in assumptions.

8. Compliance Schedule

At the time of proposal, promulgation of the final section 316(b) Phase II rule was scheduled for August 28, 2003. As a result, EPA assumed that facilities would come into compliance with the preferred option between 2004 and 2008 as their existing NPDES permits expired and were reviewed. For regulatory options based on the reductions in impingement and entrainment achievable using a closed-cycle recirculating system, EPA further assumed that facilities costed with a cooling tower would come into compliance between 2005 and 2012. Since proposal, the section 316(b) regulatory development schedule has changed. Promulgation of the final rule is now scheduled for February 16, 2004, making it impossible for facilities to come into compliance in 2004 (the assumption in all economic analyses is that facilities comply in the beginning of the year in which they receive requirements in their permit). As a result, EPA shifted the compliance schedule for the NODA analysis by one year for all Phase II facilities. Facilities costed with a cooling tower are now assumed to have a compliance window from 2005 to 2013, while facilities without a recirculating requirement are assumed to come into compliance between 2005 and 2009 (during the year of their first post-promulgation permit). For purposes of the cost and impacts analysis, EPA used the 2010 model run year instead of the 2008 model run year, as at proposal. Under the preferred option, all facilities are projected to come into compliance by 2009.

9. Number of Facilities Projected To Upgrade to Recirculating Wet Cooling (Waterbody/Capacity-Based Option)

For the proposed Phase II rule, EPA estimated that 51 model facilities would upgrade their cooling systems from once-through to closed-cycle, recirculating cooling systems under the waterbody/capacity-based option. EPA estimates for these analyses that 44 model facilities would upgrade cooling systems for the same option. The requirements of the regulatory alternative have not changed. The change in number of facilities that would be required to upgrade their cooling system is due to: (1) EPA's effort to update, correct, and verify facility design intake flows and (2) the fact that EPA no longer needs to use a statistical methodology to determine the number of short technical questionnaire facilities that withdraw more than one percent of the mean tidal excursion. EPA has updated design intake flows for a number of in-scope facilities. In a few cases, these database flow changes have impacted the determination of whether a facility is projected to upgrade its cooling system because the requirements for the waterbody/capacity-based option, in some instances, hinge on intake flow. Since proposal, EPA has identified those short technical questionnaire facilities whose design intake flow exceeds one percent of the mean tidal excursion. This information was not available for the analyses supporting the proposal, and as such, EPA utilized a statistical method to project which facilities would meet these criteria. For these current analyses, EPA has utilized the actual data in lieu of the statistical method. As a result, a number of changes have been made to the list of short-technical questionnaire model facilities projected to upgrade their cooling systems.

IV. Engineering Cost Analysis

A. Facility Flow Verifications

In order to ensure the accuracy and quality of the data used for the costing effort, the Agency revisited its database of facility and intake design flows. Flow is an important factor in calculating costs. The Agency first screened the flow data in order to identify facilities with potentially inaccurate flow information. From this first set of facilities, the Agency attempted to identify errors by inspecting the original questionnaires on which the flows were reported. Through this effort, the Agency was able to correct a few flow values by identifying survey reporting errors (such as unit conversion inconsistencies). The remainder of the potentially inaccurate flow data set required outreach to 25 facilities to solve the identified discrepancies. In many cases, the original reported flows were correct. In others, incorrect initial reporting had led to incorrect calculations of design flow rates. The Agency corrected these flows for the master database used to support analyses presented in this Notice of Data Availability (*see* ''Flow Correction and Verification,'' in the Confidential Business Information portion of the docket).

B. Technology Cost Modules

The Agency developed a new approach to developing compliance costs that includes a broader range of compliance technologies than it used for calculating compliance costs for the proposed rule requirements. In order to do so, the Agency sought to evaluate new and/or additional costs for a wider range of intake technologies identified as having the potential to meet the proposed regulation requirements without the expense and energy penalty associated with capacity-reduction technologies such as cooling towers. In selecting among available technologies, EPA revised its traditional least cost approach, and instead assigned costs based on the projected performance of available technologies on a site-specific basis. This approach is discussed in more detail in section IV.C. below.

The revised and new technology modules analyzed by the Agency include the following:

—Addition of fish handling and return system to an existing traveling screen system,

—Addition of fine-mesh screens (both with and without a fish handling and return system) to an existing traveling screen system,

—Addition of a new, larger intake in front of an existing intake screen system,

—Addition of passive fine-mesh screen system (cylindrical wedgewire) near shoreline,

—Addition of a fish net barrier system,

—Addition of an aquatic filter barrier system,

—Relocation of an existing intake to a submerged offshore location (with velocity cap inlet, passive fine-mesh screen inlet, or onshore traveling screens),

—Addition of a velocity cap inlet to an existing offshore intake,

—Addition of passive fine-mesh screen to an existing offshore intake,

—Addition or modification of a shoreline-based traveling screen for an offshore intake system, and

—Addition of dual-entry, single-exit traveling screens (with fine-mesh) to a shoreline intake system.

The explanation and derivation of each of these modules is discussed in the public record (*see* ''316(b) Phase II NODA Cost Modules.'')

At proposal, EPA based its cost analysis primarily on the addition of fine-mesh traveling screens with fish handling systems. EPA recognized at proposal that some facilities would need to add larger intakes, move intakes, or modify offshore intakes, and included an approximate adjustment factor in its cost estimates to account for these types of modifications, but lacked sufficient data to model them explicitly. In the NODA analysis, EPA has added explicit cost modules for each of these activities. As a result, the per facility costs for adding traveling screens with fish handling systems have gone down significantly, but a significant number of facilities (about 40% of the in-scope universe) have been costed for other technologies, which are significantly more expensive than traveling screens. To help commenters better understand the impacts of these revisions, EPA has placed a summary document in the record that shows modeled costs for a range of flows for each major technology module used at proposal and in this NODA, broken out by salt water versus freshwater and nuclear facility versus non-nuclear facility (see ''Comparison of Capital and Net O & M Compliance Costs for Technologies Costed in Proposed Rule and NODA''). As discussed in section III above, EPA also modified its estimate of facility downtime potentially necessary to install these technologies, as well as capacity reduction technologies such as cooling towers.

EPA has not yet examined other new information suggesting that site-specific factors may affect the costs of retrofitting wet towers at existing power plants. For example, in October 2002, the Department of Energy (DOE) provided EPA with a study analyzing the costs of retrofitting wet cooling towers at four facilities (*see* DCN W–00–32, 316(b) Phase II, comment 2.11). The study found costs at these facilities would be higher than EPA estimated for similar facilities in its proposal record. EPA invites comment on the data contained in the DOE study, and will consider these data as the Agency makes decisions for the final rule. In January 2003, the DOE/National Energy Technology Laboratory (NETL) provided EPA with an addendum to their October 2002 (see DCN W–00–32, 316(b) Phase II, comment 2.14). In that addendum, DOE determined that three out of four facilities would likely require plume abatement technologies that could double the capital costs of the cooling tower portion of a retrofit project. In February 2003, DOE provided additional information indicating that one plant located on brackish waters in a densely populated urban area that is considering a cooling tower retrofit may install a reverse osmosis system to reduce particulate salt emissions (see ''Astoria Repowering Project Article X Supplement,'' Reliant Energy, November 12, 2002). EPA notes that some other facilities located on brackish water using cooling towers do not use such systems to reduce particulate emissions (see DCN 4–2553) . The Agency requests comment on whether site-specific factors other than those addressed in the Agency's derivation of cost estimates for the waterbody/capacity-based option at proposal could increase or lower the costs of retrofitting a wet cooling tower at an existing plant.

C. Facility-Level Costing Options

In order to implement the revised costing approach (see section IV.B. above), the Agency necessarily changed its approach to developing costs at the model facility level. This approach focuses as much as possible on site-specific characteristics for which the Agency obtained data through the 316(b) questionnaire. In addition, EPA utilized available geographic information, including detailed topographic mapping and overhead satellite imagery, to better utilize site-specific characteristics of each model facility's intake(s) to inform decisions on the proper costing modules projected for compliance. ''Technology Costing Module Applications for Model Facilities,'' provides the background and explanation of the Agency's approach to model facility level costing.

EPA's approach to model facility-level costing may be described as follows. In order to project upgrades to technologies as a result of compliance with the proposed rule, the Agency utilizes as much information as is available about the characteristics of the hundreds of facilities within the scope of the proposed rule. By incorporating as many site-specific features as possible into the design and implementation of its costing approach the Agency has been able to capture a representative range of compliance costs at what it deems ''model facilities.'' However, the Agency did not have and will never have the opportunity to visit and study in detail all of the engineering aspects of each facility complying with this rule (over 400 facilities could incur technology-related compliance costs as a result of this rule). Therefore, although the Agency has developed costs that represent EPA's best effort to develop a site-specific engineering assessment for a particular facility, this assessment does not incorporate certain peculiarities that only long-term study of each facility would bear out. Hence, the Agency refers to its approach as a ''model'' facility approach.

In selecting technology modules for each model facility, EPA departed from its traditional least cost approach. This is because, while the Agency is confident that the suite of available technologies can achieve compliance with the proposed performance generally (60–90% reduction in entrainment and 80–95% reduction in impingement relative to the calculation baseline) EPA lacks sufficient data to determine the performance of each technology on a site-specific basis. The Agency thus selected the best performing technology (rather than the least costly technology) that was suitable for each site, in order to ensure that the technology on which costs were based would in fact achieve compliance at that site. EPA recognizes that this approach may entail a greater degree of cost conservatism than is typical in regulatory analyses, and that this may have implications for the cost-cost comparison provisions in the proposed rule. EPA requests comment on its revised approach for selecting model facility cost modules.

EPA believes that its modular approach to deriving costs of technologies and the costs to install and operate technologies incorporates sufficient flexibility to derive costs that reflect a broad range of applications. To ensure that the Agency does not underestimate the costs of the rule, EPA has approached the compliance costing effort with great conservatism. When there is uncertainty or the data are inconclusive, EPA has favored conservative approaches to costs (that is, higher than average). Therefore, the Agency is confident that the compliance costs represented in the analyses accompanying this Notice of Data Availability represent conservative estimates for the range of model facilities represented. However, for a particular facility, the costs may be higher or may be lower than would actually be realized.

D. Clarifications and Corrections

Estimating Design Intake Flows for Short Technical Questionnaire Facilities

At proposal, the Agency utilized a statistical methodology based on linear regression to assess the design intake flow information for facilities that responded to the short technical questionnaire. Because the Agency initially asked short technical respondents for only their actual annual intake flow for the reporting year, it was necessary to obtain design intake flow information for the purpose of accurately assessing compliance costs. The Agency did not include the statistical methodology for estimating design intake flows for short technical questionnaire facilities and its results in the record for the proposed rule. The Agency continues to use this methodology for this Notice of Data Availability and hereby includes the supporting information in the record (see DCN 5–2501).

V. IPM Analyses

At proposal, EPA used an electricity market model, the Integrated Planning Model 2000 (IPM® 2000), to identify potential economic and operational impacts of various regulatory options considered for proposal.[3] EPA conducted impact analyses at the market level, by North American Electric Reliability Council (NERC) region,[4] and for facilities subject to the

[3] For a detailed description of the IPM 2000 see Chapter B3 of the Economic and Benefits Analysis (EBA) document in support of the proposed rule (DCN 4–0002; *http://www.epa.gov/ost/316b/econbenefits/b3.pdf*).

[4] The ten NERC regions modeled by the IPM are: ECAR (East Central Area Reliability Coordination Agreement), ERCOT (Electric Reliability Council of Texas), FRCC (Florida Reliability Coordinating Council), MAAC (Mid-Atlantic Area Council), MAIN (Mid-America Interconnected Network, Inc.), MAPP (Mid-Continent Area Power Pool), NPCC (Northeast Power Coordination Council), SERC (Southeastern Electricity Reliability Council), SPP

Continued

Phase II regulation. Analyzed characteristics included changes in capacity, generation, revenue, cost of generation, and electricity prices. These changes were identified by comparing two scenarios: (1) The base case scenario (in the absence of any Section 316(b) regulation) and (2) the post compliance scenario (after the implementation of the new Section 316(b) regulations). The results of these comparisons were used to assess the impacts of the preferred option and two of the five alternative regulatory options considered by EPA: (1) the ''Intake Capacity Commensurate with Closed-Cycle, Recirculating Cooling System based on Waterbody Type/Capacity'' Option (hereafter the ''waterbody/capacity-based'' option) and (2) the ''Intake Capacity Commensurate with Closed-Cycle, Recirculating Cooling System for All Facilities'' Option (hereafter the ''all closed-cycle'' option).

Since publication of the proposed rule, EPA has made several changes to its IPM analysis. The following sections present a discussion of these changes and the results of the re-analysis of the preferred option and the waterbody/capacity-based option. EPA would use the same methodology as described in Chapter B3 of the EBA (as amended in this NODA) to analyze other options presented at proposal but not explicitly analyzed for this NODA if they were chosen for promulgation.

A. Changes to the IPM Analyses Since Proposal

This section presents the changes to the IPM assumptions and modeling procedures used at proposal. This section also describes modifications EPA made to the analyses to correct errors that were discovered after publication of the proposed rule.

1. IPM Analysis of the Proposed Regulatory Requirements

For the proposal, EPA did not explicitly analyze the preferred option because of time constraints. Rather, EPA conducted an electricity market model analyses of two alternative options that had higher costs than those of the preferred option. To assess the expected economic impacts of the preferred option at proposal, EPA adopted an indirect approach.[5] EPA acknowledges that an analysis specific to the requirements of the preferred option is preferable, and, as a result, EPA conducted an IPM model run using the proposed regulatory requirements for this NODA. The results of this analysis are presented in Section V.B below.

2. Model Aggregation

At proposal, the steam electric generators of the 530 Phase II facilities that are modeled by the IPM were disaggregated from the existing IPM model plants (as used in the standard IPM base case used for other EPA regulations, the EPA Base Case 2000) and ''run'' as individual facilities along with the other existing model plants. This change increased the total number of model plants from 1,390 under the EPA Base Case 2000 to 1,777 under the 316(b) Proposal Base Case.[6] For this NODA, EPA made two further changes to the model aggregation, which increased the total number of model plants from 1,777 to 2,096:

• *Disaggregation of non-steam generators at Phase II facilities.* At proposal, EPA only disaggregated Phase II steam electric generators from the original model plant specification. These steam electric generators were then re-aggregated to the facility-level, and the facility-level output was used in EPA's facility impact analyses. Disaggregating only steam-electric generators led to the underestimation of certain facility-level operating characteristics (*e.g.,* generation and revenues) because the facility-level results produced by the model did not include the economic activities of non-steam generators at Phase II facilities. Therefore, for this NODA analysis, EPA also disaggregated the non-steam generators at facilities subject to the rule from the original model plant specification, so that the facility-level results include the economic activities of the entire plant.

• *Phase III facilities.* In addition to disaggregating generators at Phase II facilities, EPA also disaggregated generators at Phase III facilities for this NODA. (At the time this analysis was started, the section 316(b) regulatory schedule called for proposal of the Phase III rule three months before promulgation of the Phase II rule.)

Because changes in model aggregation can result in changes to the base case results, EPA compared the base case results generated for the proposal and NODA analyses. This comparison identified little difference in the base case results caused by the modification in the model aggregation: Base case total production costs (capital, O&M, and fuel) using the revised NODA specifications are lower by 0.2% to 0.3% in the years 2008, 2010, and 2020. Early retirements of base case oil and gas steam capacity under the NODA specifications decreased by 1,258 MW. Early retirements of base case nuclear and coal capacity remained constant. In addition, the revised model specifications result in changes in base case coal and gas fuel use by less than 1.0 percent.

3. Capacity Utilization

Under the preferred option and the alternative regulatory options considered at proposal, facilities with a capacity utilization rate of less than 15 percent may be subject to less stringent compliance requirements than facilities with a utilization rate of 15 percent or more, depending on the water body from which they withdraw and the technologies they already have in place. EPA made the following changes to the determination of the capacity utilization of Phase II facilities for the economic analysis:

• *Capacity utilization rates based on steam-electric generators only.* At proposal, the 15 percent capacity utilization determination was based on the generation and capacity of the entire facility, including steam electric and non-steam generators. As discussed at Section III above, EPA believes that utilization of the steam electric part of the facility better reflects the facility's potential for adverse environmental impact because only the steam electric generators use cooling water subject to this regulation. At Section XI below, EPA invites comment on a refinement to the definition of ''capacity utilization rate'' at proposed § 125.93 to focus only on the steam electric generators at a facility. For the NODA, EPA is using the capacity utilization of only the steam electric generators at Phase II facilities so that the updated economic analyses, including the IPM analysis, include this potential refinement.

• *IPM capacity utilization rates.* At proposal, EPA used the average capacity utilization based on Energy Information Administration (EIA) data for 1995 to 1999. This utilization rate was often different from the rate based on the IPM base case results. This discrepancy might have led to an underestimation of economic impacts for those facilities whose utilization rate is less than 15 percent based on EIA data but 15 percent or more based on IPM data, and to an overestimation of economic impacts for those facilities whose utilization rate is 15 percent or more based on EIA data but less than 15

(Southwest Power Pool), and WSCC (Western Systems Coordinating Council). Electric generators in Alaska and Hawaii are not modeled by the IPM.

[5] For more information on this analysis, please refer to Section VIII.A of the preamble to the proposed rule and Chapter B3 of the EBA document.

[6] For more information on changes made to the EPA Base Case 2000, see EBA, Chapter B3, Section B3–2.2.

percent based on IPM data. To make the compliance response and costs consistent with the economic performance of facilities in the IPM, EPA used projected IPM capacity utilization rates for 2008 (the first model-run year) for the NODA.

As a result of these two changes, of the 530 facilities modeled by the IPM at proposal, 19 facilities that had a capacity utilization rate of less than 15 percent for the proposal analysis have a rate of 15 percent or more for the NODA analysis (base case using the EPA electricity demand growth assumption). Conversely, 75 facilities that had a rate of 15 percent or more for the proposal analysis have a rate of less than 15 percent for the NODA analysis (base case using the EPA electricity demand growth assumption). The net effect of these changes is that for the NODA analysis more facilities are estimated to have the less stringent compliance requirements associated with a low capacity utilization rate than was the case for the proposal analysis.

- *Generation cap.* A final modification to the capacity utilization of Phase II facilities relates to the potential change in the utilization rate between the base case and the post-compliance cases. Because facilities with a baseline capacity utilization rate of less than 15 percent are potentially subject to less stringent compliance requirements (depending on the water body from which they withdraw and the technologies they already have in place), they would not be able to increase their post-compliance capacity utilization without incurring more stringent compliance requirements. In order to ensure that the capacity utilization rate in the post-compliance case is consistent with the costing assumptions, the generation of facilities with a steam-electric capacity of less than 15 percent in the base case was capped so that their post-compliance capacity utilization would remain below 15 percent.

4. Treatment of Installation Downtime

The IPM models the electric power market over the 26-year period 2005 to 2030. Due to the data-intensive processing procedures, the model is run for a limited number of years only. Run years are selected based on analytical requirements and the necessity to maintain a balanced choice of run years throughout the modeled time horizon. EPA selected the following run years for the Section 316(b) analyses: 2008, 2010, 2013, 2020, and 2026.[7] 2005 to 2009 are mapped into the 2008 run year; 2010 to 2012 are mapped into the 2010 run year; and 2013 to 2015 are mapped into the 2013 run year. The years that are mapped into a run year are assumed to have the same characteristics as the run year itself. This model characteristic creates a challenge in correctly representing estimated downtimes associated with recirculating systems and other compliance technologies exactly the way they are estimated to occur (downtimes assigned to a model run year are also assigned to non-run years, and downtimes assigned to non-run years are not taken into account).

There are different options of accounting for downtimes. At proposal, EPA decided to model the downtime for each facility in its estimated year of compliance. Since 2005 through 2009 are all mapped into 2008, a facility that had downtime in 2008 was modeled as if it also had downtimes in 2005, 2006, 2007, and 2009. This may have understated the net present value (NPV) of the facility's operations and therefore overestimated its closure decision. Conversely, a facility that had a downtime in a non-model run year was modeled as if it had no downtime at all. This may have overestimated its NPV and therefore understated its closure decision. While this approach potentially affected the facility-level analysis, it provided for a realistic snapshot of the market effect of downtimes in the model run year.

For the NODA analysis, EPA decided to change the representation of downtimes to an average over the years that are mapped into each model run year. For example, a facility with a downtime in 2008 was modeled as if 1/5th of its downtime occurred in each year between 2005 and 2009. This approach more closely models potential facility-level impacts as it accounts for the correct total amount of downtime for each facility. The potential drawback of this approach is that the snapshot of the market-level effect of downtimes during the model run year is the average effect; this approach does not model potential worst-case effects of above-average amounts of capacity being down in one NERC region during a specific year.

5. Correction of Errors

EPA corrected two IPM input errors that were discovered after publication of the proposed rule: (1) At proposal, the capital costs of compliance were erroneously considered sunk and were not taken into account in making early retirement decisions; (2) The energy penalty was omitted for a few facilities costed with a recirculating system (one out of 49 facilities under the waterbody/capacity-based option and nine out of 408 facilities under the all closed-cycle option). These errors may have led the IPM to understate the modeled economic impacts at these facilities.

6. Other Changes Affecting the IPM Results

In addition to the modeling changes described above, a number of other changes affect the results presented below. These changes are outlined in Section III above and include the following: an increase in the estimated number of in-scope Phase II facilities from 550 to 551 (as a result, the number of Phase II facilities modeled by the IPM increased from 530 to 531); revisions of technology and permitting/monitoring costs; changes to the assumption of construction downtimes of recirculating cooling towers and other compliance technologies; an adjustment of energy penalties; changes in the estimation of the capacity utilization threshold; and adjustments to the compliance schedule.

EPA also notes that in 2010, non-dispatched capacity in the IPM base case (based on EPA's electricity demand growth assumption) is approximately 12 percent of total capacity, which is consistent with historical rates to ensure system reliability. (Non-dispatched facilities are those that operate on a stand-by basis throughout the year but are not called upon to generate and dispatch electricity.) Most of this capacity is oil/gas steam capacity (66 percent) and gas turbines (27 percent). Overall, 11 percent of steam electric capacity and 15 percent of non-steam capacity are modeled to be on stand-by. A large portion of the non-dispatched steam electric capacity is subject to Phase II regulation. In total, approximately 12 percent of Phase II steam electric capacity is not dispatched in the base case. This number is higher than historical data for these facilities. The main reason for this difference is that over time, existing capacity, especially oil/gas steam capacity, is expected to become less competitive relative to new capacity additions, especially combined-cycle facilities. Oil and gas steam units generally have (a) higher heat rates, (b) higher fuel costs, (c) higher variable O&M costs, and (d) higher emission rates than other steam electric capacity. As a result, some relatively inefficient oil and gas steam units are modeled to be idle in the IPM.

[7] Model run years 2020 and 2026 were specified for model balance, while run years 2008, 2010, and 2013 were selected to provide output across the compliance period. Output for 2020 and 2026 is not used in EPA's analyses. For more information on IPM model run years, see Chapter B3, section B3–2.1.d of the EBA.

All Phase II facilities are subject to the requirements of the Phase II regulation, even if they do not generate electricity. Therefore, unless EPA modeled a facility to cease operations and exit the marketplace, EPA assigned compliance costs to non-dispatched facilities. While none of the Phase II units that stand-by in the base case are modeled to be economic closures under the preferred option, it is possible that other economic measures, *e.g.*, impacts on pre-tax income, may be overestimated for these facilities. This would be the case because revenues might be understated if the modeling assumption that these facilities do not generate electricity is not realistic.

EPA requests comment on this part of the analysis.

B. Revised Results for the Preferred Option

This section presents the revised impact analysis of the preferred option. The impacts of compliance with the preferred option are defined as the difference between the model output for the base case scenario and the model output for the post-compliance scenario.[8] EPA analyzed impacts from the preferred option using output from model run year 2010. 2010 was chosen to represent the effects of the preferred option for a typical year in which all facilities are in compliance (compliance years for the preferred option are 2005 to 2009).[9] The analysis was conducted at two levels: the market level including all facilities (by NERC region) and the Phase II facility level (including analyses of the in-scope Phase II facilities as a group and of individual Phase II facilities). The results of these analyses are presented below.

1. Market-Level Impacts of the Preferred Option

The market-level analysis includes results for all generators located in each NERC region including facilities both in scope and out of scope of the proposed Phase II rule. Exhibit 1 below presents five measures used by EPA to assess market-level impacts associated with the preferred option: (1) Incremental capacity closures, calculated as the difference between capacity closures under the preferred option and capacity closures under the base case; (2) incremental capacity closures as a percentage of baseline capacity; (3) post-compliance changes in variable production costs per MWh, calculated as the sum of total fuel and variable O&M costs divided by total generation; (4) post-compliance changes in energy price, where energy prices are defined as the wholesale prices received by facilities for the sale of electric generation; and (5) post-compliance changes in pre-tax income, where pre-tax income is defined as total revenues minus the sum of fixed and variable O&M costs, fuel costs, and capital costs. Additional results are presented in *Chapter B3: Electricity Market Model Analysis* (sec. B3–4.1) of the EBA, as updated for this NODA analysis. Chapter B3 also presents a more detailed interpretation of the results of the market-level analysis.

EXHIBIT 1.—MARKET-LEVEL IMPACTS OF THE PREFERRED OPTION (2010)

NERC region	Baseline capacity (MW)	Incremental capacity closures (MW)	Closures as % of baseline capacity	Change in variable production cost per MWh	Change in energy price per MWh	Change in pre-tax income ($2002)
ECAR	118,529	0	0.0	0.1	0.0	−1.1
ERCOT	75,290	0	0.0	0.0	6.1	−6.0
FRCC	50,324	0	0.0	0.4	0.6	−3.1
MAAC	63,784	0	0.0	−0.1	0.0	−0.9
MAIN	59,494	434	0.7	0.8	−0.3	−0.7
MAPP	35,835	0	0.0	−0.1	−0.4	−0.6
NPCC	72,477	0	0.0	−0.4	0.9	0.8
SERC	194,485	0	0.0	−0.1	0.0	−0.5
SPP	49,948	0	0.0	−0.1	−0.2	−0.4
WSCC	167,748	0	0.0	0.0	0.0	−1.1
Total	887,915	434	0.0	0.0	n/a	−1.1

One of the ten NERC regions modeled, MAIN, would experience economic closures of existing capacity as a result of the preferred option. However, this closure of 434 MW of nuclear capacity represents a relatively small percentage of baseline capacity in the region (0.7 percent). Three NERC regions would experience increases in variable production costs per MWh, although the largest increase would not exceed 1.0 percent. In addition, three NERC regions would experience an increase in energy price under the preferred option. Of these, only ERCOT would experience an increase of more than 1.0 percent (6.1 percent). Pre-tax incomes would decrease in all but one region, but the majority of these changes would be on the order of 1.0 percent or less. ERCOT would experience the largest decrease in pre-tax income (−6.0 percent). Only one region, NPCC, would experience an increase in market-level pre-tax income (0.8 percent).

2. Facility-Level Impacts of the Preferred Option

The results from model run year 2010 were used to analyze two potential facility-level impacts associated with the preferred option: (1) Potential changes in the economic and operational characteristics of the group

[8] Two base case scenarios were used to analyze the impacts associated with the preferred option and the waterbody/capacity-based option. The base case scenario used to analyze the preferred option was developed using EPA's electricity demand assumption. Under this assumption, demand for electricity is based on the Annual Energy Outlook (AEO) 2001 forecast adjusted to account for demand reductions resulting from the implementation of the Climate Change Action Plan (CAAP). The base case for the waterbody/capacity-based option was developed using the unadjusted electricity demand from the AEO 2001. (*See* the Appendix of ch.B8 of the EBA, as published for the proposed rule, for further explanation on the two base cases; *http://www.epa.gov/ost/316b/econbenefits/b8.pdf*.) EPA is currently completing additional IPM runs and will develop analyses of both options using both base cases. EPA intends to place these additional analyses in the docket during the comment period on this Notice. EPA expects to use information from the analyses in today's Notice and these additional analyses to support decision-making for the final rule.

[9] EPA also analyzed potential market-level impacts of the preferred option for a year within the compliance period during which some Phase II facilities experience installation downtimes. This analysis used output from model run year 2008. *See* ch. B3, sec. B3–4.3 of the EBA, as updated for this NODA analysis, for the results of this analysis.

of in-scope Phase II facilities and (2) potential changes to individual facilities within the group of Phase II facilities. EPA analyzed incremental capacity closures, changes in variable production costs per MWh of generation, total generation, and pre-tax income to assess impacts to all Phase II facilities resulting from the preferred option. Exhibit 2 below presents the results of this analysis, by NERC region.

EXHIBIT 2.—IMPACTS ON PHASE II FACILITIES OF THE PREFERRED OPTION (2010)

NERC region	Baseline capacity (MW)	Incremental closures		Change in variable production cost per MWh (%)	Change in generation (%)	Change in pre-tax Income (%)
		Capacity (MW)	% of baseline capacity			
ECAR	82,313	0	0.0	0.0	−0.1	−1.4
ERCOT	43,522	0	0.0	−0.7	−1.7	−11.0
FRCC	27,537	0	0.0	0.3	−0.8	−4.1
MAAC	33,590	0	0.0	0.0	0.2	−1.4
MAIN	35,373	434	1.2	0.5	−1.1	−1.0
MAPP	15,727	0	0.0	0.0	0.0	−1.6
NPCC	37,651	0	0.0	−1.4	−2.3	−0.8
SERC	107,450	0	0.0	−0.2	−0.2	−0.7
SPP	20,471	0	0.0	−0.4	−0.6	−1.0
WSCC	27,206	0	0.0	−1.0	−5.5	−27.0
Total	430,840	434	0.1	−0.5	−0.8	−2.0

Similar to the market level results, MAIN is the only region that would experience incremental capacity closures at Phase II facilities under this regulatory option: A total of 434 MW, or 1.2 percent of all Phase II capacity in this region, would be retired. Total capacity closures in MAIN are a net estimate (*i.e.*, policy case closures minus base cases closures) consisting of 519 MW of capacity retiring at one facility and an 85 MW reduction in closures at a second facility. Variable production costs per MWh at Phase II facilities would increase in two regions and decrease in five regions under the preferred option. No region would experience an increase in Phase II variable production costs that exceeds 0.5 percent while Phase II facilities in NPCC and WSCC would see reductions of 1.4 percent and 1.0 percent, respectively. Phase II facilities in four NERC regions would experience decreases in generation in excess of 1.0 percent as a result of the preferred option. The largest decrease would be in WSCC, where Phase II facilities would experience a 5.5 percent reduction in both generation and revenues. Overall, pre-tax income would decrease by 2.0 percent for the group of Phase II facilities. The effects of this change are concentrated in a few regions: WSCC would experience a reduction in pre-tax income of 27.0 percent, which is driven by a reduction in both generation and revenues (not presented in this exhibit). ERCOT and FRCC are estimated to experience a reduction of 11.0 and 4.1 percent, respectively.

Results for the group of Phase II facilities as a whole may mask shifts in economic performance among individual facilities subject to this rule. To assess potential distributional effects, EPA analyzed facility-specific changes in capacity utilization (defined as generation divided by capacity times 8,760 hours), generation, revenue, variable production costs per MWh (defined as variable O&M cost plus fuel cost divided by generation), and pre-tax income.

Exhibit 3 presents the total number of Phase II facilities with different degrees of change in each of these measures. This exhibit excludes 18 in-scope facilities with significant status changes (10 facilities are baseline closures, one facility is a policy closure, and seven facilities changed their repowering decision between the base case and the policy case). These facilities are either not operating at all in either the base case or the post-compliance case, or they experience fundamental changes in the type of units they operate; therefore, the measures presented below would not be meaningful for these facilities. In addition, the change in variable production cost per MWh of generation could not be developed for 57 facilities with zero generation in either the base case or post-compliance scenario. For these facilities, the change in variable production cost per MWh is indicated as ‘‘n/a.’’

EXHIBIT 3.—OPERATIONAL CHANGES AT PHASE II FACILITIES FROM THE PREFERRED OPTION (2010) [a]

Economic measures	Reduction			Increase			No change	N/A
	≦=1%	1–3%	> 3%	≦=1%	1–3%	> 3%		
Change in Capacity Utilization [b]	9	15	24	9	6	9	441	0
Change in Generation	7	1	44	10	3	17	431	0
Change in Revenue	80	27	42	100	22	15	227	0
Change in Variable Production Costs/MWh	33	13	9	140	13	14	234	57
Change in Pre-Tax Income	105	113	199	22	13	37	24	0

[a] For all measures percentages used to assign facilities to impact categories have been rounded to the nearest 10th of a percent.
[b] The change in capacity utilization is the difference between the capacity utilization percentages in the base case and post-compliance case. For all other measures, the change is expressed as the percentage change between the base case and post-compliance values.

Exhibit 3 indicates that the majority of Phase II facilities would not experience changes in capacity utilization or generation due to compliance with the preferred option. Of those facilities with changes in post-compliance capacity utilization and generation, most would experience decreases in these measures. Exhibit 3 also indicates that the majority of facilities with changes in post-compliance variable production costs would experience increases. However, more than 80 percent of those increases would not exceed 1.0 percent. Changes in revenues at most Phase II facilities would also not exceed 1.0 percent. The largest effect of the preferred option would be on facilities' pre-tax income: over 80 percent of facilities would experience a reduction in pre-tax income, with almost 40 percent experiencing a reduction of 3.0 percent or greater.

C. Revised Results for the Waterbody/Capacity-Based Option

This section presents the revised impact analysis of the alternative waterbody/capacity-based option. Under this option, facilities that withdraw water from an estuary, tidal river, or ocean and that meet certain intake flow requirements, would generally be required to meet performance standards for reducing impingement mortality and entrainment based on a level that can be attained by using a closed-cycle, recirculating cooling system. These facilities would have the choice to comply with Track I or Track II requirements. Facilities that choose to comply with Track I would be required to reduce their intake flow to a level commensurate with that which can be attained by a closed-cycle, recirculating system. Facilities that choose to comply with Track II would have to demonstrate that alternative technologies would reduce impingement and entrainment to comparable levels that would be achieved with a closed-cycle recirculating system (see section VI.B.2 of the proposal preamble for a discussion of Track I and Track II under this option). Other facilities would be required to reduce impingement mortality or impingement mortality and entrainment based on the performance of technologies such as fine-mesh screens and fish-return systems.

EPA's estimation of impacts associated with the alternative waterbody/capacity-based option is based on an electricity market model analysis that assumes that all facilities required to reduce impingement mortality and entrainment based on the performance of a closed-cycle recirculating cooling system would choose to comply with the requirements of Track I. This analysis further assumes that such facilities would install a recirculating wet cooling tower. These requirements would be met by the end of the term of the first permit after promulgation of the final rule (2005 to 2013), depending on when a permittee's first NPDES permit after promulgation expires. The impacts of compliance with the waterbody/capacity-based option are defined as the difference between the model output for the base case scenario and the model output for the post-compliance scenario.[10]

EPA analyzed impacts using IPM output from model run year 2013. 2013 was chosen to represent the effects of the waterbody/capacity-based option for a typical year in which all facilities are in compliance (compliance years for the waterbody/capacity-based option are 2005 to 2013; however, for the purposes of this analysis, all facilities are modeled to comply by 2012).[11] The analysis was conducted at two levels: the market level including all facilities (by NERC region) and the Phase II facility level (including analyses of the in-scope Phase II facilities as a group and of individual Phase II facilities), using the same framework as the analysis of the preferred option presented above. It should be noted that a direct comparison of the results of the preferred option and the waterbody/capacity-based option is not possible because (1) the analyses use output for different model run years (2010 for the preferred option and 2013 for the waterbody/capacity-based option) and (2) the two analyses use different base cases with different assumptions about future growth in electricity demand. As noted above, EPA will provide analyses of both regulatory options for both base cases and intends to place these in the docket during the comment period on this Notice.

1. Market-Level Impacts of the Waterbody/Capacity-Based Option

The market-level analysis includes results for all generators located in each NERC region including facilities both in scope and out of scope of Phase II regulation. Exhibit 4 below presents the same five measures as discussed for the preferred option: (1) Incremental capacity closures, calculated as the difference between capacity closures under the waterbody/capacity-based option and capacity closures under the base case; (2) incremental capacity closures as a percentage of baseline capacity; (3) post-compliance changes in variable production costs per MWh, calculated as the sum of total fuel and variable O&M costs divided by total generation; (4) post-compliance changes in energy price, where energy prices are defined as the prices received by facilities for the sale of electric generation; and (5) post-compliance changes in pre-tax income, where pre-tax income is defined as total revenues minus the sum of fixed and variable O&M costs, fuel costs, and capital costs. Additional results are presented in Chapter B8 (Section B8–2) of the EBA, as updated for this NODA analysis. Chapter B8 also presents a more detailed interpretation of the results of the market-level analysis.

EXHIBIT 4.—MARKET-LEVEL IMPACTS OF THE WATERBODY/CAPACITY-BASED OPTION (2013)—

NERC Region	Baseline capacity (MW)	Incremental capacity closures (MW)	Closures as % of baseline capacity	Change in variable production cost per MWh	Change in energy price per MWh	Change in pre-tax income ($2002)
ECAR	133,048	0	0.0%	0.5%	0.8%	1.3%
ERCOT	86,609	0	0.0	1.2	1.7	−0.1
FRCC	57,078	0	0.0	1.7	3.8	−5.4
MAAC	71,441	0	0.0	1.3	1.4	−4.1
MAIN	66,420	1,012	1.5	2.2	1.6	1.4
MAPP	39,694	0	0.0	0.3	1.8	2.0
NPCC	77,557	0	0.0	1.2	1.1	−3.3
SERC	220,567	0	0.0	1.0	1.4	0.2
SPP	55,711	0	0.0	0.6	1.5	1.2

[10] Two base case scenarios were used to analyze the impacts associated with the preferred option and the waterbody/capacity-based option. See footnote 8 above for a full explanation.

[11] EPA also analyzed potential market-level impacts of the alternative waterbody/capacity-based option for a year within the compliance period during which some Phase II facilities experience installation downtimes. This analysis used output from model run year 2008. See Chapter B8, Section B8–4 of the EBA, as updated for this NODA analysis, for the results of this analysis.

EXHIBIT 4.—MARKET-LEVEL IMPACTS OF THE WATERBODY/CAPACITY-BASED OPTION (2013)——Continued

NERC Region	Baseline capacity (MW)	Incremental capacity closures (MW)	Closures as % of baseline capacity	Change in variable production cost per MWh	Change in energy price per MWh	Change in pre-tax income ($2002)
WSCC	186,001	2,150	1.2	2.9	1.4	−1.7
Total	994,126	3,162	0.3	1.2	n/a	−0.5

Two of the ten NERC regions modeled, MAIN and WSCC, would experience economic closures of facilities as a result of this option. The capacity closures in MAIN and WSCC represent 1.5 percent and 1.2 percent, respectively, of baseline capacity in these regions and 0.3 percent of total baseline capacity for all regions taken as a whole. Variable production costs per MWh and energy prices would increase in all NERC regions. The increases in variable production costs would exceed 1.0 percent in six NERC regions, and two regions, MAIN and WSCC, would experience increases of more than 2.0 percent. Energy prices would increase by more than 1.0 percent in nine of the ten regions modeled, with FRCC experiencing the largest increase (3.8 percent). Half of the regions would experience a reduction in pre-tax income, while the other half would experience increases in this measure. The majority of these changes would be less than 2.0 percent. FRCC, MAAC, and NPCC would experience the largest decrease in pre-tax income (-5.4, -4.1, and -3.3 percent, respectively), while the largest increase would occur in MAPP (2.0 percent).

2. Phase II Facility-Level Impacts of the Waterbody/Capacity-Based Option

The results from model run year 2013 were used to analyze two potential facility-level impacts associated with the preferred option: (1) Potential changes in the economic and operational characteristics of the group of in-scope Phase II facilities and (2) potential changes to individual facilities within the group of Phase II facilities. EPA analyzed the same measures as discussed for the preferred option to assess impacts to the group of Phase II facilities resulting from the waterbody/capacity-based option: economic closures, changes in variable production costs per MWh of generation, total generation, and pre-tax income. Exhibit 5 below presents the results from this analysis, by NERC region.

EXHIBIT 5.—IMPACTS ON PHASE II FACILITIES OF THE WATERBODY/CAPACITY—BASED OPTION (2013)

NERC	Baseline capacity (MW)	Closure analysis		Change in variable production cost per MWh	Change in generation	Change in pre-tax income
		Capacity (MW)	% of baseline capacity			
ECAR	82,258	0	0.0%	0.3%	0.1%	1.0%
ERCOT	44,400	0	0.0	0.3	0.6	0.5
FRCC	27,513	0	0.0	0.3	3.5	10.5
MAAC	34,696	0	0.0	0.8	1.0	7.7
MAIN	34,944	1,012	2.9	1.2	2.5	1.5
MAPP	15,723	0	0.0	0.0	0.1	2.0
NPCC	37,219	0	0.0	0.8	−0.6	−9.2
SERC	107,458	0	0.0	0.7	0.1	−0.1
SPP	20,471	0	0.0	−0.7	−0.6	1.4
WSCC	28,093	2,150	7.7	0.5	−29.2	−30.7
Total	432,776	3,162	0.7	0.0	−2.1	−2.1

Similar to the results of the broader market-level analysis, MAIN and WSCC are the only regions that would experience incremental capacity closures at Phase II facilities under this regulatory option. In MAIN, 1,012 MW, or 2.9 percent of baseline Phase II capacity, would retire; in WSCC, 2,150 MW, or 7.7 percent of baseline Phase II capacity, would retire. In aggregate, these closures of 3,162 MW represents less than 1.0 percent of total baseline Phase II capacity. Phase II facilities in only one region, MAIN, would experience an increase in excess of 1.0 percent in variable production cost per MWh. Phase II facilities in seven NERC regions would experience a decrease in generation. Of these, three regions would see reductions in excess of 2.0 percent with the largest decrease occurring in WSCC (-29.2 percent), partially because of the post-compliance closures. Similar to the market level, FRCC, MAAC, and NPCC would experience relatively large reductions in pre-tax income (-10.5, -7.7, and -9.2 percent, respectively). However, the highest reduction would be seen in WSCC (-30.7 percent), where the compliance costs per MW of Phase II capacity is relatively high, and where only a relatively small portion of the overall capacity is regulated under the Phase II rule.

To assess potential shifts in economic performance among individual facilities subject to this rule, EPA analyzed the same facility-specific changes as for the preferred option: changes in capacity utilization (defined as generation divided by capacity times 8,760 hours), generation, revenue, variable production costs per MWh (defined as variable O&M cost plus fuel cost divided by generation), and pre-tax income.

Exhibit 6 presents the total number of Phase II facilities with different degrees of change in each of these measures. This exhibit excludes 30 in-scope facilities with significant status changes (nine facilities are baseline closures, three facilities are policy closures, and 18 facilities changed their repowering decision between the base case and the policy case). These facilities are either not operating at all in either the base case or the post-compliance case, or they experience fundamental changes in the type of units they operate; therefore, the measures presented below would not be meaningful for these facilities. In addition, the change in variable production cost per MWh of generation could not be developed for 62 facilities with zero generation in either the base case or post-compliance scenario. For these facilities, the change in variable production cost per MWh is indicated as ''n/a.''

EXHIBIT 6.—NUMBER OF PHASE II FACILITIES WITH OPERATIONAL CHANGES AT PHASE II FACILITIES WATERBODY/CAPACITY-BASED OPTION (2013) [a]

Economic measures	Reduction			Increase			No change	N/A
	≦1%	1–3%	>3%	≦1%	1–3%	>3%		
Change in Capacity Utilization [b]	4	11	21	6	14	15	430	0
Change in Generation	7	24	37	5	7	23	398	0
Change in Revenue	56	13	41	108	247	28	8	0
Change in Variable Production Costs/MWh	18	5	8	154	115	21	118	62
Change in Pre-Tax Income	51	62	164	45	141	36	2	0

[a] For all measures percentages used to assign facilities to impact categories have been rounded to the nearest 10th of a percent.
[b] The change in capacity utilization is the difference between the capacity utilization percentages in the base case and post-compliance case. For all other measures, the change is expressed as the percentage change between the base case and post-compliance values.

Exhibit 6 indicates that the majority of Phase II facilities would not experience changes in capacity utilization or generation due to compliance with the waterbody/capacity-based option. Of facilities with post-compliance changes in capacity utilization and/or generation, the majority would experience a decrease in these measures. Exhibit 6 also indicates that the majority of Phase II facilities would experience increases in both revenues and variable production costs of between 0.0 and 3.0 percent. Similarly, almost all Phase II facilities would experience a change in pre-tax income, with a slight majority seeing a reduction in this measure.

VI. Other Economic Analyses

EPA updated several of its other economic analyses conducted at proposal to determine the effect of changes made to the assumptions for this NODA on steam electric generating facilities. For more detailed information on these analyses, refer to the memo entitled ''Supporting Documentation of Changes to Economic Impacts in Support of the Section 316(b) Phase II NODA'' (DCN 5–3004). This section and the supporting memo discuss changes made to EPA's methodology and assumptions as well as the updated results. For a discussion of the original methodology used by EPA for the proposal analysis, refer to the chapters in Part B of the Economic and Benefits Analysis (EBA) document in support of the proposed rule at *http://www.epa.gov/waterscience/316b/econbenefits/*.

It should be noted that the measures presented in this section are provided in addition to the impact measures based on the Integrated Planning Model (IPM®) analyses (see Section V of this Notice). The following measures are used to assess the magnitude of compliance costs; they are not used to predict closures or other types of economic impacts on facilities subject to Phase II regulation.

It should also be noted that the results of the preferred option and the waterbody/capacity-based option cannot be directly compared to each other. EPA used two different demand growth assumptions for the IPM base cases of the preferred option (EPA electricity demand assumption) and the waterbody/capacity-based option (AEO electricity demand assumption, upon request by the Department of Energy). Since EPA is using IPM base case data in its estimate of the cost of installation downtime, the cost of the energy penalty, and revenues, the results presented in this section could vary between the two options, even for facilities or NERC regions with identical compliance requirements under the two options.[12] EPA intends to place additional IPM runs in the record during the NODA comment period to allow direct comparisons of both policy alternatives under both base cases.

A. National Costs

Based on the NODA analysis, EPA estimates that facilities subject to the preferred option would incur annualized post-tax compliance costs of approximately $265 million (at proposal, this estimate was $178 million). These costs include one-time technology costs of complying with the rule, a one-time cost of installation downtime,[13] annual operating and maintenance costs, and permitting costs (including initial permit costs, annual monitoring costs, and permit reissuance costs). This cost estimate does not include the costs of administering the rule by permitting authorities and the federal government. Also excluded are compliance costs for eight facilities that are projected to be baseline closures. Including compliance costs for projected baseline closure facilities would result in a total annualized compliance cost of approximately $269 million (at proposal, this estimate was $182 million). The cost differences between proposal and the NODA are accounted for primarily by the expanded range of technology options considered for the NODA and the ''best performing technology'' selection criteria used to assign cost modules to model facilities (see Section IV of this Notice).

EPA also updated the estimated total national annualized post-tax cost of compliance for the alternative waterbody/capacity-based option. Costs for this option include the same components as the estimate for the preferred option (one-time technology costs, cost of downtime, annual operating and maintenance costs, and permitting costs) but also include the cost of the energy penalty incurred by facilities estimated to upgrade to a recirculating cooling tower system. For the NODA analysis, the estimated total annualized post-tax cost of compliance for the waterbody/capacity-based option is approximately $793 million (at proposal, this estimate was $585 million). This increase reflects a number

[12] For example, compliance requirements in NERC regions without estuarine/tidal river or ocean facilities (*i.e.*, ECAR, MAIN, MAPP, and SPP) are identical under the two options. For this NODA analysis, all facilities in these regions would have had identical compliance costs under the two options, were it not for the difference in base case assumptions.

[13] At proposal, EPA assumed that the technologies required to comply with the preferred option would not require installation downtimes (see Section III.4 of this Notice).

of changes including increased technology costs, increased downtime for technology installation, and the use of electric demand assumptions from DOE's Annual Energy Outlook. Not included in this estimate are seven facilities that are projected to be baseline closures.[14] Including compliance costs for projected baseline closure facilities would result in a total annualized cost of compliance with the waterbody/capacity-based option of approximately $797 million (at proposal, this estimate was $595 million).

Exhibit 7 below summarizes the changes between the proposal and NODA analyses for the preferred option and the waterbody/capacity-based option.

EXHIBIT 7—SUMMARY OF CHANGES IN NATIONAL COSTS

	Proposal ($2001; mill.)	NODA ($2002; mill.)	Change	
			Absolute	Percent
Preferred Option				
Number of Phase II facilities	550	551	1	0.2
All facilities (pre-tax)	$279	$416	$137	49.1
All facilities (post-tax)	$182	$269	$87	47.8
Number of baseline closures	11	8	(3)	–27.3
Non-baseline closures (pre-tax)	$271	$410	$139	51.3
Non-baseline closures (post-tax)	$178	$265	$87	48.9
Waterbody/Capacity-Based Option				
Number of Phase II facilities	550	551	1	0.2
All facilities (pre-tax)	$968	$1,280	$312	32.2
All facilities (post-tax)	$595	$797	$202	34.0
Number of baseline closures	9	7	(2)	–22.2
Non-baseline closures (pre-tax)	$951	$1,273	$322	33.9
Non-baseline closures (post-tax)	$585	$793	$208	35.6

B. Cost-to-Revenue Measure

1. Facility-Level Analysis

EPA examined the annualized post-tax compliance costs of the preferred option and the waterbody/capacity-based option as a percentage of baseline annual revenues, for each of the 551 facilities subject to Phase II of the Section 316(b) regulation. This measure allows for a comparison of compliance costs incurred by each facility with its revenues in the absence of Phase II regulation. The revenue estimates are facility-specific baseline projections from the IPM base case for 2008 (see Section V of this Notice for a discussion of EPA's analyses using the IPM).[15]

Similar to the findings at proposal, the results of this analysis show that the vast majority of facilities subject to the preferred option, 404 out of 551 (73 percent), would incur annualized costs of less than one percent of revenues. Of these, 292 facilities would incur compliance costs of less than 0.5 percent of revenues. Ninety-seven facilities (18 percent) would incur costs of between one and three percent of revenues, and 41 facilities (seven percent) would incur costs of greater than three percent. Eight facilities are estimated to be baseline closures, and for one facility, revenues are unknown.[16] Exhibit 8 below summarizes these findings and also presents the ratios estimated at proposal.

EXHIBIT 8—COST-TO-REVENUE RATIO FOR THE PREFERRED OPTION (FACILITY LEVEL)

Annualized cost-to-revenue ratio	Proposal		NODA	
	All phase II	Percent of total phase II	All phase II	Percent of total phase II
<0.5%	331	60	292	53
>/= 0.5 to <1.0%	78	14%	112	20
>/= 1.0% to <3.0%	82	15	97	18
>/= 3.0%	46	8	41	7
Baseline Closure	11	2	8	1
n/a	1	0	1	0
Total	550	100	551	100

Exhibit 9 below presents the same information for the waterbody/capacity-based option.[17]

[14] The number of baseline closures is different for the preferred option and the waterbody/capacity-based option because different IPM base cases were used to estimate baseline closures. See footnote 8 above for a full explanation.

[15] EPA used 2008 rather than 2010 baseline revenues for this analysis because 2008 is the first model run year specified in the IPM analyses. EPA used the first model run year because it more closely resembles the current operating conditions of in-scope facilities than later run years (over time, facilities may be increasingly affected by factors other than a Phase II regulation).

[16] For the preferred option, IPM revenues for 2008 were not available for eight facilities estimated to be baseline closures, ten facilities not modeled by the IPM, and five facilities projected to have zero baseline revenues. EPA used facility-specific electricity generation and firm-specific wholesale prices as reported to the Energy Information Administration (EIA) to calculate the cost-to-revenue ratio for the 15 non-baseline closure facilities with missing information. The revenues for one of these facilities remains unknown.

EXHIBIT 9.—COST-TO-REVENUE RATIO FOR THE WATERBODY/CAPACITY-BASED OPTION (FACILITY LEVEL)

Annualized cost-to-revenue ratio	Proposal		NODA	
	All phase II	Percent of total phase II	All phase II	Percent of total phase II
<0.5%	355	65	281	51
>/=0.5 to <1.0%	60	11	101	18
>/=1.0 to <3.0%	57	10	102	19
>/=3.0%	67	12	58	11
Baseline Closure	9	2	7	1
n/a	1	0	1	0
Total	550	100	551	100

2. Firm-Level Analysis

The firms owning the facilities subject to Phase II regulation may experience greater impacts than individual in-scope facilities if they own more than one facility with compliance costs. EPA therefore also analyzed the cost-to-revenue ratios at the firm level. EPA identified the domestic parent entity of each in-scope facility and obtained their sales revenue from publicly available data sources (the Dun and Bradstreet database for parent firms of investor-owned utilities and nonutilities; and Form EIA–861 for all other parent entities) and EPA's 2000 Section 316(b) Industry Survey. This analysis showed that 128 unique domestic parent entities own the facilities subject to Phase II regulation. For both analyzed options, EPA compared the aggregated annualized post-tax compliance costs for each facility owned by the 128 parent entities to the firms' total sales revenue.

Since proposal, EPA has not updated the parent firm determination for Phase II facilities. However, EPA updated the average Form EIA–861 data used for this analysis from 1996 to 1998 (used at proposal) to 1997 to 1999 (used for the NODA). In addition, EPA made one modification to the data sources used: At proposal, EPA used Dun and Bradstreet (D&B) data for any parent entity listed in the database. If D&B data were not available, EPA used the EIA database or the Section 316(b) Survey. For the NODA analysis, EPA used the D&B database for privately-owned entities only. For other entities, EPA used the EIA database.

For the preferred option, EPA estimates that of the 128 unique entities, only two entities would incur compliance costs of greater than three percent of revenues; 11 entities would incur compliance costs of between one and three percent of revenues; eight entities would incur compliance costs of between 0.5 and one percent of revenues; and the remaining 107 entities would incur compliance costs of less than 0.5 percent of revenues. The highest estimated cost-to-revenue ratio for this NODA analysis is 7.4 percent of the entities' annual sales revenue (at proposal this value was 5.3 percent). Exhibit 10 below summarizes these findings and also presents the ratios estimated at proposal.

EXHIBIT 10.—COST-TO-REVENUE RATIO FOR THE PREFERRED OPTION (FIRM LEVEL)

Annualized cost-to-revenue ratio	Proposal		NODA	
	All phase II	Percent of total phase II	All phase II	Percent of total phase II
<0.5%	104	79	107	84
>/= 0.5 to <1.0%	12	9	8	6
>/= 1.0 to <3.0%	10	8	11	9
>/= 3.0%	3	2	2	2
Baseline Closure	2	2	0	0
Total	131	100	128	100

Exhibit 11 below presents the same information for the waterbody/capacity-based option.

EXHIBIT 11.—COST-TO-REVENUE RATIO FOR THE WATERBODY/CAPACITY-BASED OPTION (FIRM LEVEL)

Annualized cost-to-revenue ratio	Proposal		NODA	
	All phase II	Percent of total phase II	All phase II	Percent of total phase II
< 0.5%	108	82	95	74
>/= 0.5 to <1.0%	12	9	16	13
>/= 1.0 to <3.0%	6	5	15	12

[17] For the waterbody/capacity-based option, IPM revenues for 2008 were not available for seven facilities estimated to be baseline closures, ten facilities not modeled by the IPM, and two facilities projected to have zero baseline revenues. EPA used facility-specific electricity generation and firm-specific wholesale prices as reported to the Energy Information Administration (EIA) to calculate the cost-to-revenue ratio for the 12 non-baseline closure facilities with missing information. The revenues for one of these facilities remains unknown.

EXHIBIT 11.—COST-TO-REVENUE RATIO FOR THE WATERBODY/CAPACITY-BASED OPTION (FIRM LEVEL)—Continued

Annualized cost-to-revenue ratio	Proposal		NODA	
	All phase II	Percent of total phase II	All phase II	Percent of total phase II
>/= 3.0%	3	2	2	2
Baseline Closure	2	2	0	0
Total	131	100	128	100

C. Cost Per Household

EPA also conducted an analysis that evaluates the potential cost per household, if Phase II facilities were able to pass compliance costs on to their customers. This analysis estimates the average compliance cost per household for each North American Electricity Reliability Council (NERC) region,[18] using two data inputs: (1) The average annual pre-tax compliance cost per megawatt hour (MWh) of total electricity sales and (2) the average annual MWh of residential electricity sales per household.

The results of this analysis show that the average annual cost per residential household would range from $0.55 (in ASCC) to $5.69 (in HI) for the preferred option and from $0.55 (in ASCC) to $20.41 (in HI) for the waterbody/capacity-based option. Exhibit 12 below presents the values for each NERC region for the preferred option and the waterbody/capacity-based option. The exhibit also presents the values for the preferred option at proposal.

EXHIBIT 12.—SUMMARY OF COST PER HOUSEHOLD BY NERC REGION

NERC region	Preferred option			W/C-based option
	Proposal ($2001)	NODA ($2002)	Change	NODA ($2002)
ASCC	$0.33	$0.55	$0.22	$0.55
ECAR	0.99	1.49	0.50	1.52
ERCOT	1.01	1.12	0.11	1.75
FRCC	1.58	2.04	0.46	12.08
HI	2.55	5.69	3.14	20.41
MAAC	1.16	1.50	0.34	9.53
MAIN	0.84	1.32	0.48	1.32
MAPP	0.88	1.09	0.21	1.10
NPCC	1.09	1.49	0.40	4.57
SERC	0.83	1.17	0.34	3.21
SPP	0.64	0.88	0.24	0.88
WSCC	0.36	0.94	0.58	5.08
U.S. Average	0.87	1.30	0.43	4.00

D. Electricity Price Analysis

EPA also considered potential effects of the proposed Phase II rule on electricity prices. EPA used three data inputs in this analysis: (1) Total pre-tax compliance cost incurred by facilities subject to Phase II regulation, (2) total electricity sales, based on the Annual Energy Outlook (AEO) 2002, and (3) prices by end use sector (residential, commercial, industrial, and transportation), also from the AEO 2002. All three data elements were calculated by NERC region.

The results of the NODA analysis show that the annualized costs of complying (in cents per KWh sales) range from 0.007 cents in SPP to 0.020 cents in NPCC for the preferred option, and from 0.007 cents in SPP to 0.096 cents in MAAC for the waterbody/capacity-based option.

To determine potential effects of these compliance costs on electricity prices, EPA compared the per KWh compliance cost to baseline electricity prices by end use sector and for the average of the sectors. This analysis shows that the average increase in electricity prices would be 0.17 percent under the preferred option and 0.51 percent under the waterbody/capacity-based option. (At proposal, the estimated increase in electricity prices for the preferred option was 0.11 percent.)

Exhibit 13 below presents the values for each NERC region for the preferred option and the waterbody/capacity-based option. The exhibit also presents the values for the preferred option at proposal.[19]

[18] There are twelve NERC regions: ASCC (Alaska Systems Coordinating Council), ECAR (East Central Area Reliability Coordination Agreement), ERCOT (Electric Reliability Council of Texas), FRCC (Florida Reliability Coordinating Council), HI (Hawaii), MAAC (Mid-Atlantic Area Council), MAIN (Mid-America Interconnected Network, Inc.), MAPP (Mid-Continent Area Power Pool), NPCC (Northeast Power Coordination Council), SERC (Southeastern Electricity Reliability Council), SPP (Southwest Power Pool), and WSCC (Western Systems Coordinating Council).

[19] Note that Alaska and Hawaii are not represented in the AEO.

EXHIBIT 13.—SUMMARY OF ELECTRICITY PRICES BY NERC REGION

NERC region	Preferred option				W/C-based option	
	Proposal ($2001)		NODA ($2002)		NODA ($2002)	
	Annualized pre-tax compliance cost (cents/ KWh sales)	% change in price	Annualized pre-tax compliance cost (cents/ KWh sales)	% change in price	Annualized pre-tax compliance cost (cents/ KWh sales)	% change in price
ECAR	0.010	0.15	0.015	0.23	0.015	0.23
ERCOT	0.007	0.11	0.008	0.12	0.013	0.18
FRCC	0.012	0.15	0.015	0.20	0.088	1.16
MAAC	0.012	0.13	0.015	0.17	0.096	1.05
MAIN	0.010	0.14	0.016	0.22	0.016	0.22
MAPP	0.008	0.13	0.010	0.15	0.010	0.16
NPCC	0.017	0.19	0.020	0.22	0.061	0.68
SERC	0.006	0.10	0.008	0.14	0.023	0.38
SPP	0.005	0.09	0.007	0.12	0.007	0.12
WSCC	0.004	0.05	0.010	0.13	0.053	0.70
U.S. Average	0.008	0.11	0.012	0.17	0.037	0.51

VII. Performance Standards

In the proposed rule, EPA set up a framework that would require facilities that did not reduce their intake capacity commensurate with a closed-cycle recirculating cooling system to meet certain other performance standards for reducing impingement mortality and entrainment based on technologies such as fine-mesh screens and fish-return systems. These other performance standards were based on the source water body type where the cooling water intake structure is located, the facility's capacity utilization rate, and the proportion or volume of the water body that is withdrawn by the facility. In general, most facilities would be required to implement control technologies that reduce impingement mortality by 80 to 95 percent and/or entrainment by 60 to 90 percent unless they demonstrate the need for a site-specific determination of best technology available. (See proposed § 125.94 and Chapter VI. Best Technology Available for Minimizing Adverse Environmental Impact at Phase II Existing Facilities (67 FR 17140)).

A. Technology Efficacy Database to Support Performance Standards

In an effort to document and further assess the performance of various technologies and operational measures designed to minimize the impacts of cooling water withdrawals, EPA compiled a database of documents that analyzes the efficacy of a specific technology or suite of technologies. The database contains materials that range from brief journal articles to more intensive analyses found in historical section 316(b) demonstration reports and technology evaluations. At this time, EPA is assembling as much documentation as possible to support future Agency decisions. Information entered into the database includes some notation of the limitations the individual studies may have for use in further analyses (*e.g.*, no biological data or conclusions).

EPA's intent in assembling this information is four-fold. First, EPA seeks to develop a categorized database containing a comprehensive collection of available literature regarding technology performance that will serve as a more rigorous compilation of data supporting the determination that the proposed performance standards are best technology available. Second, EPA expects to use the data to demonstrate that the technologies chosen as compliance technologies for costing purposes are reasonable and can meet the performance standards. Third, the availability of a user-friendly database would allow EPA, State permit writers, and the public to more easily evaluate potential compliance options, facility compliance with performance standards, and data pertaining to the streamlined option described in this NODA (see section VII.B below). Fourth, EPA has attempted to evaluate the technology efficacy data against objective criteria in order to assess the general quality and thoroughness of each study. This may assist in further analysis of conclusions made using the data.

Basic information from each document is recorded in the database (*e.g.*, type of technology evaluated, facility at which it was tested, etc.) In addition to basic document information, the database contains information in two principal areas: (1) General facility information and (2) detailed study information.

For those documents that refer to a specific facility (or facilities), basic technical information is included to enable EPA to classify facilities according to general categories. EPA collected locational data (*e.g.*, waterbody type, name, state) as well as basic cooling water intake structure configuration information. Each technology evaluated in the study is also recorded, along with specific details regarding its design and operation. Major categories of technology include modified traveling screens, wedge-wire screens, fine-mesh screens, velocity caps, barrier nets, and behavioral barriers. (Data identifying the technologies present at a facility as well as the configuration of the intake structure refer to the configuration at the time the study was conducted and do not necessarily reflect the present facility set-up.)

Information on the type of study and any study results, is recorded in the second portion of the database. EPA identifies whether the study evaluates the technology with respect to impingement mortality reduction (or avoidance), entrainment survival, or entrainment exclusion (or avoidance). Some studies address more than one area of concern and are noted accordingly. If provided, EPA records basic biological data used to evaluate the technology. These include target or commercially/recreationally valuable species, species type, life history stage, size, sample size, and raw numbers of impinged and/or entrained organisms. Finally, EPA records any overall conclusions reached by the study, usually presented as a percentage reduction or increase, depending on the area of focus. Identifying this information for each document allows EPA and others to more readily locate and compare documents addressing similar technologies.

Each document is reviewed according to five areas of data quality where possible: (1) Applicability and utility, (2) soundness, (3) clarity and completeness, (4) uncertainty and variability, and (5) evaluation and review. Because the literature in question comes from many different sources and was developed under widely varying standards, EPA was not able to evaluate all of these criteria for all documents contained in the database.

To date, EPA has collected 148 documents for inclusion in the database. EPA did not exclude any document that addressed technology performance in relation to impingement and entrainment, regardless of the overall quality of the data. Sample questions are included in Exhibit 1 below. The proposed technology database is available in the record (See the document ''Technology Efficacy Database'' in the docket).

EXHIBIT 1.—QUALITY ASSURANCE SAMPLE QUESTIONS

QA Criteria	Sample Questions
Applicability and Utility.	• Does the study address impingement and/or entrainment reduction? • Does the study evaluate a technology (or technologies) in situ or against performance data from another source? • Does the study include biological data?
Soundness	• Does the study detail the CWIS configuration at the time of the study? • Are SOPs for sampling and testing included? • Is some measure of before and after biological data included? • Are O&M procedures described for the test period?
Clarity and Completeness.	• Is the sampling method clearly described? • Is a complete biological data set included? • Are results clearly and completely documented?
Uncertainty and Variability.	• Does the study identify potential uncertainties or mitigating factors such as those due to environmental conditions?
Evaluation and Review.	• What is the source of the document? • Is the document a primary study? • Has the document been peer reviewed? • Was the purpose of the study to evaluate the performance of a specific technology?

EPA is seeking comment on the applicability, quality, and quantity of the information and analyses in this database upon which EPA is relying. More specifically, EPA requests comment on whether these data are of sufficient quantity and quality to support the determination that the proposed performance standards are best technology available and that the existing facilities can meet these standards by implementing design and construction technologies either singly or in conjunction with other design and construction technologies (including operational and restoration measures). In addition, EPA requests comment on limitations of the data and identification of other relevant information available to be included in this database. Based on a preliminary review of the available data, the Agency continues to believe that an 80–95% reduction in impingement mortality and a 60–90% reduction in entrainment are achievable.

B. Streamlined Technology Option for Certain Locations

EPA received a number of comments expressing concern that the proposed Comprehensive Demonstration Study requirements at § 125.95(b) would impose a significant burden on permit applicants. As proposed, the Comprehensive Demonstration Study would have as many as seven different components: (1) A Proposal for Information Collection, (2) Source Waterbody Flow Information; (3) an Impingement Mortality and Entrainment Characterization Study; (4) a Design and Construction Technology Plan; (5) Information to Support any Proposed Restoration Measures; (6) Information to Support Site-Specific Determination of Best Technology Available for Minimizing Adverse Environmental Impact; and (7) a Verification Monitoring Plan.[20] The proposed Comprehensive Demonstration Study requirement would allow a permit applicant to either identify and compile available existing data, or to perform new site-specific studies to characterize the waterbody within the influence of the cooling water intake structure and the efficacy of proposed technologies.

Some commenters suggested that EPA provide an additional, more streamlined compliance option under which a facility could implement certain specified technologies that are deemed highly protective in exchange for not having to perform, or greatly reducing the scope of, the proposed Comprehensive Demonstration Study required at § 125.95(b). In response to these comments EPA is considering, and invites the public to comment on two variations of a streamlined compliance option that would reduce the information collection burden imposed on permit applicants.

Under the first variation, EPA would evaluate the effectiveness of specific technologies using the impingement mortality and entrainment performance standards specified in the proposed rule as assessment criteria. Specifically, EPA would require that the demonstrated efficacy of the control technology would at least reduce impingement mortality by 80 to 95 percent for fish and shellfish. If it was also to be used by facilities with an additional requirement to reduce entrainment by 60 to 90 percent for all life stages of fish and shellfish, then EPA would ensure that the technology would also satisfy this requirement. Evaluation of the level of impingement mortality or entrainment reduction would be based on review and analysis of available data, studies, and literature. The Agency also would assess the conditions where such technologies are effective (*e.g.*, location, whether a technology reduces impingement or entrainment or both, flow, velocity, species, life stage, etc.). If, based on such an assessment, the Agency identifies technologies that are sufficiently protective and for which applicability conditions can be defined, EPA would promulgate regulations (either as part of the 316(b) Phase II rule or at some later date) that allow for their use as a means of complying with Phase II section 316(b) requirements.

EPA is in the process of assessing this option and has not completed a comprehensive review of control technology efficacy data for the purpose of identifying and delineating technologies that might qualify under this option. However, the efficacy data

[20] Information to support the use of restoration measures and/or the use of site-specific determinations would be required to be collected and submitted only by permit applicants that choose to use restoration measures or demonstrate that a site-specific determination of best technology available is appropriate for their facility.

currently available to EPA do seem to support the use of a streamlined technology option for certain limited locations. Such a technology would be used to treat the entire cooling water intake flow and would not be used in combination with restoration measures to meet the performance standards. EPA is considering whether the following technology operated in the following locations would qualify for streamlined application requirements:

Use of submerged wedge-wire screens where the cooling water intake structure is located in a freshwater river or stream, sustained countercurrents exist to promote cleaning of the screen face, and the design intake velocity is 0.5 feet per second (ft/s) or less.

EPA believes that sufficient data exist in the record to demonstrate that all facilities that meet the criteria (*e.g.*, cooling water intake structure is located in a freshwater river or stream, facility proposes to use wedge-wire screen technology only, technology has a design intake velocity of 0.5 ft/s or less, and sustained countercurrents exist) and employ this technology would meet both the impingement mortality and entrainment reduction performance standards and that the record would thus justify limiting the amount of site-specific information required to be collected to support the use of this technology in freshwater systems (See DCN 1–3075, 1–5069, 1–5070, 3–0002, and 4–4002B). Facilities that choose to comply under this compliance option would still be required to meet the proportional flow standards in § 125.94(b)(2), (3), or (4).

At a minimum, the permitting authority would require each facility applying to use this technology to provide documentation that the facility's cooling water intake meets the applicability conditions specified for the technology and that, once installed, the facility will properly operate and maintain the technology. In addition, at a minimum, monitoring would be required as necessary to verify that the technology is in fact achieving an acceptable level of performance.

Under the second variation of this option, the Phase II regulations would establish the criteria and process for approving cooling water intake structure control technologies, but would allow the approval process to be carried out by the Director, perhaps with EPA oversight or approval. Under this option, the rule would define the criteria that a control technology must meet to be approved, and the process for approval. The criteria would focus on reducing impingement mortality and/or entrainment levels consistent with the proposed performance standards (see § 125.94), as appropriate under specified conditions. This option would also specify the data requirements and process required to have a control technology approved. Under the option, the requisite data would be submitted to the Director who would determine whether the technology satisfied the applicable performance criteria. If so, the technology would be approved for use by any eligible facility (*i.e.*, any facility that meets the applicability criteria) under the jurisdiction of the Director. The Director's draft determinations would likely be published and an opportunity for public comment would be provided. The Director would then modify the State's implementing regulations to include the other technology as one eligible for a streamlined comprehensive demonstration study. This option could create an incentive for the regulated community to develop and document both existing and new innovative technologies to reduce cooling water structure impacts.

The two variations are not mutually exclusive. If EPA implemented both, it might adopt regulatory language similar to that provided below as a new § 125.94(a)(4). Note that 4(i) corresponds to the first approach and 4(ii) to the second.

(4)(i) You may demonstrate to the Director that your Phase II existing facility meets the conditions in (A), (B) and (C), and you will properly install, operate, and maintain submerged wedge-wire screen technology;

(A) Your cooling water intake structure is located in a freshwater river or stream;

(B) Your cooling water intake structure is situated such that sufficient ambient counter currents exist to promote cleaning of the screen face; and

(C) Your design intake velocity is 0.5 ft/s or less.

(ii) Any interested person may submit a request that a technology be approved for use under the compliance option in § 125.94(a)(4). If the Director approves, the technology may be used with compliance option § 125.94(a)(4) by all facilities under their jurisdiction. Requests for alternative technologies for compliance under § 125.94(a)(4) must be submitted to the Director and include the information in paragraphs (A), (B), and (C) below:

(A) A detailed description of the technology;

(B) A list of design criteria for the technology and site characteristics and conditions that each facility must posses in order to ensure that the technology can consistently meet the appropriate impingement mortality and entrainment performance standards in § 125.94(b); and

(C) Information and data sufficient to demonstrate that all facilities under the jurisdiction of the Director can meet the applicable impingement mortality and entrainment performance standards in § 125.94(b) if the applicable design criteria and site characteristics and conditions are present at the facility.

Another paragraph could be added as § 125.95(c) that would establish the streamlined information collection requirements for the new compliance option at § 125.94(a)(4). The language might read as follows:

(c) You must submit to the director the application information required by 40 CFR 122.21(r)(2), (3), and (5) and the Verification Monitoring Plan in 125.95(b)(7).

Both options discussed above pose several implementation issues. There is the question of how, and on what basis, should technology effectiveness be assessed? Because each control technology is being assessed in a general context (*i.e.*, not as applied to a specific facility, but as applied in specified conditions), it is not clear that an appropriate baseline can be established. Thus, EPA is considering using available data, studies, and literature to establish the performance levels of specific control technologies. Such an approach presents additional issues, such as which data are of sufficient quality to be considered, how much data are needed to make a national determination, whether actual data or modeled data suffice, and whether sufficient data exist to pursue such an approach. Another issue is determining what factors beyond impingement mortality and entrainment reduction efficacy are most critical to determining when a specific control technology can be used effectively. As noted above, many factors influence control technology efficacy. Additionally, EPA would have to determine how broadly applicable a technology must be before it could qualify as ''pre-approved.'' Finally, where a facility plans to implement an approved technology, EPA expects that Directors would retain discretion to impose permit conditions necessary to ensure the technology meets applicable standards, as well as the ability to add permit conditions as necessary to ensure all Phase II existing facilities that pursue this compliance option meet section 316(b) standards.

EPA requests comment on both variations of this option for Phase II section 316(b) compliance. The Agency is interested in comments on the overall approach, as well as on the specific issues each option presents, as discussed above. In addition, EPA is interested in comments on the criteria used to determine eligibility for the streamlined technology option presented above, the availability of data needed to make technology determinations in general, as well as in receiving actual data that may support such determinations.

VIII. Cost Tests

Under the proposed rule, a facility may choose a site-specific alternative to demonstrate use of best technology available for minimizing adverse environmental impact at its site. If a facility chooses this alternative, the facility must demonstrate to the Director that the costs of compliance with the applicable performance standards would be ''significantly greater'' than the costs considered by the Administrator when establishing the performance standards, or that costs would be ''significantly greater'' than the benefits of complying with the applicable performance standards at its site. As discussed in the proposed rule, EPA's new facility rule required costs to be ''wholly out of proportion'' to the costs EPA considered when establishing the requirement at issue rather than ''significantly greater'' as proposed for existing facilities (see 67 FR 17146). This difference in standards for new and existing facilities is based on (1) the greater flexibility available to new facilities for selecting the location of their intakes and installing technologies at lower costs relative to the costs associated with retrofitting existing facilities and (2) the desire to avoid economically impracticable impacts on energy prices, production costs, and energy production that could occur if large numbers of Phase II existing facilities incurred costs that were more than ''significantly greater'' than but not ''wholly out of proportion'' to the costs in EPA's record. At proposal, EPA invited comment on whether a ''significantly greater'' cost test was appropriate for evaluating requests for alternative requirements by Phase II existing facilities but did not specify what degree of difference in cost or cost as compared to benefit is ''significant''. Many commenters requested that ''significantly'' be explicitly defined for the purposes of this rulemaking.

At this time, EPA requests comment on whether the Agency should adopt a quantitative definition of ''significantly greater,'' and if so, what specific ratio would be appropriate.

IX. Biology—Supporting Information

A. Entrainment Survival

Following publication of the proposed rule, EPA reviewed an additional 23 facility reports that evaluated entrainment survival. To date, EPA has reviewed a total of 36 entrainment survival studies. The additional facility studies examined by EPA after publication of the proposed rule include studies from the following facilities: Anclote Power Plant, Bergum Power Station, Bowline Point Generating Station, Connecticut Yankee Atomic Power Company, Contra Costa Power Plant, Danskammer Point Generating Station, Fort Calhoun Nuclear Station, Ginna Generating Station, Indian Point Generating Station, Muskingum River Plant, Northport Generating Station, Pittsburg Power Plant, and Roseton Generating Station.

Based on its review, EPA believes that the entrainment survival studies support the use of a default assumption of zero percent survival in the benefits assessment. The studies reviewed are characterized by significant uncertainty and variability which complicates efforts to synthesize the various results in a manner that would provide useful generalizations of the results or application to other particular facilities. The primary issue with regard to these studies is whether the results can support a defensible estimate of survival substantially different from the value of zero percent survival assumed by EPA. The review of the studies has shown that while some individual organisms may be alive in the discharge samples, the proportion of the organisms that are alive in the samples is highly variable and unpredictable. The current state of knowledge would not support reliable predictions of entrainment survival for the range of species, life stages, regions, and facilities involved in EPA's national benefits estimates. Therefore, EPA believes that the reported results do not provide a clear indication as to the extent of entrainment survival above zero percent to be used as a defensible assumption to calculate national benefits for this rule. EPA requests comment on this issue.

The revised version of Chapter A7: Entrainment Survival from the Case Study Analysis for the Section 316(b) Phase II Existing Facilities Rule provides more detailed information on the scientific basis for this position and has been added to the docket. EPA plans to conduct a formal, external peer review of this document prior to the final rule, and results from the peer review will be added to the docket when complete.

As at proposal, EPA notes that the proposed rule language does not preclude the use of estimates of entrainment mortality and survival when presenting a fair estimation of the monetary benefits achieved through the installation of the best technology available, instead of assuming 100 percent entrainment mortality. In EPA's view, estimates of entrainment mortality and survival used for this purpose should be based on sound scientific studies. EPA believes such studies should address times of both full facility capacity and peak abundance of entrained organisms. EPA requests comment on whether it is appropriate to allow consideration of entrainment mortality and survival in benefit estimates, and if so, should EPA set minimum data quality objectives and standards for a study of entrainment mortality and survival used to support a site-specific determination of best technology available for minimizing adverse environmental impact. EPA also requests comment on how an applicant can design and implement an entrainment mortality and survival study to properly account for those organisms which may disintegrate upon passage through a facility. EPA may decide to specify data quality objectives and standards either in the final rule language or through guidance.

B. Restoration

Restoration projects, when successful, can recreate otherwise lost natural resources. The Agency proposed in § 125.94(d) (67 FR 17221) that a facility may implement restoration measures in lieu of or in combination with reductions in impingement mortality and entrainment upon demonstration to the Director that such efforts will maintain fish and shellfish in the waterbody, including the community structure and function, at a level comparable to that which would be achieved through compliance with standards proposed in §§ 125.94(b) and (c) (67 FR 17221).

The Agency believes restoration projects have the potential to mitigate harm to fish and shellfish from cooling water intake structures. However, careful execution of these projects is vital to their successful use (see ''Note to Docket on Restoration Information Sources.'') Use of good practices drawn from historical experiences with restoration increases the probability of restoration project success, and therefore, reduces environmental and compliance costs associated with project failure. Therefore, EPA is considering requiring the following 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 italic):

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 italic):

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(is) 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 decided to combine restoration measures with technologies or operational measures, they would provide peer reviewers, for background information purposes, with access to materials for submission to the Director under proposed §§ 125.95(b)(2)-(4). EPA requests comment on whether adding a peer review requirement may add expense and delay to the permitting process and, if so, what might be the extent of the expense or delay. EPA also requests comment on whether a peer review may result in cost savings by ensuring that restoration projects are effective and cost-effective. If EPA were to add such a requirement, regulatory language might be modified as follows:

Add to Section 125.95(b)(5):

(vi) The final report from an independent peer review of the items you submit under (b)(5)(I), (ii), (iii), (iv), (v), and (b)(7) of this section. You must choose the peer reviewers in consultation with Federal, State, and Tribal fish and wildlife management agencies with responsibility for fish and wildlife potentially affected by your cooling water intake structure.

EPA requests comment on adding such a requirement.

C. Request for Impingement and Entrainment Data

EPA solicits data on additional impingement and entrainment at facilities withdrawing cooling water from surface waters of the U.S. Facilities responding to EPA's questionnaire surveys reported studies of impingement or entrainment at the following water sources: estuary or tidal river, 98 facilities; freshwater stream or river, 201 facilities; the Great Lakes, 20 facilities; lake or reservoir, 74 facilities; ocean, 21 facilities. Despite the large number of facilities reporting studies in freshwater, EPA has received relatively few such studies. To date, EPA has received approximately 20 studies from inland facilities. Thus, EPA especially requests recent impingement and entrainment studies and data for freshwater sources (streams, rivers, lakes, and reservoirs). Please see the section entitled **FOR FURTHER INFORMATION CONTACT** at the beginning of this notice for technical points of contact to whom studies and/or data may be submitted.

X. National Benefits

A. Case Study Clarifications and Corrections

EPA had numerous lengthy telephone conferences with industry and environmental groups to respond to questions on the cost-benefit analysis presented at proposal. EPA also provided detailed written responses to these questions in a series of memoranda provided to commenters during the summer of 2002. These materials are entitled: ''Appendix 2: Summary of CBI and Non-CBI Facilities from Questionnaires,'' ''Response to UWAG Questions Re: Phase II Proposal Record, Revised December 2, 2002,'' ''Appendix 1: Additional Detail on Extrapolation,'' ''Appendix 3: Tables 1–4,'' ''Response to Riverkeeper Questions Regarding Phase II Proposal Record, Revised July 31, 2002,'' ''Example calculations for national extrapolation,'' ''Responses to Riverkeeper Questions on § 316(b) Phase II Case Study Benefits Analyses,'' ''Responses to PG&E Questions about the § 316(b) Phase II Brayton Point Case Study,'' ''Responses to Riverkeeper Follow-Up Questions on § 316(b) Phase II Case Study Benefits Analyses,'' ''Responses to Riverkeeper Questions on § 316(b) Phase II Case Study Benefits Analyses,'' and ''Responses to Riverkeeper Questions About the § 316(b) Phase II Case Study I&E Analyses.'' The memorandum entitled ''Analytical and Clerical Errors in the § 316(b) Phase II Case Study Document, Preamble, and Economic and Benefits Analysis'' is an additional memorandum that corrects any clerical or analytical errors that were identified subsequent to proposal.

B. Regional Approach to Developing Benefits Estimates

1. Objectives of Regional Approach

In its analysis for section 316(b) Phase II proposal, EPA relied on nine case studies to estimate the potential economic benefits of reduced impingement and entrainment. EPA extrapolated facility-specific estimates to other facilities located on the same waterbody type and summed the results for all waterbody types to obtain national estimates. A number of commenters expressed concern about this method of extrapolation, noting that even within the same water body type, there are important ecological and socioeconomic differences among different regions of the country. For example, commercial and recreational fisheries of Atlantic Coast estuaries are substantially different from those of Pacific Coast estuaries.

To address this concern, EPA has revised the design of its analysis to examine cooling water intake structure impacts at the regional-scale. The regional approach to developing national benefits estimates involves evaluating changes in impingement and entrainment losses and the associated monetary values for improved recreational and commercial catch and nonuse value of these changes in impingement and entrainment, at the regional level. The estimated benefits will then be aggregated across all regions to yield the national benefit estimate. For this analysis, coastal regions are fisheries regions defined by National Oceanic and Atmospheric Administration (NOAA) National Marine Fisheries Service (NMFS). Freshwater facilities are grouped into either the Great Lakes region or the interior region of the U.S. (The regional approach is further discussed in the document entitled ''Regional Methodology Used in the section 316(b) Phase II Notice of Data Availability.'') EPA believes that these regional definitions are both ecologically and economically meaningful, and offer a better scale of resolution upon which to base estimates of national impacts and benefits.

EPA is proposing this regional analytical approach for this national rulemaking effort, but is not advocating this approach for impact and/or benefits analyses that might be conducted for individual National Pollution Discharge Elimination System (NPDES) permits. At the individual permit level it should be generally necessary to conduct a more detailed, site-specific analysis of the environmental ramifications of the cooling water intake structures governed by the permit in question than is necessary or feasible for this national-level rulemaking analysis. Such a site-specific analysis to support a permit might, for example, consider detailed, species specific information on impingement mortality and entrainment, different factors, or use different approaches in estimating total benefits.

In addition, EPA received a number of comments on the valuation approaches applied to evaluate the proposed rule. In estimating benefits of the proposed rule for each case study, the Agency used several valuation approaches that are the focus of this NODA: (1) Commercial fishery benefits were valued using market data; (2) recreational fishery benefits were valued using both primary research and benefit transfer from other nonmarket valuation studies; (3) nonuse benefits were estimated based on benefits transfer using the ''50 percent rule'' (i.e., 50 percent of use value).

Several commenters posed questions or expressed concern with how the Agency at proposal attempted to convert projected changes in commercial landings into suitable measures of producer and consumer surplus. Most commenters agreed that properly executed benefits transfer is an appropriate method for valuing nonmarket goods, and they pointed out that original travel cost analysis is one of the most appropriate approaches for estimating recreational use benefits. Most commenters agreed that nonuse values are difficult to estimate. Stated preference methods have been the most commonly used methods for estimating nonuse benefits. With these methods, people are asked through surveys to state their willingness to pay for particular ecological improvements, such as increased protection of aquatic species or habitats with particular attributes. According to these commenters, benefits transfer is the second best approach if conducting an original stated preference study is not feasible. Some commenters recommended that EPA use benefits transfer for valuing improved protection of threatened and endangered species.

EPA notes that there are advantages and disadvantages associated with using stated preference studies to value non-use benefits. On the one hand, there are no other generally accepted methods available for identifying and measuring non-use benefits for a non-market good or service. Benefit transfer methods used for estimating non-use benefits must ultimately rely on stated preference studies that independently assess non-use benefits. On the other hand, there is evidence that stated preference methods can over-estimate or misrepresent values because of a number of difficulties linked to the hypothetical nature of the survey instrument. These difficulties include (1) the absence of a real budget constraint (though survey respondents are often requested to think about their income constraints and purchases prior to stating their preferences), and (2) a frequent focus in the survey instrument on a limited number of resources or amenities to the exclusion of others. However, substantial research has been conducted to show that potential bias associated with hypothetical bids, lack of income constraint consideration, complex amenities, and whole/part complications is often manageable through careful survey design and pretesting, and/or may be accounted for through adjustments to utility-theoretic values derived from stated preference studies (see, *e.g.*, Carson, *et al.*, 1996).

In order to address some of the sources of bias in stated preference studies, a number of ''best practices'' for conducting stated preferences surveys and using them in policy analysis have evolved over the past decade. In 1992, the National Oceanic and Atmospheric Administration convened a panel of economic and survey research experts, who had no vested interest in stated preference methods, to conduct hearings on the validity of the contingent valuation (CV) method (form of stated preference) (FR 58:19, 4601–14, 1993). This panel issued proposed guidelines, consisting of a number of recommendations about survey design and implementation, ''compliance with which would define an ideal CV survey.''

The panel's general guidelines address the following issues: Sample type and size; minimizing nonresponses; use of personal interviews; pretesting for interviewer effects; reporting; careful pretesting of a CV questionnaire; conservative design; elicitation format; referendum format; accurate description of the program or policy; pretesting of photographs; reminder of undamaged substitute commodities; adequate time lapse from the accident; temporal averaging; ''no-answer'' option; yes/no follow-ups; cross-tabulations; checks on understanding and acceptance; alternative expenditure possibilities; deflection of transaction value; steady state or interim losses; present value calculations of interim losses; advance approval; burden of proof; and reliable reference surveys.

The NOAA panel concluded that (1) non-use (referred to by the panel as passive-use) losses are a meaningful component of environmental damages; (2) it is plausible that the results of CV surveys may be variable, sensitive to details of the survey instrument used, and vulnerable to upward bias; (3) under the suggested guidelines and conditions, CV studies convey reliable information—''the more closely the guidelines are followed, the more reliable the result will be. It is not necessary, however, that every single injunction be completely obeyed;'' (4) ''To the extent that the design of CV instruments makes conservative choices * * *, this intrinsic [upward] bias may be offset or even over-corrected;'' and (5) a well-conducted CV survey ''contains information that judges will wish to use, in combination with other evidence, including the testimony of expert witnesses.''

In addition to the guidelines generated by the NOAA panel, The Office of Management and Budget (OMB), in its recent Draft 2003 Report to Congress on the Costs and Benefits of Federal Regulations (68 FR 5492, Feb. 3, 2003), comments on the use of stated preference studies as it relates to policy/regulatory analysis. OMB notes that ''the contingent valuation instrument must portray a realistic choice situation for respondents—where the hypothetical choice situation corresponds closely with the policy context to which estimates will be applied.'' (68 Fed. 5519.) OMB also provides specific guidelines for sampling, survey design, transparency and replicability of results, and benefit transfer.

In response to comments, EPA made the following changes to the analysis: (1) Developed original or used available region-specific recreational angler behavior models to estimate recreational fishing benefits from reduced impingement and entrainment; (2) refined its commercial fishery analysis; and (3) developed a revised benefit transfer approach to estimate total value (including nonuse values) of impingement and entrainment losses for commercial, recreational, and forage species. In addition, EPA also carefully examined available evidence concerning total benefits, including use and nonuse values from the surface water valuation studies that are potentially applicable to the section 316(b) regulation. Section E.2 of today's notice summarizes EPA's findings from the review of the surface water valuation studies and outlines further steps in developing an approach for analyzing nonuse value of the aquatic resources affected by impingement and entrainment for the final rule analysis.

In this NODA, EPA presents its regional methodology and use benefits estimates for two regions, Northern California and the North Atlantic. Regional definitions are provided in the following section, followed by a summary of methods and results for commercial and recreational fishing. Discussion of a possible methodology for estimating nonuse benefits and some preliminary results are presented in Section E.

2. Study Regions

The Agency identified eight study regions based on similarities in the physical characteristics of the affected water bodies, aquatic species present in the area, and characteristics of commercial and recreational fishing activities in the area. EPA used NMFS definitions of marine fishery regions to define the six coastal regions. Table X–1 presents these geographic areas and the number of facilities included in each marine fishery region. A total of 124 Phase II facilities are withdrawing water from the nation's estuaries and oceans. Facilities in the Great Lakes region include all those that withdraw water from Lakes Ontario, Erie, Michigan, Huron, and Superior or are located on a waterway with open passage of Great Lakes fishery species to a Great Lake and within 30 miles of the lake. There are 55 facilities in the Great Lakes Region. The remaining 372 facilities were included in the Interior region of the U.S.

TABLE X–1.—DEFINITION OF COASTAL REGIONS

Region	Geographic area	Number of estuarine facilities	Number of ocean facilities	Total number of facilities
North Atlantic	Maine, New Hampshire, Massachusetts, Rhode Island, Connecticut.	19	2	21
Mid Atlantic	New York, New Jersey, Delaware, Maryland and Virginia	43	1	44
South Atlantic	North Carolina, South Carolina, Georgia, East Florida	13	1	14
Gulf of Mexico	West Florida, Alabama, Missouri, Louisiana, Texas	20	3	23
Northern California	All Counties North of Point Conception	6	2	8
Southern California	All Counties South of Point Conception	2	9	11
Total Number of Estuarine and Ocean Facilities [a].		103	18	121

[a] In addition, there are 3 ocean facilities in Hawaii that are not included in the NMFS-defined regions.

The analysis of direct use benefits for each region proceeds in three steps: (1) Estimating regional impingement and entrainment losses; (2) estimating benefits to recreational anglers from improved fishing opportunities due to reduced impingement and entrainment based on a region-specific valuation function; and (3) estimating benefits from improved commercial fishery yield. The following sections discuss each of these steps in detail.

3. Estimating Regional Impingement and Entrainment Losses

a. Species Groups

For the case studies presented at proposal, EPA conducted species-specific analyses of impingement and entrainment on a facility-specific basis. For the new regional studies, EPA is evaluating species groups comprised of species with similar life histories. Groups are based on family groups or groups used by NMFS for landings data. For example, bay goby, blackeye goby, yellowfin goby, and other gobies are grouped together as ''gobies.'' For the regional studies, EPA evaluated impingement and entrainment rates for such species groups and developed a regional total impingement and entrainment estimate by summing results for each group. An exception was made for species of exceptionally high commercial or recreational value (*e.g.*, striped bass). Such species were evaluated as single species.

Aggregation of species into groups of similar species facilitated parameterization of the fisheries models used by EPA to evaluate facility impingement and entrainment monitoring data. As noted by many commenters and by EPA in the section 316(b) Phase II Case Study Document, life history data are very limited for many of the species that are impinged and entrained. As a result, there are many data gaps for individual species. To overcome this limitation, in its new studies EPA used the available life history data for closely related species to construct a single representative life history for a given species group. For previously completed case studies, EPA used the species-specific life history information that was previously developed and then aggregated impingement and entrainment results for the species within a given group to obtain a group estimate. The document, ''Regional Methodology Used in the section 316(b) Phase II Notice of Data Availability,'' summarizes the regional methodology. The documents, ''Appendix 1: Life History Parameter Values Used to Evaluate I and E in the North Atlantic Region,'' and ''Appendix 2: Life History Parameter Values Used to Evaluate I and E in the Northern California Region,'' provide tables of all of the life history data and data sources used by EPA for the two regional analyses presented in this NODA.

EPA believes that the species group approach is appropriate for the national rulemaking given the many data limitations associated with our lack of knowledge of specific fish life histories, particularly the growth and mortality rates of early life stages. At the individual permit level, more detailed information should be available based on the data collected to support a permit application (see, for example, the proposed permit application requirements at § 122.21 (r) and § 125.95).

b. Impingement and Entrainment Methods

EPA evaluated facility impingement and entrainment monitoring data for all individual fish species with losses over one percent of the facility total. EPA converted annual impingement and entrainment losses for each species group into (1) age 1 equivalents, (2) fishery yield, and (3) biomass production foregone using standard fishery modeling techniques (Ricker, 1975; Hilborn and Walters, 1992; Quinn and Deriso, 1999). Details of these methods are provided in Chapter A5 of Part A of the section 316(b) Phase II Case Study Document, except for the corrections given in the preceding section ''Case Study Corrections and Clarifications'' and the changes noted below. Section A5–4 of Chapter A5 discusses data uncertainties. For all analyses, EPA assumed 100% entrainment mortality based on the analysis of entrainment survival studies presented in Chapter A7 of Part A of the section 316(b) Phase II Case Study Document

(1) Yield Equation

As several commenters pointed out, the equation for yield presented in Chapter A5 of the section 316(b) Phase II Case Study Document, contains a typographical error. The correct equation is:

$$Y_k = \Delta_j \Delta^a L_{jk} S_{ja} W_a (F_a / Z_a) (1 - e^{-Z_a})$$

where:

Y^k = foregone yield (pounds) due to impingement and entrainment losses in year k

L_{jk} = losses of individual fish of stage j in the year k

S_{ja} = cumulative survival fraction from stage j to age a

W_a = average weight (pounds) of fish at age a

F_a = instantaneous annual fishing mortality rate for fish of age a

Z_a = instantaneous annual total mortality rate for fish of age *a*

EPA would like to note that it verified that the correct equation was used for the case study analyses. The error was only in the transcription of the equation in Chapter A5.

(2) Trophic Transfer Rates Used To Model Production Foregone

For the case studies submitted at proposal, EPA used a simple model of trophic structure and trophic transfer efficiency to estimate the yield of harvested species that is lost because of the loss of forage species to impingement and entrainment (see Chapter A5 of Part A of the section 316(b) Phase II Case Study Document for details). The net trophic transfer efficiency in that model was 2.5 percent. Based on additional review of the scientific literature, EPA has modified the model so that the net trophic transfer efficiency is 20 percent. This transfer efficiency is used in natural resource damage assessments involving injuries to fish, as discussed in Reed *et al.* (1994). Although this change in transfer efficiency increases the portion of the total yield attributable to the consumption of forage fish, the net effect is insignificant because the trophic transfer pathway accounts for a very small portion of the total foregone yield.

(3) Impingement and Entrainment Extrapolation

To obtain regional impingement and entrainment estimates, EPA extrapolated losses from facilities with impingement and entrainment data to facilities without data. These results were then summed to obtain a regional total. This analysis was done separately within each region for different water body types (estuaries/tidal rivers, oceans, Great Lakes, inland freshwater rivers and lakes).

Average annual results for facilities with impingement and entrainment data were averaged and extrapolated on the basis of operational flow, in millions of gallons per day (MGD), to facilities without data. The extrapolation method used, by region, is:

(Total losses at case study facilities/ Flow at case study facilities) * Total flow in the region

The flow values used in this calculation have been weighted (weighted flow = average daily flow * weight) using the same facility weights applied in the cost analysis. The purpose of this weighting is to calculate costs and benefits for all 551 in-scope facilities, based on surveys received from 540 facilities.

The regional analyses incorporated data for many more facilities than were evaluated for proposal, and thus improved the basis for EPA's national benefits estimates.

(4) Impingement

In the case studies prepared for proposal, EPA determined that all impinged fish are age 1 because of a lack of data on the actual ages of impinged fish. As several commenters pointed out, this biases estimates low because impinged fish may include older individuals that are closer to harvestable age. This is confirmed by data on the ages of impinged fish presented in studies conducted at Salem (PSEG, 1999) and Millstone (Northeast Utilities Environmental Laboratory, 1992). To address this concern, the current studies relax the assumption that all impinged fish are age 1, and assume instead that the ages of impinged fish are 1 and older, and follow an age distribution that is implied by the associated survival rates. This approach takes into consideration the common observation that relatively few older, larger fish are impinged. The effect of this adjustment is that a higher proportion of impinged fish are assumed to survive until harvest. As a result of this adjustment, the estimate of foregone yield associated with impingement increases by a factor ranging from about three to ten, depending on a species' age-specific survival rates.

4. Recreational Fishing Benefits

For the final rule analysis, EPA's analysis of recreational fishing benefits from reduced impingement and entrainment will be based on region-specific models of recreational anglers' behavior for seven of the eight study regions: North Atlantic, Mid-Atlantic, South Atlantic, Gulf of Mexico, Northern California, Southern California, and Great Lakes. EPA's analysis of benefits for the interior U.S. region will combine an original random utility model (RUM) for the Ohio River and a benefit transfer approach for other rivers, lakes, and reservoirs affected by impingement and entrainment. Additional detail on the methods EPA will use throughout the recreational benefits analysis are provided in DCN 5–1008 and DCN 5–1009. These methods are similar to the methods used for the Delaware Bay, Tampa Bay, and Ohio River case study analyses, but EPA developed the travel coast models at the regional levels.

For the NODA, EPA developed recreational anglers' behavior models for three of the six coastal regions including Northern and Southern California and the Mid-Atlantic. Today's notice presents results only for the Northern California Region because impingement and entrainment data are not available for the Mid-Atlantic and Southern California regions at this time. For the final rule analysis, the Agency intends to expand the Tampa Bay case study used in the proposed rule analysis to include the whole Gulf of Mexico region and to develop an original travel coast model for the Great Lakes region. For the South Atlantic EPA is considering using the recreational anglers' behavior models developed by NMFS. The NMFS model is appropriate for benefit function transfer for the North Atlantic region, because it estimates region-specific values for the most important species affected by impingement and entrainment (*e.g.*, winter flounder). The Agency will further assess the applicability of the South Atlantic NMFS model for estimating benefits from reduced impingement and entrainment in the South Atlantic region when impingement and entrainment data for this region become available. If necessary, EPA will estimate a recreational behavior model for the South Atlantic region to support valuation of the most important species affected by impingement and entrainment in this region.

The regional recreational fishing studies use information on recreational anglers' behavior to infer anglers' economic value for the quality of fishing in the case study areas. The model's main assumption is that anglers will get greater satisfaction, and thus greater economic value, from sites where the catch rate is higher due to reduced impingement and entrainment, all else being equal. This benefit may occur in two ways: First, an angler may get greater enjoyment from a given fishing trip when catch rates are higher, and thus get a greater value per trip; second, anglers may take more fishing trips when catch rates are higher, resulting in greater overall value for fishing in the region.

EPA will rely on the following primary data sources in the regional analyses of recreational fishing benefits:

- For the six coastal regions, EPA intends to use the NMFS Marine Recreational Fishing Statistics Survey (MRFSS) combined with the Add-On MRFSS Economic Survey (AMES) (NMFS, 1994; 1997; 2000);
- For the Great Lakes region the Agency is considering using the 1995 Michigan Recreational Anglers survey to develop a RUM model. The Agency will

apply estimated values from Michigan sites to Great Lakes sites in other affected states. To transfer values from the Michigan study to other Great Lakes states, EPA is considering using information from state-level anglers' surveys on recreational fishing participation, targeted species, and site-specific catch rates at Great Lakes recreational fishing sites.

- For the interior U.S. region, the Agency is also considering using the 2000 National Survey of Recreation and Environment and the National Survey of Fishing, Hunting and Wildlife-Associated Recreation (U.S. Fish and Wildlife Service, 1996; 2001) to estimate the value of recreational fishery losses from impingement and entrainment at cooling water intake structures located on rivers, lakes, and reservoirs. DCN 5–1310 and DCN 5–1311 provide further information on these data sources.

These data sets provide information on where anglers fish, what fish they catch, and their personal characteristics. When anglers choose among fishing sites they reveal information about their preferences.

The Agency uses standard assumptions and specifications of the RUM model that are readily available in the recreation demand literature. Among these assumptions are that anglers choose a fishing mode and then the site at which to fish; and that anglers' choice of target species is exogenous to the model. EPA modeled an angler's decision to visit a site as a function of site-specific cost, fishing trip quality, and additional site attributes such as presence of boat launching facilities at the site.

The Agency uses the 5-year historical catch rates per hour of fishing as a measure of fishing quality in the case studies. Catch rate is one of the most important attributes of a fishing site from the angler's perspective. This attribute is also a policy variable of concern because catch rate is a function of fish abundance, which may be affected by fish mortality caused by impingement and entrainment.

The Agency uses the estimated model coefficients in conjunction with the estimated impingement and entrainment losses at the cooling water intake structures located in the relevant region to estimate per trip welfare losses from impingement and entrainment to recreational anglers.

The random utility models generate welfare measures for changes in catch rates on a per trip basis. To capture the effect of changes in catch rates on the number of fishing trips taken per recreational season, EPA will combine regional RUM models and a trip frequency model.[21] The trip frequency model estimates the number of trips that an angler will take annually. The Agency is considering developing trip frequency models for those regions for which sufficient data on anglers' socioeconomic characteristics are available. For the proposed rule analysis, the Agency developed trip frequency models for the three case studies used in the proposed rule analysis—Delaware Estuary, Tampa Bay, and the Ohio River. For the final rule analysis, the Agency will re-estimate these models to include all recreational anglers in a given region. The Agency also plans to estimate trip frequency models for the Great Lakes, North Atlantic, and South Atlantic regions for the final rule analysis. EPA will not estimate trip frequency models for the Northern and Southern California regions due to the lack of socioeconomic data for these regions. The Agency will use an average percentage increase in trip frequency from other regions to approximate changes in trip frequency for the Northern and Southern California regions due to improved fishing opportunities. However, in the regions where changes in trip participation can be calculated for the proposed rule, the increase in the number of trips was very small.

To estimate the economic value to recreational anglers of changes in catch rates resulting from changes in impingement and entrainment in a given region, EPA combines fishing participation estimates for a given region with the estimated per trip welfare gain (loss) under each policy scenario. The welfare estimates presented in the following sections are based on the estimates of baseline recreational fishing participation provided by NMFS. Thus, welfare estimates presented in today's notice do not account for changes in recreational fishing participation due to improved quality of the fishing sites, but these changes are likely to be small.

5. Commercial Fishing Benefits Methods

EPA will estimate the commercial fishing benefits expected under the final Phase II regulation for each region in the final analysis: the North Atlantic, Mid-Atlantic, South Atlantic, Gulf of Mexico, Northern California, Southern California, and Great Lakes. Additional detail on the regions is provided above. Additional detail on the methods EPA uses for this NODA and additional methods EPA is considering are provided in ''Chapter A13: Methods For Estimating Commercial Fishing Benefits'' that accompanies this NODA. These methods are similar to the methods used for the analysis for the proposed rule, but EPA has made some changes and clarification to these methods as indicated in the following steps.

1. *Estimate losses to commercial harvest (in pounds of fish) attributable to impingement and entrainment under current conditions.* EPA models these losses using the methods presented in Chapter A5 of Part A of the section 316(b) Phase II Case Study Document. Changes in these methods for the NODA and subsequent analyses are provided in the preceding sections ''Case Study Corrections and Clarifications'' and ''Impingement and Entrainment Methods.'' The basic approach is to assume linearity between stock and harvest, such that if, for example, 10% of the current commercially targeted stock is harvested, then 10% of any increase in stock due to this rule would be harvested.

2. *Estimate gross revenue of lost commercial catch.* The approach EPA uses to estimate the value of the commercial catch lost due to impingement and entrainment relies upon landings and dockside price ($/lb) as reported by NMFS for the period 1991–2001. These data are used to estimate the revenue of the lost commercial harvest under current conditions (*i.e.*, the increase in gross revenue that would be expected if all impingement and entrainment impacts were eliminated). Note that EPA currently assumes current prices when estimating changes in gross revenue, however, EPA will explore options for predicting new prices (*e.g.*, based on available elasticities), and solicits comment on the availability of information or data to assist in this matter.

3. *Estimate lost economic surplus.* The conceptually suitable measure of benefits is the sum of any changes in producer and consumer surplus. As detailed in ''Chapter A13: Methods For Estimating Commercial Fishing Benefits'' that accompanies this NODA, the methods used for estimating the change in surplus depends on whether the physical impact on the commercial fishery market appears sufficiently small such that it is reasonable to assume there will be no appreciable price changes in the markets for the impacted fisheries.

3a. *Estimate lost surplus when no change in price anticipated.* For the 2 regions analyzed to date by EPA, it is reasonable to assume no change in

[21] The trip frequency model is also called a trip participation model.

price, which implies that the welfare change is limited to changes in producer surplus. As described in ''Chapter A13: Methods For Estimating Commercial Fishing Benefits,'' this change in producer surplus is currently assumed to be equivalent to a portion of the change in gross revenues, as developed under step 2. Currently, EPA is using a range of 0% to 40% of the gross revenue losses estimated in step 2 as a means of estimating the change in producer surplus. This is based upon a review of empirical literature (restricted to only those studies that compared producer surplus to gross revenue) and is consistent with recommendations made in comments on the EPA analysis at proposal. This represents a change from the analysis for the proposed rule, which assumed a range of 40% to 70%.

EPA will continue to review this approach for the final analysis. In particular, EPA believes this is a conservative approach to estimating producer surplus when there are no anticipated price changes, because it does not account for shifts in marginal cost curves. If greater abundance of fish is assumed to imply that the same quantity of fish can be caught (*i.e.,* no change in managed quota) at a lower cost, then these cost savings may be over or underestimated using this method, depending on the slope and magnitude of shift of the marginal cost curve for harvesters. If a management council increases the optimal quota to account for greater stock size (and the cost of harvesting fish again decreases), then it is possible that the corresponding increase in producer surplus is equal to or greater than 100% of gross revenue change. EPA solicits comment on these approaches for assessing producer surplus.

3b. *Estimate economic surplus if a change in price anticipated.* EPA currently relies on the methodology in Step 9a above for estimating benefits for the two regional examples in this NODA, but EPA will explore alternative methods if changes in price are anticipated. As described in ''Chapter A13: Methods For Estimating Commercial Fishing Benefits'' that accompanies this NODA, if the impact on commercial fisheries in other regions analyzed for the final regulation are sufficiently large that a change in market prices becomes a likely outcome, then a more complex approach may be considered by the Agency. This approach would include estimates of consumer and other post harvest surplus, plus any net change in producer surplus (noting that one of the important aspects would be to net out potential transfers of surplus from producers to consumers, so as to avoid potential double-counting). This analysis would be conducted primarily to determine the distribution of surplus between consumers and producers. Joint estimation of consumer and producer surplus can lead to potential double counting as follows. If no price change is assumed when estimating gross revenue in step 2 above, then, theoretically, there is no consumer surplus. If however, change in gross revenue in Step 2 is based on a predicted price decrease, then change in producer surplus is not capturing changes in consumer surplus, assuming transfers on infra-marginal production are netted out.

EPA anticipates that the net change in producer surplus result can be added to consumer and post-harvest surplus estimated in the manner outlined by Bishop and Holt (2003). The work to date by Dr. Richard Bishop of the University of Wisconsin-Madison and Dr. Matthew Holt of North Carolina State University suggests that for the fishery markets they have studied, the percent change in consumer and post-harvest surplus roughly equals the percent change in gross revenue (as estimated in step 2), and this result may be refined in light of their recommendations and future work by EPA. EPA recognizes, however, that it would not be appropriate to add this change to an independently estimated change in producer surplus that already captures part or all of potential consumer surplus.

EPA will continue to review this approach for the final analysis, and in particular is examining and soliciting comment on using empirical information from the literature to (1) estimate price change for revenue calculations and netting out surplus transfers, (2) adjust existing estimates of normal profit so that they might better reflect the more suitable measure of producer surplus, (3) model changes in harvest cost that may result from increased stock size.

In conjunction with this NODA, EPA is asking for comment on the issues and approaches discussed above and as discussed in further detail in ''Chapter A13: Methods For Estimating Commercial Fishing Benefits'' that accompanies this NODA. Specific input is sought regarding assumptions and approaches including: (1) The likelihood that supply curves will shift, thereby creating the context for generating greater net surplus; (2) how best to incorporate fishery management regimes into the analysis; (3) estimates of normal profit and how to interpret them to estimate a more suitable measure of producer surplus; and (4) the likelihood and magnitude of price changes that may result from increased harvest.

6. Discounting Future Use Benefits

Discounting refers to the economic conversion of future benefits and costs to their present values, accounting for the fact that individuals tend to value future outcomes less than comparable near-term outcomes. Discounting is important when benefits and costs may occur in different years, and enables a comparison of benefits to costs across time periods.

For the section 316(b) rulemaking, discounting arises because some fishery benefits are realized a year or more after costs are borne. The issue of time lags between implementation of BTA and resulting increased fishery yields stems from the fact that one or more years may pass between the time an organism is spared impingement and entrainment, and the time of its ultimate harvest. For example, a larval fish spared from entrainment (in effect, at age 0) may be caught by a recreational angler at age 3, meaning that a 3-year time lag arises between the incurred cost of BTA and the realization of the estimated recreational benefit. Likewise, if a 1 year old fish is spared from impingement and is then harvested by a commercial waterman at age 2, there is a 1-year lag between the incurred BTA cost and the subsequent commercial fishery benefit.

At proposal, EPA did not apply any discounting to the beneficial fishery impacts from the reduced impingement and entrainment attributed to regulatory options, and instead assumed a steady state scenario (in effect, applying a discount rate of zero). The Agency approach at proposal was limited by the lack of age-specific monitoring data provided by the industry and the complexity of estimating appropriate species-specific and facility-specific discounting. As discussed above, the Agency also assumed at proposal that all impinged organisms were age 1, which decreased the fishery yield impacts estimated at proposal. For the new regional analysis, EPA will apply discounting by species groups in each regional study, as described below.

Two key factors determine how much the discounting will affect the benefit-cost results: the range of ages at which different types of fish are typically landed by commercial or recreational anglers, and the discount rate applied in the analysis. EPA uses the best available estimates of commercial fishing mortality rates to estimate the proportion of each species group, by age, that is caught annually following implementation of BTA. This provides an estimate of the time-path of increases in future landings attributable to the rule. EPA discounts these future changes using two discount rates: a real rate of 3% and a real rate of 7%. Additional detail on EPA's discounting methods is provided in the document entitled ''Discounting Commercial and Recreational Fishing Benefits.'' The Agency notes that discounting is applied to recreational and commercial fishing benefits only. Nonuse benefits are independent of fish age and size and, thus, start as soon as impingement and entrainment ceases.

EPA recognizes that, by addressing species groups rather than individual species, potentially important species-specific differences cannot be accounted for. However, the lack of life history data, fishing mortality rates, and other information necessary to calculate foregone yield and other endpoints of interest at the regional and national level makes it necessary to group species in this way.

C. North Atlantic Regional Study

1. *Background: Marine Fisheries of the North Atlantic*

Commercial and recreational fisheries of the North Atlantic Region are managed by the New England Fisheries Management Council (NEFMC) according to Fishery Management Plans (FMP's) developed by NEFMC (NMFS, 2002). The NMFS Northeast Fisheries Science Center provides scientific and technical support for management, conservation, and fisheries development.

The multispecies groundfish fishery is the most valuable commercial fishery of the North Atlantic region, followed by American lobster (Homarus americanus) (NMFS, 1999a). Important groundfish species include Atlantic cod (Gadus morhua), haddock (Melanogrammus aeglefinus), yellowtail flounder (Pleuronectes ferrugineus), windowpane flounder (Scophthalmus aquosus), and winter flounder (Pleuronectes americanus). Atlantic pelagic fisheries are dominated by Atlantic mackerel (Scomber scombrus), Atlantic herring (Clupea harengus), bluefish (Pomatomus saltatrix), and butterfish (Peprilus triacanthus) (NMFS, 1999a). Important recreational fisheries of the region include Atlantic cod, winter flounder, Atlantic mackerel, striped bass (Morone saxatilis), bluefish, and bluefin tuna (Thunnus thynnus) (NMFS, 1999a).

Fifteen groundfish species making up 25 stocks are managed under the Northeast Multispecies FMP of the NEFMC (NMFS, 2002). Table X–2 summarizes the stock status of these species, indicating which stocks are subject to overfishing (the harvest rate exceeds threshold) and which stocks are overfished (stock size is below threshold). Overfishing refers to a level of fishing mortality that jeopardizes the long term capacity of the stock to produce the potential maximum sustainable yield on a continuing basis. In some cases, heavy fishing in the past may have reduced a stock to low abundance, so that it is now considered overfished even though the stock is not currently subject to overfishing.

TABLE X–2.—SUMMARY OF STOCK STATUS FOR HARVESTED SPECIES OF THE NORTH ATLANTIC REGION INCLUDED IN FEDERAL FISHERY MANAGEMENT PLANS

Stock (Species in bold are major stocks, with annual landings over 200,000 pounds)	Overfishing? (Is fishing mortality above threshold?)	Overfished? (Is biomass below threshold?)	Approaching Overfished Condition?
Cod:			
Gulf of Maine	Yes	Rebuilding	No.
Georges Bank	No	Rebuilding	No.
Haddock:			
Gulf of Maine	Yes	Rebuilding	No.
Georges Bank	No	Rebuilding	No.
American Plaice	Yes	No	No.
Redfish (ocean perch)	No	Yes	N/A.
Witch Flounder	No	No	No.
Yellowtail Flounder:			
Georges Bank	No	No	No.
Southern New England	No	Yes	N/A.
Cape Cod	No	Rebuilding	No.
Middle Atlantic	Yes	Yes	N/A.
White Hake	Yes	Yes	N/A.
Pollock	Unknown	Unknown	Unknown.
Ocean Pout	No	Yes	N/A.
Atlantic Halibut	Unknown	Yes	N/A.
Windowpane Flounder:			
Gulf of Maine/Georges Bank	No	No	No.
Southern New England/Middle Atlantic	No	No	Yes.
Winter Flounder:			
Gulf of Maine	Unknown	Undefined	Unknown.
Georges Bank	No	Rebuilding	No.
Southern New England	No	No	No.
Silver Hake:			
Gulf of Maine/Northern Georges Bank	Unknown	Rebuilding	No.
Southern Georges Bank/Middle Atlantic	Unknown	Yes	N/A.
Offshore Hake	Unknown	Unknown	Unknown.
Red Hake:			
Gulf of Maine/Northern Georges Bank	No	No	No.
Southern Georges Bank/Middle Atlantic	No		Unknown.

Source: Table 4 in NMFS (2002).

As indicated in Table X–2, seven of the stocks managed under the Northeast Multispecies FMP are classified as overfished, including redfish (Sebastes spp.), the southern New England and Middle Atlantic stocks of yellowtail flounder, white hake (Urophycis tenuis), ocean pout (Macrozoarces americanus), Atlantic halibut (Hippoglossus hippoglossus), and the Southern Georges Bank stock of silver hake (Merluccius bilinearis). Other stocks are in the process of being rebuilt from levels below the maximum sustainable yield, including the Gulf of Maine and Georges Bank stocks of Atlantic cod and haddock, the Cape Cod stock of yellowtail flounder, the Georges Bank stock of winter flounder, and the Gulf of Maine/Northern Georges Bank stock of silver hake (NMFS, 2002).

Stocks of another 12 North Atlantic species are under the jurisdiction of the Atlantic States Marine Fisheries Commission (ASMFC) and are not included in federal FMPs. These stocks and their status are given in Table X–3.

Offshore fisheries for crustaceans and molluscs, particularly American lobster (Homarus americanus) and sea scallop (Placopecten magellanicus), are among the most valuable fisheries in the Northeast (NMFS, 1999a). Surfclams (Spisula solidissima), ocean quahogs (Arctica islandica), squids (Loligo pealeii and Illex illecebrosus), northern shrimp (Pandalus borealis), and red crab (Chaceon quinquedens) also provide important invertebrate fisheries.

TABLE X–3.—SUMMARY OF STOCK STATUS OF HARVESTED SPECIES OF THE NORTH ATLANTIC REGION UNDER AFSMC JURISDICTION AND NOT INCLUDED IN FEDERAL FISHERY MANAGEMENT PLANS

Stock (species in bold are major stocks, with annual landings over 200,000 pounds)	Overfishing? (fishing mortality above threshold)	Overfished? (stock size below threshold)	Approaching overfished condition?
American Eel	Unknown	Unknown	Unknown
American Lobster	Yes	Undefined	Unknown
Atlantic Croaker	Unknown	Unknown	Unknown
Atlantic Menhaden	No	No	Unknown
Atlantic Sturgeon	No	Yes	N/A
Horseshoe Crab	Unknown	Unknown	Unknown
Northern Shrimp	Yes	Undefined	Unknown
Spot	Unknown	Unknown	Unknown
Spotted Seatrout	Unknown	Unknown	Unknown
Striped Bass	No	No	Unknown
Tautog	Yes	Undefined	Unknown
Weakfish	Undefined	No	No

Source: Table 6 in NMFS (2002).

The Northeast lobster fishery is second in commercial value after the multispecies groundfish fishery. The most recent comprehensive stock assessment, completed in 1996, indicated that lobster fishing mortality rates for both inshore and offshore populations greatly exceed the levels needed to provide maximum yields (NMFS, 1999a). Lobster fishing mortality in the Gulf of Maine was almost double the overfishing level. Inshore from Cape Cod through Long Island Sound fishing mortality was three times the overfishing level.

2. Impingement and Entrainment Results

Table X–4 provides a list of impinged and entrained species for the North Atlantic region that EPA was able to evaluate at the time of the NODA. The life history data used in EPA's analysis and associated data sources are provided in ''Appendix 1: Life History Parameter Values Used to Evaluate I & E in the North Atlantic Region.''

TABLE X–4.—SPECIES GROUPS AND ASSOCIATED SPECIES FOR THE NORTH ATLANTIC REGION

Species	Commercial	Recreational	Forage
Alewife	X		
American fourspot flounder			X
American plaice	X		
American sand lance			X
American shad	X	X	
Atlantic tomcod			X
Atlantic cod	X	X	
Atlantic seasnail			X
Atlantic silverside	X		
Atlantic menhaden	X		
Atlantic mackerel	X	X	
Atlantic herring	X		X
Bay anchovy			X
Blackspotted stickleback			X
Blue mussel	X	X	
Blueback herring	X	X	
Bluefish	X	X	
Butterfish			X
Clearnose skate	X		
Cunner	X	X	
Cusk			X
Fourbeard rockling			X

TABLE X–4.—SPECIES GROUPS AND ASSOCIATED SPECIES FOR THE NORTH ATLANTIC REGION—Continued

Species	Commercial	Recreational	Forage
Fourspine stickleback			X
Grubby sculpin			X
Gulf snailfish			X
Haddock	X		
Hickory shad	X		X
Hogchoker			X
Lined seahorse			X
Little skate	X		
Longhorn sculpin			X
Lumpfish			X
Lumpsucker			X
Moustache sculpin			X
Mummichog			X
Ninespine stickleback			X
Northern kingfish			X
Northern pipefish			X
Northern searobin		X	
Pollock	X	X	
Radiated shanny			X
Rainbow smelt	X	X	
Red hake	X		
Rock gunnel			X
Round herring	X		
Scup	X	X	
Sea raven	X		
Seaboard goby			X
Seahorse			X
Searobin		X	
Shorthorn sculpin			X
Silver hake	X		
Smallmouth flounder			X
Smooth flounder			X
Spot			X
Spotted hake	X		X
Striped bass	X	X	
Striped killifish			X
Striped searobin		X	
Summer flounder			X
Tautog	X	X	
Threespine stickleback			X
Weakfish	X	X	
White hake	X		
White perch	X	X	
Windowpane	X	X	
Winter flounder	X	X	
Witch flounder	X		
Yellowtail flounder	X	X	

Sixteen of a total of 67 distinct species (24%) that are known to be impinged and entrained by facilities of the North Atlantic region are harvested species for which some stock assessment has been conducted. These include several stocks that are currently overfished, stocks that have been overfished and are rebuilding, or stocks that are approaching an overfished condition (Atlantic cod, haddock, silver hake, windowpane flounder, and winter flounder) and stocks for which stock size is uncertain (American lobster, spot, and tautog). Table X–5 summarizes the stock status of the 16 impinged and entrained species of the North Atlantic that are harvested. Note that status is uncertain for nearly half of the stocks listed.

TABLE X–5.—SUMMARY OF STOCK STATUS OF HARVESTED SPECIES OF THE NORTH ATLANTIC REGION THAT ARE IMPINGED AND ENTRAINED

Stock (All are major stocks, with annual landings over 200,000 pounds)	Overfishing? (Is fishing mortality above threshold?)	Overfished? (Is stock size below threshold?)	Approaching overfished condition?
American lobster	Yes	Undefined	Unknown.
American plaice	Yes	No	No.
Atlantic cod-Gulf of Maine	Yes	Rebuilding	No.
Atlantic cod-Georges Bank	No	Rebuilding	No.
Atlantic croaker	Unknown	Unknown	Unknown.
Atlantic haddock-Gulf of Maine	Yes	Rebuilding	No.

TABLE X–5.—SUMMARY OF STOCK STATUS OF HARVESTED SPECIES OF THE NORTH ATLANTIC REGION THAT ARE IMPINGED AND ENTRAINED—Continued

Stock (All are major stocks, with annual landings over 200,000 pounds)	Overfishing? (Is fishing mortality above threshold?)	Overfished? (Is stock size below threshold?)	Approaching overfished condition?
Atlantic haddock-Georges Bank	No	Rebuilding	No.
Atlantic herring	No	No	No.
Atlantic menhaden	No	No	Unknown.
Pollock	Unknown	Unknown	Unknown.
Red hake-Gulf of Maine/Northern Georges Bank	No	No	No.
Red hake-Southern Georges Bank/Middle Atlantic	No		Unknown.
Silver hake-Gulf of Maine/Northern Georges Bank	Unknown	Rebuilding	No.
Silver hake-Southern Georges Bank/Middle Atlantic	Unknown	Yes	N/A.
Spot	Unknown	Unknown	Unknown.
Striped bass	No	No	Unknown.
Tautog	Yes	Undefined	Unknown.
Weakfish	Undefined	No	No.
Windowpane flounder-Gulf of Maine/Georges Bank	No	No	No.
Windowpane flounder-Southern New England/Middle Atlantic	No	No	Yes.
Winter flounder-Gulf of Maine	Unknown	Undefined	Unknown.
Winter flounder-Georges Bank	No	Rebuilding	No.
Winter flounder-Southern New England	No	No	No.

Source: Table 3 in NMFS (2002).

3. Impingement and Entrainment Losses Expressed as Age 1 Equivalents, Foregone Yield, and Production Foregone

At the outset, it should be noted that many of the species for which impingement and entrainment estimates are provided are presently at or near historic low levels of abundance. As a result, EPA's estimates of impingement and entrainment may reflect lower totals than would be produced by healthy populations. With ongoing fisheries management efforts by federal and state government and fisheries management councils designed to increase fish populations, impingement and entrainment numbers may increase in the future. For example, NMFS has spent approximately $150 million in the New England fishing vessel buy-back program to reduce fishing pressure on groundfish stocks. In addition, extensive fishing restrictions, habitat restoration projects, and other efforts are also being carried out to help rebuild groundfish stocks.

Table X–6 provides EPA's estimate of the annual age 1 equivalents, foregone fishery yield, and production foregone resulting from the impingement of aquatic species at facilities located on estuaries/tidal rivers in the North Atlantic Region. Table X–7 displays this information for entrainment. Table X–8 provides EPA's estimate of the annual age 1 equivalents, foregone fishery yield, and biological production foregone resulting from the impingement of aquatic species at ocean facilities in the North Atlantic Region.

TABLE X–6.—TOTAL ANNUAL IMPINGEMENT LOSSES FOR ALL ESTUARY/TIDAL RIVER FACILITIES IN THE NORTH ATLANTIC REGION EXPRESSED AS AGE 1 EQUIVALENTS, FOREGONE FISHERY YIELD, AND PRODUCTION FOREGONE

Species	Age 1 equivalents (#s)	Total yield (lbs)	Production foregone (lbs)
Alewife	164,315	0	15,240
American sand lance	3,288,738	0	9,226
Atlantic cod	19,771	6,506	20,031
Atlantic herring	619	138	161
Atlantic mackerel	121	30	33
Atlantic menhaden	25,320	3,239	6,078
Atlantic silverside	33,187	0	134
Bay anchovy	58,826	0	90
Bluefish	1,118	706	954
Butterfish	9,915	401	900
Cunner	14,593	73	954
Fourbeard rockling	18	0	2
Grubby	48,273	0	11,756
Hogchoker	790,907	0	7,293
Northern pipefish	13,040	0	71
Pollock	525	817	1,601
Radiated shanny	35	0	0
Rainbow smelt	22,041	46	655
Red hake	1,414	306	488
Rock gunnel	435	0	9
Scup	1,030	129	541
Searobin	1,683	99	559
Silver hake	81,196	31,094	81,393
Skate species	4,575	1,000	1,844

TABLE X–6.—TOTAL ANNUAL IMPINGEMENT LOSSES FOR ALL ESTUARY/TIDAL RIVER FACILITIES IN THE NORTH ATLANTIC REGION EXPRESSED AS AGE 1 EQUIVALENTS, FOREGONE FISHERY YIELD, AND PRODUCTION FOREGONE—Continued

Species	Age 1 equivalents (#s)	Total yield (lbs)	Production foregone (lbs)
Striped bass	81	128	234
Striped killifish	7,767	0	202
Tautog	12,435	5,679	22,039
Threespine stickleback	78,481	0	92
Weakfish	10,829	7,882	13,033
White perch	31,126	389	4,079
Windowpane	16,074	1,774	2,881
Winter flounder	572,714	61,802	283,550
Total	5,311,206	122,238	486,124

TABLE X–7.—TOTAL ANNUAL ENTRAINMENT LOSSES FOR ALL ESTUARY/TIDAL RIVER FACILITIES IN THE NORTH ATLANTIC REGION EXPRESSED AS AGE 1 EQUIVALENTS, FOREGONE FISHERY YIELD, AND PRODUCTION FOREGONE

Species	Age 1 equivalents (#s)	Total yield (lbs)	Production foregone (lbs)
Alewife	1,643	0	2,032
American sand lance	2,538,069	0	225,821
Atlantic menhaden	46,389	6,886	429,124
Atlantic silverside	28,589	0	32,912
Bay anchovy	4,399,749	0	5,163,216
Cunner	1,892,973	8,981	153,386
Grubby	3,197,585	0	899,274
Hogchoker	122,044	0	280,069
Rainbow smelt	176,933	1,255	20,408
Scup	1,820	777	16,903
Seaboard goby	5,410,421	0	191,385
Silver hake	6	190	396
Tautog	152,431	67,949	243,253,891
Threespine stickleback	2,332	0	128
Weakfish	1,757	1,265	8,420,351
White perch	0	0	638
Windowpane	26,337	2,705	1,088,284
Winter flounder	8,114,448	876,449	22,039,724
Total	26,113,529	966,457	282,217,941

TABLE X–8.—TOTAL ANNUAL IMPINGEMENT LOSSES FOR ALL OCEAN FACILITIES IN THE NORTH ATLANTIC REGION EXPRESSED AS AGE 1 EQUIVALENTS, FOREGONE FISHERY YIELD, AND PRODUCTION FOREGONE

Species	Age 1 equivalents (#s)	Total yield (lbs)	Production foregone (lbs)
Alewife	19,507	100	3,179
American plaice	0	0	0
American sand lance	4,134	0	111
Atlantic cod	893	311	905
Atlantic herring	36,716	5,119	9,538
Atlantic mackerel	27	13	7
Atlantic menhaden	16,581	5,718	6,611
Atlantic silverside	39,296	22	123
Bay anchovy	147	0	0
Blueback herring	1,457	13	317
Bluefish	98	56	84
Butterfish	775	48	192
Cunner	2,464	15	161
Fourbeard rockling	22	0	2
Grubby	7,745	0	1,886
Hogchoker	33	0	8
Little skate	870	209	351
Lumpfish	910	0	941
Northern pipefish	1,402	0	8
Pollock	2,356	3,485	7,186
Radiated shanny	283	0	3

TABLE X–8.—TOTAL ANNUAL IMPINGEMENT LOSSES FOR ALL OCEAN FACILITIES IN THE NORTH ATLANTIC REGION EXPRESSED AS AGE 1 EQUIVALENTS, FOREGONE FISHERY YIELD, AND PRODUCTION FOREGONE—Continued

Species	Age 1 equivalents (#s)	Total yield (lbs)	Production foregone (lbs)
Rainbow smelt	25,005	190	4,854
Red hake	7,054	1,287	2,434
Rock gunnel	1,883	0	38
Sculpin species	1,704	0	415
Scup	764	154	500
Searobin	234	17	78
Striped bass	581	815	1,679
Striped killifish	458	0	12
Tautog	370	429	1,003
Threespine stickleback	880	0	0
White perch	310	0	12
Windowpane	2,063	181	299
Winter flounder	6,981	2,224	5,375
Total	184,004	20,406	48,312

Table X–9 displays this information for entrainment. In these tables, ''total yield'' includes direct losses of harvested species as well as the yield of harvested species that is lost due to losses of forage species. As discussed in detail in Chapter A5 of Part A of the section 316(b) Phase II Case Study Document, EPA used a simple model of trophic structure and trophic transfer efficiency to estimate the yield of harvested species that is lost because of the loss of forage to impingement and entrainment. The conversion of forage to yield contributes only a very small fraction to total yield.

TABLE X–9.—TOTAL ANNUAL ENTRAINMENT LOSSES FOR ALL OCEAN FACILITIES IN THE NORTH ATLANTIC REGION EXPRESSED AS AGE 1 EQUIVALENTS, FOREGONE FISHERY YIELD, AND PRODUCTION FOREGONE

Species	Age 1 equivalents (#s)	Total yield (lbs)	Production foregone (lbs)
Alewife	0	0	1,119
American plaice	1,388	952	859
American sand lance	4,513,770	0	267,006
Atlantic cod	4,468	2,887	4,827
Atlantic herring	34,143	5,837	20,037
Atlantic mackerel	7,716	1,441	13,253
Atlantic menhaden	8,124	3,729	14,845
Atlantic silverside	5,087	3	600
Bluefish	5	62	13
Butterfish	27	81	10
Cunner	1,177,927	5,584	92,933
Fourbeard rockling	576,339	0	69,754
Grubby	252,098	0	70,899
Lumpfish	6,094	0	36,035
Northern pipefish	782	0	33
Pollock	499	1,050	6,617
Radiated shanny	1,789,347	0	20,033
Rainbow smelt	1,330,867	9,997	386,647
Red hake	2,539	1,005	3,379
Rock gunnel	8,080,717	0	214,957
Sculpin species	764,165	0	214,910
Searobin	3,925	527	1,563
Tautog	882	2,417	2,537
Windowpane	27,575	3,788	5,418
Winter flounder	287,616	92,710	227,283
Total	18,876,100	132,070	1,675,567

4. Recreational Fishing Valuation

As noted above, anglers will get greater satisfaction, and thus greater economic value, from sites where the catch rate is higher, all else being equal. Recreational fishery losses due to impingement and entrainment may reduce recreational catch rates and thus negatively impact angler welfare. To estimate welfare losses to recreational anglers in the North Atlantic region from impingement and entrainment at cooling water intake structures in North Atlantic, the Agency used a model developed by R. Hicks *et al.* (NMFS, August 1999). For details see '' The Economic Value of New England and

Mid-Atlantic Sportfishing in 1994'' provided in DCN 5–1271.

To estimate per trip welfare losses to recreational anglers from impingement and entrainment in the North Atlantic region, the Agency combined the Hicks' model coefficients with the estimated impingement and entrainment losses at cooling water intake structures located in the North Atlantic and NMFS data on recreational landings. The Hicks' model includes three fishing modes—boat, shore, and charter boat—and five species groups—big game, small game, flatfish, bottom fish, and ''no target catch''. The ''no target catch'' group includes all species caught by anglers not targeting any specific fish species. For details on species groupings, see Table 1.3 in the ''The Economic value of New England and Mid-Atlantic Sportfishing in 1994'' report provided in DCN 5–1271. EPA used Hicks' definition of species groups to estimate changes in the average historical catch rate from eliminating impingement and entrainment.

Table X–10 shows the total average recreational landings for each species group, the number of fish impinged and entrained, and the estimated percent change in recreational landings if impingement and entrainment effects are eliminated. Eliminating impingement and entrainment would increase flatfish catch rates by 12.5%; small game catch rates by 0.01%; bottom fish catch rates by 1.05%; and no target catch rates by 1.45%. Table X–10 also shows the reductions in impingement and entrainment losses that would result from installation of the preferred option at each facility in the North Atlantic region, as well as the resulting increases in catch rates. Reductions in baseline impingement and entrainment losses due to the preferred option will result in a 3.64% increase in catch rates for flounders; a 0.23% increase in bottom fish catch rate; and a 0.4% increase in catch rate for no target anglers.

TABLE X–10.—ESTIMATED CHANGE IN THE TOTAL RECREATIONAL CATCH FOR NORTH ATLANTIC UNDER THE BASELINE AND POST-COMPLIANCE SCENARIOS

Species	Avg. total catch 1997–2001	Baseline		Preferred option	
		Total recreational losses from impingement and entrainment	Impingement and entrainment as % of total catch	Change in recreational losses from reduced impingement and entrainment	Reduced impingement and entrainment as % of total catch
Flatfish	2,525,530	315,703	12.50	91,995	3.64
Small Game	15,678,352	1,020	0.01	105	0.00
Bottom Fish	8,869,064	93,111	1.05	20,535	0.23
No Target Catch	28,280,214	409,960	1.45	112,652	0.40

Table X–11 presents the willingness to pay (WTP) values for anglers, regardless of fishing mode, for catching an additional fish per trip. Table X–11 also presents the estimated per trip welfare losses from the baseline impingement and entrainment levels at cooling water intake structures in the North Atlantic region, and the estimated welfare gain from the post-compliance impingement and entrainment reduction. The estimated per trip welfare losses from baseline impingement and entrainment at the cooling water intake structures are $0.34, $0.02, and $0.02 for flatfish, bottom fish, and no target catch, respectively (all in 2002$). Per trip welfare gains from the preferred option are $0.10, $0.005, and $0.004 for flatfish, bottom fish, and no target catch, respectively (all in 2002$). As shown in Table X–11, the greatest welfare gain from reducing impingement and entrainment losses at cooling water intake structures in the North Atlantic region results from improved opportunity for catching flatfish (*i.e.*, flounders).

TABLE X—11.—PER TRIP WELFARE GAIN FROM VARIOUS IMPROVEMENTS IN FISHING QUALITY AT ALL SITES IN NORTH ATLANTIC (2002$)

Species group	All Fishing Modes/All Anglers		
	Eliminating baseline impingement and entrainment losses	Reducing impingement and entrainment under the preferred option	+1 Fish
Big Game	NA	NA	5.90
Small Game	$0.0003	$0.00003	2.53
Flatfish	$0.34	$0.10	3.57
Bottom Fish	$0.02	$0.005	1.06
No Target Catch	$0.02	$0.004	1.66

EPA combined these estimates of per trip welfare change with fishing participation estimates from NMFS to estimate the annual value to recreational anglers of improved catch rates resulting from post-compliance reductions in impingement and entrainment at cooling water intake structures in the North Atlantic. Table X–12 provides the total number of angler days in the North Atlantic.GPOTABLE

TABLE X–12.—TOTAL NORTH ATLANTIC FISHING TRIPS IN 2001

	All fishing modes
Total North Atlantic Trips, 2001	8,084,261

Source: Marine Recreational Fishery Statistics Survey, NMFS, 2001.

EPA calculated total recreational losses to North Atlantic anglers by multiplying the estimated per trip welfare loss from baseline impingement and entrainment for a given species group by the number of recreational fishing trips in 2001. Table X–13 summarizes the results of this calculation. The total value of recreational losses for all species impinged and entrained at the cooling water intake structures in the North Atlantic is $3.1 million per year (2002$), for all anglers before discounting. Discounting the baseline losses at three percent and seven percent yields total recreational losses of $2.6 million, and $2.3 million, respectively, for all anglers (2002$). Table X–13 also presents estimates of the total welfare gain to recreational anglers from the post-compliance impingement and entrainment reduction. The estimated welfare gain from reduction in baseline losses resulting from the preferred option is $0.88 million, before discounting, for all anglers (2002$). Applying the discount factors for three and seven percent yield total losses of $0.76 million and $0.65 million, respectively (2002$).

TABLE X–13.—ESTIMATED ANNUAL WELFARE CHANGE TO RECREATIONAL ANGLERS IN THE NORTH ATLANTIC REGION UNDER THE BASELINE AND POST-COMPLIANCE SCENARIOS (2002$)

Species groups	Total baseline welfare losses			Welfare gain from reduction in baseline impingement and entrainment losses		
	Before discount	Discounted using 3%	Discounted using 7%	Before discounting	Discounted using 3%	Discounted using 7%
Big Game	NA	NA	NA	NA	NA	NA
Small Game	$2,425.28	$1,527.93	$1,358.16	$242.53	$184.32	$169.77
Flat Fish	2,748,648.74	2,418,810.89	2,061,486.56	808,426.10	711,414.97	606,319.58
Bottom Fish	161,685.22	88,926.87	77.608.91	40,421.31	21,019.08	18,189.59
No Target Catch	151,685.22	129,348.18	111,562.80	32,337.04	26,193.01	22,312.56
All Species	3,074,444.46	2,638,613.86	2,252,016.42	881,426.98	758,811.37	646,991.49

5. Commercial Fishing Valuation

Table X–14 provides EPA's estimate of the value of gross revenues lost in commercial fisheries resulting from the impingement of aquatic species in the North Atlantic region. Table X–15 displays this information for entrainment. As described above, EPA estimates that 0 to 40% of these revenue losses represent surplus losses to producers, assuming no change in prices or fishing costs. EPA will refine these assumptions for the final rule.

TABLE X–14A.—ANNUAL COMMERCIAL FISHING GROSS REVENUES LOST DUE TO IMPINGEMENT AT ESTUARY FACILITIES IN THE NORTH ATLANTIC REGION

Species	Estimated pounds of harvest lost	Estimated value of harvest lost (in dollars)		
		Undiscounted	Discounted using 3% discount rate	Discounted using 7% discount rate
Atlantic cod	3,253	$2,928	$2,657	$2,349
Atlantic herring	138	8	7	7
Atlantic mackerel	23	7	6	5
Atlantic menhaden	3,236	153	145	135
Bluefish	77	19	18	16
Butterfish	401	249	244	237
Pollock	409	286	245	203
Rainbow smelt	46	24	23	22
Red hake	305	64	60	56
Scup	64	53	46	40
Searobin	16	33	30	27
Silver hake	31,094	10,496	9,281	7,952
Skate species	1,000	140	131	122
Tautog	443	331	240	159
Weakfish	6,729	5,474	4,926	4,324
White perch	82	92	84	75
Windowpane	1,774	993	925	845
Winter flounder	30,901	39,524	34,738	29,657

TABLE X–14A.—ANNUAL COMMERCIAL FISHING GROSS REVENUES LOST DUE TO IMPINGEMENT AT ESTUARY FACILITIES IN THE NORTH ATLANTIC REGION—Continued

Species	Estimated pounds of harvest lost	Estimated value of harvest lost (in dollars)		
		Undiscounted	Discounted using 3% discount rate	Discounted using 7% discount rate
Total	79,991	60,874	53,806	46,231

TABLE X–14B.—ANNUAL COMMERCIAL FISHING GROSS REVENUES LOST DUE TO IMPINGEMENT AT OCEAN FACILITIES IN THE NORTH ATLANTIC REGION

Species	Estimated pounds of harvest lost	Estimated value of harvest lost (in dollars)		
		Undiscounted	Discounted using 3% discount rate	Discounted using 7% discount rate
American plaice	0	$0	$0	$0
Atlantic cod	156	129	117	104
Atlantic herring	5,113	256	231	204
Atlantic mackerel	10	3	2	2
Atlantic menhaden	5,712	228	216	200
Atlantic silverside	22	12	12	12
Blueback herring	13	1	1	1
Bluefish	6	2	1	1
Butterfish	48	23	22	21
Little skate	208	40	37	34
Pollock	1,743	1,202	1,031	854
Rainbow smelt	189	38	35	32
Red hake	1,285	283	267	248
Scup	77	80	70	60
Searobin	3	6	5	5
Tautog	33	21	19	17
White perch	0	0	0	0
Windowpane	181	103	96	87
Winter flounder	1,112	1,535	1,330	1,114
Total	15,910	3,962	3,492	2,995

TABLE X–15A.—ANNUAL COMMERCIAL FISHING GROSS REVENUES LOST DUE TO ENTRAINMENT AT ESTUARY FACILITIES IN THE NORTH ATLANTIC REGION

Species	Estimated pounds of harvest lost	Estimated value of harvest lost (in dollars)		
		Undiscounted	Discounted using 3% discount rate	Discounted using 7% discount rate
Atlantic menhaden	6,878	$326	$299	$267
Rainbow smelt	1,253	244	226	206
Scup	389	315	269	221
Silver hake	190	62	53	44
Tautog	5,299	3,966	2,786	1,779
Weakfish	1,080	806	705	595
White perch	0	0	0	0
Windowpane	2,705	1,514	1,369	1,204
Winter flounder	438,225	560,512	478,280	393,062
Total	456,019	567,746	483,987	397,377

TABLE X–15B.—ANNUAL COMMERCIAL FISHING GROSS REVENUES LOST DUE TO ENTRAINMENT AT OCEAN FACILITIES IN THE NORTH ATLANTIC REGION

Species	Estimated pounds of harvest lost	Estimated value of harvest lost (in dollars)		
		Undiscounted	Discounted Using 3% discount rate	Discounted using 7% discount rate
American plaice	951	$1,142	$957	$770
Atlantic cod	1,444	1,198	1,056	899

TABLE X–15B.—ANNUAL COMMERCIAL FISHING GROSS REVENUES LOST DUE TO ENTRAINMENT AT OCEAN FACILITIES IN THE NORTH ATLANTIC REGION—Continued

Species	Estimated pounds of harvest lost	Estimated value of harvest lost (in dollars)		
		Undiscounted	Discounted using 3% discount rate	Discounted using 7% discount rate
Atlantic herring	5,831	292	255	217
Atlantic mackerel	1,121	314	280	242
Atlantic menhaden	3,725	149	137	122
Atlantic silverside	3	2	2	2
Bluefish	7	2	2	1
Butterfish	80	38	35	32
Pollock	525	362	302	241
Rainbow smelt	9,987	1,997	1,810	1,599
Red hake	1,004	221	202	181
Searobin	85	174	155	133
Tautog	188	121	106	90
Windowpane	3,788	2,159	1,940	1,692
Winter flounder	46,355	63,970	53,829	43,393
Total	75,094	72,142	61,067	49,613

6. Total Recreational and Commercial Losses From Baseline Impingement and Entrainment in the North Atlantic Region

Table X–16 presents EPA's estimates of total baseline recreational and commercial fishing losses from impingement and entrainment at cooling water intake structures in the North Atlantic region. Total commercial and recreational fishing losses are $3.3 million per year for all species and fishing modes, before discounting. Discounting these total baseline welfare losses by three and seven percent yield total losses of $2.8 million and $2.4 million, respectively.

TABLE X–16.—ESTIMATED DISCOUNTED COMMERCIAL AND RECREATIONAL BASELINE WELFARE LOSSES IN THE NORTH ATLANTIC REGION FROM IMPINGEMENT AND ENTRAINMENT (2002$) [a]

Benefit type	Before discounting	Discounted using 3% discount rate	Discounted using 7% discount rate
Recreational	$3,074,444	$2,638,614	$2,252,016
Commercial [b]	281,889	240,941	198,487
Total	3,356,333	2,879,555	2,450,503

[a] Welfare losses represent losses due to both impingement and entrainment because recreational estimates cannot be presented separately for these categories.
[b] Based on 40 percent of gross revenues, or upper bound of 0–40 percent range assumed to represent producer surplus.

7. Estimated Use Benefits of Proposed Regulatory Option in the North Atlantic Region

Table X–17 presents EPA's estimates of the gain from the post-compliance reduction in impingement and entrainment at cooling water intake structures in the North Atlantic region. The total reduction in commercial and recreational fishing is $ 0.96 million per year for all species and fishing modes, before discounting. Discounting these total reduced welfare losses by three and seven percent yields total losses of $0.83 million and $0.70 million, respectively. These numbers may change for final if additional impingement and entrainment data become available.

TABLE X–17.—ESTIMATED DISCOUNTED COMMERCIAL AND RECREATIONAL REDUCED WELFARE LOSSES IN THE NORTH ATLANTIC REGION FROM IMPINGEMENT AND ENTRAINMENT (2002$) [a]

Benefit type	Expected % reduction	Before discounting	Discounted using 3% discount rate	Discounted using 7% discount rate
Recreational	28.7%	$881,426	$758,811	$646,991
Commercial [b]	29.2	82,222	70,256	57,860
Total	28.7	963,648	829,067	704,851

[a] Welfare losses represent losses due to both impingement and entrainment because recreational estimates cannot be presented separately for these categories.
[b] Based on 40 percent of gross revenues, or upper bound of 0–40 percent range assumed to represent producer surplus.

D. Northern California Regional Study

1. Background: Marine Fisheries of Northern California

The Northern California NMFS region extends from Point Conception north to the Oregon border. The oceanic transition zone off Point Conception creates a natural ecological separation between northern and southern California. North of Point Conception, coastal waters are cold and oceanic conditions are harsh, whereas to the south waters are warmer and conditions are moderate. As a result, the fish species composition differs between the two regions (Leet *et al.*, 2001). Fisheries of the Northern California Region are managed by the Pacific Fishery Management Council (PFMC), which governs commercial and recreational fisheries in federal waters from 3–200 nautical miles off the coasts of Washington, Oregon and California. The NMFS Northwest Fisheries Science Center provides scientific and technical support for management, conservation and fisheries development.

There are 83 species of groundfish included under PFMC's Groundfish FMP, including nearly 50 species of rockfish (Sebastes spp.) (Table 3 in NMFS, 2002). Pacific whiting (Merluccius productus) dominates the commercial catch, accounting for 78% of Pacific Coast landings (NMFS, 1999a). During the 1990's a major fishery developed for nearshore species, including rockfishes, cabezon, and sheephead (Leet *et al.*, 2001). Rockfishes are important for both commercial and recreational fisheries (NMFS, 1999a). In 1994, a limited entry program was implemented for the groundfish fishery due to concerns about overfishing (NMFS, 1999a).

There are five species of anadromous Pacific salmon supporting coastal and freshwater commercial and recreational fisheries along the Pacific Coast, including chinook (Oncorhynchus tshawytscha), coho (O. kisutch), sockeye (O. nerka), pink (O. gorbuscha), and chum (O. keta) salmon (NMFS, 1999a).

Since 1991, NMFS has listed 20 Evolutionary Significant Units (ESU's) [22] of Pacific Coast salmon and steelhead trout (O. mykiss) under the federal Endangered Species Act (ESA) (NMFS, 1999b). In NMF's Northern California region, listed species include steelhead, coho salmon, and chinook salmon of the central California Coast and steelhead and chinook salmon of California's Central Valley.

Ocean fisheries for chinook and coho salmon are managed by the PFMC under the Pacific Coast Salmon FMP. In Puget Sound and the Columbia River, chinook and coho fisheries are managed by the states and tribal fishery agencies. Declines in chinook and coho salmon coast-wide have led to reductions and closures of ocean fisheries in recent years (NMFS, 1999a).

The Pacific Salmon FMP contains no fishery management objectives for sockeye, chum, even-year pink, and steelhead stocks because fishery impacts are considered inconsequential (Table 3 in NMFS, 2002). Pink, chum, and sockeye salmon are managed jointly by the Pacific Salmon Commission, Washington state, and tribal agencies (NMFS, 1999a).

Pacific Coast pelagic species managed by the PFMC include Pacific mackerel (Scomber japonicus), jack mackerel (Trachurus symmetricus), Pacific sardine (Sardinops sagax), northern anchovy (Engraulis mordax), and California market squid (Loligo opalescens) (NMFS, 2002). These species typically fluctuate widely in abundance, and currently most stocks are low relative to historical levels (NMFS, 1999a). Pacific mackerel and Pacific sardine are not overfished, but the stock size of the other species governed by the Coastal Pelagic FMP is unknown (Table 3 in NMFS, 2002). Due to increases in abundance in recent years, Pacific mackerel now accounts for over half of recent landings of Pacific Coast pelagic species (NMFS, 1999a).

Pacific Coast shellfish resources are important both commercially and recreationally (NMFS, 1999a). Shrimps, crabs, abalones, and clams command high prices and contribute substantially to the value of Pacific Coast fisheries, even though landings are small.

2. Impingement and Entrainment Results

Table X–18 provides a list of impingement and entrainment species in the Northern California region and the species groups that were evaluated in EPA's analysis of regional impingement and entrainment. The life history data used in EPA's analysis and associated data sources are provided in ''Appendix 2: Life History Parameter Values Used to Evaluate I & E in the Northern California Region.''

TABLE X–18.—SPECIES GROUPS AND ASSOCIATED SPECIES FOR THE NORTHERN CALIFORNIA REGIONAL STUDY

Group evaluated	Species	Commercial	Recreational	Forage	Special status
Anchovies	Northern anchovy	X	X		
Bay shrimps	Bay shrimp		X		
	Other bay shrimp [a]		X		
Cabezon	Cabezon	X	X		
California halibut	California halibut	X	X		
Drums/croakers	Queenfish	X	X		
	White croaker	X	X		
	Other croakers		X		
Dungeness crab	Dungeness crab	X	X		
Flounders	Dover sole	X	X		
	English sole	X	X		
	Pacific sanddab	X	X		
	Rock sole	X	X		
	Sand sole	X	X		
	Starry flounder	X	X		
	Other flounders [B]	X	X		
Gobies	Bay goby			X	
	Blackeye goby			X	
	Blind goby			X	
	Longjaw mudsucker			X	

[22] An Evolutionarily Significant Unit (ESU) is a term introduced by NMFS in 1991 to refer to the Endangered Species Act (ESA) interpretation of ''distinct population segment.'' A stock must satisfy two criteria to be considered an ESU: (1) ''it must be substantially reproductively isolated from other conspecific population units,'' and (2) ''it must represent an important component in the evolutionary legacy of the species.''

TABLE X–18.—SPECIES GROUPS AND ASSOCIATED SPECIES FOR THE NORTHERN CALIFORNIA REGIONAL STUDY—Continued

Group evaluated	Species	Commercial	Recreational	Forage	Special status
	Shadow goby			X	
	Yellowfin goby			X	
Herrings	Pacific herring	X	X		
	Pacific sardine	X	X		
	Other herrings		X		
Rock crabs	Slender crab			X	
	Brown rock crab		X		
	Hairy rock crab			X	
	Red rock crab	X	X		
	Slender rock crab			X	
	Yellow crab		X		
Rockfishes	Aurora rockfish	X	X		
	Black and yellow rockfish	X	X		
	Black rockfish	X	X		
	Blue rockfish	X	X		
	Boccacio	X	X		
	Brown rockfish	X	X		
	California scorpionfish	X	X		
	Chilipepper	X	X		
	Copper rockfish	X	X		
	Gopher rockfish	X	X		
	Grass rockfish	X	X		
	Kelp rockfish	X	X		
	Olive rockfish	X	X		
	Shortbelly rockfish	X	X		
	Yellowtail rockfish	X	X		
	Other rockfish	X	X		
Sculpins	Other sculpins[c]	X	X		
Silversides	Jacksmelt		X		
	Other silversides[d]		X		
Smelts	Surf smelt	X	X		
	Other smelts[e]	X	X		
Surfperches	Barred surfperch	X	X		
	Black surfperch	X	X		
	Pile surfperch	X	X		
	Shiner perch	X	X		
	Striped surfperch	X	X		
	Walleye surfperch	X	X		
	White surfperch	X	X		
	Other surfperch[f]	X	X		
Chinook salmon	Chinook salmon				X (FT, ST, FE, SE, FCT)
Delta smelt	Delta smelt				X (FT, ST)
Green sturgeon	Green sturgeon				X (SOC)
Longfin smelt	Longfin smelt				X (SOC)
Sacramento splittail	Sacramento splittail				X (FT)
Steelhead	Steelhead				X (FT)
Striped bass	Striped bass		X		
Herrings	American shad		X		

[a] Other bay shrimp includes Alaskan bay shrimp, black tailed bay shrimp, blackspotted bay shrimp, Franciscan bay shrimp, smooth bay shrimp, and spotted bay shrimp.
[b] Other flounders includes CO Turbot, curlfin turbot, diamond turbot, fantail sole, horneyhead turbot, slender turbot, and speckled turbot.
[c] Other sculpin includes bonyhead sculpin, brown Irish lord, buffalo sculpin, coralline sculpin, fluffy sculpin, manacled sculpin, pacific staghorn sculpin, prickly sculpin, rosy sculpin, roughcheek sculpin, smoothhead sculpin, snubnose sculpin, staghorn sculpin, tidepool sculpin, and wooly sculpin.
[d] Other silversides includes topsmelt.
[e] Other smelts includes night smelt and popeye blacksmelt.
[f] Other surfperch includes dwarf surfperch, kelp surfperch, rainbow surfperch, and spotfin surfperch.
FT = federally listed as threatened
ST = state listed as threatened
FE = federally listed as endangered
SE = state listed as endangered
FCT = federal candidate for listing as threatened
SOC = species of concern

Available impingement and entrainment data indicate that 20 of a total of 92 distinct species that are impinged and entrained by northern California facilities are harvested species subject to FMP's developed by the PFMC. Table X–19 summarizes information on the stock status of these species. Note that stock status is known for only 4 of these species. Most of the species listed are rockfish species. Northern anchovy falls under the

Coastal Pelagic FMP and the other species in the table are included in the Groundfish FMP. Although under the jurisdiction of the PFMC, there are no fishery management objectives for Central Valley chinook salmon and Central California Coast coho salmon because of their ESA listing (NMFS, 2002). There are also no fishery management goals for steelhead because fishery impacts are considered inconsequential (NMFS, 2002).

TABLE X–19.—SUMMARY OF STOCK STATUS OF HARVESTED SPECIES OF THE NORTHERN CALIFORNIA REGION THAT ARE IMPINGED AND ENTRAINED AND ARE INCLUDED IN FEDERAL FMP'S

Stock (species in bold are major stocks, with annual landings over 200,000 pounds)	Overfishing? Is fishing mortality above threshold?)	Overfished? (Is stock size below threshold?)	Approaching overfished condition?
Aurora rockfish	Unknown	Unknown	Unknown
Black rockfish	No	No	No
Black-and-yellow rockfish	Unknown	Unknown	Unknown
Blue rockfish	Unknown	Unknown	Unknown
Bocaccio	No	Yes	N/A
Cabezon	Unknown	Unknown	Unknown
California scorpionfish	Unknown	Unknown	Unknown
Central California Coast coho salmon[a]	N/A	N/A	N/A
Central Valley chinook salmon[a]	N/A	N/A	N/A
Chilipepper rockfish	No	No	No
Copper rockfish	Unknown	Unknown	Unknown
Gopher rockfish	Unknown	Unknown	Unknown
Grass rockfish	Unknown	Unknown	Unknown
Kelp rockfish	Unknown	Unknown	Unknown
Northern anchovy-central subpopulation		Undefined	Unknown
Olive rockfish	Unknown	Unknown	Unknown
Shortbelly rockfish	No	No	No
Starry flounder	Unknown	Unknown	Unknown
Steelhead[b]	N/A	N/A	N/A
Yellowtail rockfish	No	No	No

Source: Table 4 in NMFS (2002).
[a] There are no fishery management goals for Central Valley chinook salmon and Central California Coast coho salmon because of their ESA listing (NMFS, 2002).
[b] There are no fishery management goals for steelhead because fishery impacts are considered inconsequential (NMFS, 2002).

3. Impingement and Entrainment Losses Expressed as Age 1 Equivalents, Foregone Yield, and Production Foregone

Table X–20 provides EPA's estimate of the annual age 1 equivalents, foregone fishery yield, and production foregone resulting from the impingement of aquatic species at facilities located on estuaries/tidal rivers in the Northern California Region. Table X–21 displays this information for entrainment. Table X–22 provides EPA's estimate of the annual age 1 equivalents, foregone fishery yield, and production foregone resulting from the impingement of aquatic species at ocean facilities in the Northern California Region. Table X–23 displays this information for entrainment.

TABLE X–20.—TOTAL ANNUAL IMPINGEMENT LOSSES FOR ALL ESTUARY/TIDAL RIVER FACILITIES IN THE NORTHERN CALIFORNIA REGION EXPRESSED AS AGE 1 EQUIVALENTS, FOREGONE FISHERY YIELD, AND PRODUCTION FOREGONE

Species group	Age 1 equivalents (#s)	Total yield (lbs)	Production foregone
Anchovies	6,483,908	10,156	86,487
Bay shrimps	310,400	22	169
Cabezon	968	1,882	4,569
Chinook salmon	1,880	0	50,674
Croakers	6,737	390	710
Delta smelt	18,454	0	25
Dungeness crab	1,028	404	995
Flounders	56,767	4,652	16,970
Gobies	10,819	0	47
Herrings	545,982	25,560	65,791
Longfin smelt	189,940	0	6,553
Rock crabs	840,492	165	115,125
Rockfishes	257,596	62,420	164,021
Sacramento splittail	24,188	0	11,166
Sculpins	128,009	1,304	9,151
Silversides	888,074	39,672	202,453
Smelts	71,279	1,620	13,400
Striped bass	762,529	277,119	1,270,930
Surfperches	725,358	45,156	109,915
Total	11,324,407	470,522	2,129,153

TABLE X–21.—TOTAL ANNUAL ENTRAINMENT LOSSES FOR ALL ESTUARY/TIDAL RIVER FACILITIES IN THE NORTHERN CALIFORNIA REGION EXPRESSED AS AGE 1 EQUIVALENTS, FOREGONE FISHERY YIELD, AND PRODUCTION FOREGONE

Species group	Age 1 equivalents (#s)	Total yield (lbs)	Production foregone (lbs)
Anchovies	332,963	525	47,178
Bay shrimps	5,820,260	419	4,164
Cabezon	20	46	2,868
California halibut	717	2,686	5,476
Chinook salmon	88	0	3,033
Croakers	0	0	476
Delta smelt	268,874	0	3,894
Dungeness crab	80,574	37,273	184,655
Flounders	1,984	193	2,602
Gobies	2,874,204	0	44,209
Herrings	1,495,230	69,974	257,242
Longfin smelt	333	0	19
Rock crabs	2,491,669	490	1,406,358
Rockfishes	63	17	5,512
Sacramento splittail	39	0	87
Sculpins	78,819	4,731	32,034
Silversides	5,744	321	1,948
Smelts	386	16	565
Striped bass	1,950,593	708,904	3,383,949
Total	15,402,559	825,595	5,386,270

TABLE X–22.—TOTAL ANNUAL IMPINGEMENT LOSSES FOR ALL OCEAN FACILITIES IN THE NORTHERN CALIFORNIA REGION EXPRESSED AS AGE 1 EQUIVALENTS, FOREGONE FISHERY YIELD, AND PRODUCTION FOREGONE

Species group	Age 1 equivalents (#s)	Total yield (lbs)	Production foregone (lbs)
Anchovies	63	0	1
Bay shrimps	17,240	1	9
Cabezon	20	39	94
Croakers	581	34	61
Dungeness crab	3,431	1,583	3,322
Flounders	2,583	212	772
Rock crabs	3,841	1	526
Rockfishes	3,938	949	2,497
Sculpins	935	10	67
Silversides	841	30	192
Surfperches	2,802	122	425
Total	36,275	2,981	7,965

TABLE X–23.—TOTAL ANNUAL ENTRAINMENT LOSSES FOR ALL OCEAN FACILITIES IN THE NORTHERN CALIFORNIA REGION EXPRESSED AS AGE 1 EQUIVALENTS, FOREGONE FISHERY YIELD, AND PRODUCTION FOREGONE

Species group	Age 1 equivalents (#s)	Total yield (lbs)	Production foregone (lbs)
Anchovies	5,382	8	87,011
Bay shrimps	1,410,174	101	3,721
Cabezon	170	331	24,314
California halibut	5,413	19,617	42,161
Croakers	1	0	1,892
Flounders	5,198	431	6,817
Gobies	415,594	0	6,392
Herrings	847,884	39,634	215,090
Rock crabs	63,433,607	12,467	38,249,035
Rockfishes	1,620	390	142,462
Sculpins	539,868	5,523	38,624
Silversides	19	13	6
Smelts	778	19	1,140
Total	66,665,707	78,534	38,818,665

In these tables, ''total yield'' includes direct losses of harvested species as well as the yield of harvested species that is lost due to losses of forage species. As discussed in detail in Chapter A5 of Part A of the section 316(b) Phase II Case Study Document, EPA used a simple model of trophic structure and trophic transfer efficiency to estimate the yield of harvested species that is lost because of the loss of forage to impingement and entrainment. The conversion of forage to yield contributes only a very small fraction to total yield.

4. Recreational Fishing Valuation

This notice presents results for the Northern California regional analysis, including benefits calculations for this region. Details of the Northern California study are presented in DCN 5–1009. As noted above, the Northern California region is defined based on NMFS regional boundaries. Northern California includes all northern counties to, and including, San Luis Obispo County. EPA included anglers and sites from the counties on each regional border in the model, to allow anglers to travel to substitute sites in the bordering region. For example, EPA added Santa Barbara County from the Southern California region to allow anglers from Northern California to travel to all substitute sites located within a one day travel distance limit.

The Northern California model focuses on the following species and species groups: salmon, sturgeon, flounders, small game fish, big game fish, bottom fish, and other species. The flounder category includes flounders and halibut; the small game group includes striped bass and small tuna and mackerel; the big game category includes large tuna, sharks, marlin, and dolphin fish; the bottom fish category includes greenlings, sculpins, surfperches, croakers, rockfishes and other bottom species; and the other species category includes only anchovies, smelts, silversides and herrings. Approximately 20 percent of anglers fishing from boats and 47 percent of anglers fishing from shore target no particular species. These anglers (hereafter, no-target anglers) caught fish in all species groups. Therefore, EPA used average catch rates for all species caught by no-target anglers to define fishing site quality for no-target anglers.

The methodology used in the Northern California study follows closely that of McConnell and Strand (1994) and Hicks (1999) work for NMFS. EPA maintained most important aspects of the methodologies used in the previous recreational NMFS studies. The Agency, however, estimated separate models for boat and shore anglers for the Northern California region. The Agency attempted to estimate a nested RUM model for Northern California, including both boat and shore anglers. However, preliminary model results indicated that nesting was not appropriate for the data. The Agency did not estimate a model for the charter boat mode for the NODA, however, because charter boat trips represent only thirteen percent of the total angling trips in this region. For the NODA analysis, the welfare gain from improved catch rates to charter boat anglers is approximated based on the regression coefficients developed for boat anglers.

The Agency combined the estimated model coefficients with the estimated impingement and entrainment losses at the cooling water intake structures in the Northern California Region to estimate per trip welfare losses from impingement and entrainment. Table X–24 shows the total average recreational landings for each species group, the number of fish impinged and entrained, and the estimated percent change in recreational landings from impingement and entrainment elimination. Eliminating impingement and entrainment is expected to increase flounders catch rates by 0.58%; small game catch rates by 56.02%; bottom fish catch rates by 6.6%; and other species catch rates by 5.5%.

TABLE X–24.—IMPINGEMENT AND ENTRAINMENT AS PERCENT OF TOTAL CATCH FOR NORTHERN CALIFORNIA

Species	Avg. total catch 1996–2000	Change in recreational losses from reduced impingement and entrainment	Reduced impingement and entrainment as % of total catch
Flounders	238,394	1,377	0.578
Small Game	459,563	257,431	56.016
Bottom Fish	3,665,520	241,089	6.595
Other	1,442,356	79,047	5.480
All Species	5,795,833	578,944	9.989

Table X–25 shows the impingement and entrainment reductions that would result from installation of the preferred option at each facility in Northern California, as well as the resulting increases in catch rates. The preferred option will result in a 0.32% reduction in impingement and entrainment losses for flounders; a 14.9% reduction in losses for small game fish; a 5% reduction in losses for bottom fish; and a 4.4% reduction in losses for other species.

TABLE X–25.—ESTIMATED CHANGE IN CATCH RATES RESULTING FROM THE PREFERRED OPTION FOR NORTHERN CALIFORNIA

Species	Avg. total catch 1996–2000	Total recreational losses from impingement and entrainment	Change in recreational losses from impingement and entrainment as % of total catch
Flounders	238,394	762	0.320
Small Game	459,563	68,615	14.931
Bottom Fish	3,665,520	183,651	5.024

TABLE X–25.—ESTIMATED CHANGE IN CATCH RATES RESULTING FROM THE PREFERRED OPTION FOR NORTHERN CALIFORNIA—Continued

Species	Avg. total catch 1996–2000	Total recreational losses from impingement and entrainment	Change in recreational losses from impingement and entrainment as % of total catch
Other	1,442,356	62,760	4.351
All Species	5,795,833	315,788	5.449

The willingness to pay values for boat and shore anglers for an additional fish per trip, and for the expected benefits from reducing impingement and entrainment at cooling water intake structures in the Northern California region are shown in Table X–26. Table X–26 shows that boat anglers value most highly the improvements in catch rates for sturgeon and salmon, followed by flounder and big game fish. Boat and shore anglers show a few notable differences in values. For example, the value for flounders is higher for boat anglers. This can be explained by the fact that most boat anglers target and catch halibut, a larger species; most shore anglers catch the smaller flounders. The value for flounders is also higher for boat anglers. This can be explained by the fact that most boat anglers target and catch halibut, a larger species; most shore anglers catch the smaller flounders.

TABLE X–26.—PER TRIP WELFARE GAIN FROM IMPROVEMENTS IN FISHING QUALITY AT ALL SITES IN NORTHERN CALIFORNIA (2002$)

Targeted species group	Per trip welfare gain (2002$)				WTP for an additional fish per trip (2002$)	
	Eliminating impingement and entrainment		Reducing impingement and entrainment with preferred technology			
	Boat anglers	Shore anglers	Boat anglers	Shore anglers	Boat anglers	Shore anglers
Flounders	$0.32	$0.96	$0.02	$0.01	$2.97	$0.99
Small Game fish	1.19	3.37	0.32	0.96	0.76	3.55
Bottom fish	0.24	0.11	0.18	0.08	0.75	0.54
Other fish	NA	0.58	NA	0.46	NA	1.10
No Target	2.66	0.02	2.48	0.00	8.53	0.76
Salmon	NA	NA	NA	NA	9.40	10.66
Sturgeon	NA	NA	NA	NA	33.5	NA
Big Game fish	NA	NA	NA	NA	4.05	NA

As shown in Table X–26, the estimated welfare gains from impingement and entrainment reduction are $0.02, $0.32, and $0.24 per trip for boat anglers targeting flounders, small game and bottom fish, respectively; and $0.01, $0.96, $0.08, and $0.46 per trip for shore anglers targeting flounders, small game, bottom fish and other specie, respectively (all in 2002$). Anglers targeting small game are expected to experience the greatest welfare gain from reducing impingement and entrainment at cooling water intake structures in Northern California.

EPA then combined the estimated per trip welfare gain from eliminating impingement and entrainment at Northern California cooling water intake structures with NMFS fishing participation estimates to estimate the annual value to recreational anglers of improved catch rates resulting from reduced impingement and entrainment in the Northern California region. Table X–27 provides the total number of angler days in Northern California by fishing mode and targeted species.

TABLE X–27.—TOTAL NORTHERN CALIFORNIA FISHING TRIPS BY MODE, 2001 AND PERCENT OF ANGLERS TARGETING EACH SPECIES

Total Northern California trips, 2001	Boat mode 920,196		Shore mode 864,178		Charter mode 193,007	
	Percent of Anglers Targeting Each Species by Mode and Number of Trips by Mode and Species					
Salmon	34.93%	321,424	1.41%	12,185	27.54%	53,154
Sturgeon	8.73%	80,333	1.41%	NA	0.00%	0
Flounders	13.86%	127,539	1.86%	16,074	0.00%	0
Small Game	7.28%	66,990	22.2%	191,848	1.32%	2,548
Big Game	2.12%	19,508	0.83%	NA	0.00%	0
Bottom Fish	13.27%	122,110	23.1%	199,625	57.97%	111,886
Other Fish	0.03%	NA	1.86%	16,074	0.00%	0
No Target	19.77%	181,923	47.34%	409,102	13.18%	25,438

EPA calculated total baseline recreational losses to Northern California anglers by multiplying the estimated per trip welfare gain from impingement and entrainment elimination for a given species group by the relevant number of recreational fishing trips in 2001. Similarly, EPA calculated the total gains resulting from the preferred technology. Table X–28 summarizes results of these calculations. The total value of baseline recreational losses for all species impinged and entrained is $1,432,645 per year (2002$), for boat, shore, and charter anglers. The total annual value of reduced recreational losses with the preferred option is $790,560 per year (2002$), for boat, shore, and charter anglers. Table X–28 also presents the discounted values, using EPA's preferred 3% discount rate and OMB's 7% discount rate.

TABLE X–28.—ESTIMATED ANNUAL WELFARE CHANGE TO RECREATIONAL ANGLERS IN NORTHERN CALIFORNIA UNDER THE BASELINE AND POST-COMPLIANCE SCENARIOS (2002$) —

Species	Total baseline welfare losses			Total welfare gain from reductions in impingement and entrainment baseline losses under the preferred option		
	Before discounting	3% Discount rate	7% discount rate	Before discounting	3% discount rate	7% discount rate
Salmon [a]	N/A	N/A	N/A	N/A	N/A	N/A
Sturgeon [a]	N/A	N/A	N/A	N/A	N/A	N/A
Flounders	$56,634	$45,307	$35,679	$2,702	$2,189	$1,729
Small Game	728,909	634,151	532,104	206,584	183,860	157,004
Big Game	N/A	N/A	N/A	N/A	N/A	N/A
Bottom Fish	77,312	71,900	67,261	59,041	54,908	51,366
Other Fish	9,276	7,699	6,772	7,376	5,975	5,458
No Target	560,514	465,227	409,175	514,857	471,034	390,994
Totals	1,432,645	1,224,284	1,050,991	790,560	663,965	596,551

[a] Impingement and entrainment data are not available for these species.

5. Commercial Fishing Valuation

Table X–29 provides EPA's estimate of the value of gross revenues lost in commercial fisheries resulting from the impingement of aquatic species in the Northern California region. Table X–30 displays this information for entrainment. As described above, EPA estimates that 0 to 40% of these revenue losses represent surplus losses to producers, assuming no change in prices or fishing costs. EPA will refine these assumptions for the final rule.

TABLE X–29A.—ANNUAL COMMERCIAL FISHING GROSS REVENUES LOST DUE TO IMPINGEMENT AT ESTUARY FACILITIES IN THE NORTHERN CALIFORNIA REGION

Species	Estimated pounds of harvest lost	Estimated Value of Harvest Lost (in dollars)		
		Undiscounted	Discounted using 3% discount rate	Discounted using 7% discount rate
Anchovies	10,156	$812	$781	$744
Cabezon	1,019	3,383	2,899	2,401
Croakers	97	55	48	40
Dungeness	404	623	588	546
Flounders	4,606	1,428	1,368	1,294
Herrings	25,560	5,368	4,840	4,257
Rock crabs	165	188	171	151
Rockfishes	38,955	21,425	16,863	12,547
Sculpins	147	384	367	345
Smelts	1,520	395	375	352
Surfperches	3,198	5,020	4,650	4,219
Total	85,826	39,082	32,949	26,897

TABLE X–29B.—ANNUAL COMMERCIAL FISHING GROSS REVENUES LOST DUE TO IMPINGEMENT AT OCEAN FACILITIES IN THE NORTHERN CALIFORNIA REGION

Species	Estimated pounds of harvest lost	Estimated Value of Harvest Lost (in dollars)		
		Undiscounted	Discounted using 3% discount rate	Discounted using 7% discount rate
Anchovies	0	$0	$0	$0
Cabezon	21	69	59	49
Croakers	8	5	4	3
Dungeness	1,583	2,438	2,301	2,137

TABLE X–29B.—ANNUAL COMMERCIAL FISHING GROSS REVENUES LOST DUE TO IMPINGEMENT AT OCEAN FACILITIES IN THE NORTHERN CALIFORNIA REGION—Continued

Species	Estimated pounds of harvest lost	Estimated Value of Harvest Lost (in dollars)		
		Undiscounted	Discounted using 3% discount rate	Discounted using 7% discount rate
Flounders	210	65	62	59
Rock crabs	1	1	1	1
Rockfishes	592	325	256	191
Sculpins	1	3	3	3
Surfperches	9	13	12	11
Total	2,424	2,920	2,699	2,454

TABLE X–30A.—ANNUAL COMMERCIAL FISHING GROSS REVENUES LOST DUE TO ENTRAINMENT AT ESTUARY FACILITIES IN THE NORTHERN CALIFORNIA REGION

Species	Estimated pounds of harvest lost	Estimated value of harvest lost (in dollars)		
		Undiscounted	Discounted using 3% discount rate	Discounted using 7% discount rate
Anchovies	525	$42	$39	$36
Cabezon	25	82	69	55
California halibut	1,076	2,701	2,145	1,600
Croakers	0	0	0	0
Dungeness	37,273	57,400	52,594	47,024
Flounders	192	59	55	50
Herrings	69,974	14,695	12,864	10,893
Rock crabs	490	558	492	419
Rockfishes	10	6	4	3
Sculpins	2,096	5,490	5,087	4,612
Smelts	15	4	4	3
Total	111,675	81,039	73,353	64,696

TABLE X–30B.—ANNUAL COMMERCIAL FISHING GROSS REVENUES LOST DUE TO ENTRAINMENT AT OCEAN FACILITIES IN THE NORTHERN CALIFORNIA REGION

Species	Estimated pounds of harvest lost	Estimated value of harvest lost (in dollars)		
		Undiscounted	Discounted using 3% discount rate	Discounted using 7% discount rate
Anchovies	8	$1	$1	$1
Cabezon	179	595	495	394
California halibut	2,816	7,067	5,604	4,177
Croakers	0	0	0	0
Flounders	427	132	123	112
Herrings	39,634	8,323	7,286	6,170
Rock crabs	12,467	14,212	12,532	10,659
Rockfishes	243	134	102	73
Sculpins	621	1,627	1,507	1,366
Smelts	18	5	4	4
Total	56,413	32,096	27,655	22,956

6. Total Recreational and Commercial Losses from Baseline Impingement and Entrainment in the Northern California Region

Table X–31 presents EPA's estimates of total baseline welfare losses from impingement and entrainment at cooling water intake structures in the Northern California region. Total commercial and recreational fishing losses are 1.5 million per year for all species and fishing modes, before discounting. Discounting these total baseline welfare losses by 3% and 7% yields total losses of $1.3 million and $1.1 million, respectively.

TABLE X–31.—ESTIMATED COMMERCIAL AND RECREATIONAL BASELINE WELFARE LOSSES IN NORTHERN CALIFORNIA FROM IMPINGEMENT AND ENTRAINMENT (2002$) [a]

Benefit type	Before discounting	Discounting using 3% discount rate	Discounted using 7% discount rate
Recreational	$1,432,645	$1,224,284	$1,050,991
Commercial [b]	62,055	54,662	46,801
Total	1,494,700	1,278,946	1,097,792

[a] Welfare losses represent losses due to both impingement and entrainment because recreational estimates cannot be presented separately for these categories.
[b] Based on 40 percent of gross revenues, or upper bound of 0–40 percent range assumed to represent producer surplus.

7. Estimated Use Benefits of Proposed Regulatory Options for the Northern California Region

Table X–32 presents EPA's estimates of total welfare gain from post-compliance impingement and entrainment reduction at cooling water intake structures in the Northern California region. Total commercial and recreational fishing gains are $0.85 million per year for all species and fishing modes, before discounting. Discounting the estimated welfare gain by 3% and 7% yields total losses of $0.71 million and $0.64 million, respectively.

TABLE X–32.—ESTIMATED DISCOUNTED COMMERCIAL AND RECREATIONAL REDUCED WELFARE LOSSES IN NORTHERN CALIFORNIA FROM IMPINGEMENT AND ENTRAINMENT (2002$) [A]

Benefit type	Expected % reduction	Before discounting	Discounted using 3% discount rate	Discounted using 7% discount rate
Recreational	55.2%	$790,560	$663,965	$596,551
Commercial [b]	36.7	22,755	19,514	16,208
Total	54.4	847,448	712,749	637,080

[a] Welfare losses represent losses due to both impingement and entrainment because recreational estimates cannot be presented separately for these categories.
[b] Based on 40 percent of gross revenues, or upper bound of 0–40 percent range assumed to represent producer surplus.

E. Nonuse Benefits

Reducing impingement and entrainment losses of fish and shellfish results in both use and nonuse benefits. Impingement and entrainment losses to commercial and recreational fish that are harvested by fishermen can be valued as direct use benefits. Methodologies for estimating use values for recreational and commercial species are well developed, and some of these species have been extensively studied. As a result, these values are relatively easy to estimate. The portion of impingement and entrainment losses consisting of fish that are recreationally and commercially landed, however, represented only approximately 0.15 percent of the total age one equivalent impingement and entrainment losses at five estuary/tidal river and ocean case study facilities evaluated for the section 316(b) Phase II proposal (See Appendix 4 of Estimating Total and Nonuse Values for Fish, Based on Habitat Values for Coastal Wetlands and Eelgrass (SAV) DCN 5–1010.) [23] The remaining impingement and entrainment losses at these five facilities are distributed as follows:

- Unharvested recreational and commercial fish represent 0.77 percent of the total age one equivalent impingement and entrainment losses,
- Forage fish represent 99.08 percent of the total age one equivalent loss.

Neither forage species nor the unlanded portion of recreational and commercial species have direct uses; therefore, they do not have direct use values. The lack of use values for the unlanded fish means that EPA did not directly value approximately 99.85 percent of the total age one equivalent impingement and entrainment losses at the five cooling water intake structures discussed above.[24] Although individuals do not use these resources directly, they may nevertheless care about and be affected by changes in their status or quality. Monetary expression of individuals' preferences for these resources is known as nonuse value. Both commercial and recreational fishermen, as well as those who do not use the resource, may have nonuse values for these species.

Given that aquatic species without any direct uses account for the majority of cooling water intake structure losses, it is important to try to account for nonuse values in the benefits analysis. Stated preference methods, or benefit transfers based on stated preference studies, are the only generally accepted techniques for estimating nonuse values. Stated preference methods rely on surveys, which ask people to state their willingness to pay for particular ecological improvements, such as increased protection of aquatic species or habitats with particular attributes. Benefits transfer involves adapting research conducted for another purpose, from the available literature, to address the policy questions at hand. It is not feasible to conduct a primary stated-preference study for the section 316(b) rule, because of the regulatory schedule and the time and significant resources

[23] The estuary/tidal river facilities incorporated in this estimate include Salem, Big Bend, and Brayton Point. The ocean facilities are Seabrook and Pilgrim.

[24] Although the percentages vary by case study, the same trend occurs in the other case studies. For example, the total percentage unvalued in the Great Lake case study (J. R. Whiting and Monroe) was 99.92 percent. For example, the total percentage unvalued in the Great Lake case study (J. R. Whiting and Monroe) was 99.92 percent. Note that some use value for forage fish is accounted for in the commercial and recreational fishing benefits through trophic transfer. However, trophic transfer accounts for a small percentage of total recreational and commercial yield.

necessary to properly perform such a study. Thus, EPA's analysis of nonuse benefits of the section 316(b) regulation relies on benefits transfer. As noted above, however, stated preference methods have several limitations that must be considered when conducting benefits transfer. EPA recognizes that benefits transfer of stated preference-based WTP estimates to a policy context that differs from the study context can be problematic, given the significant influence of context on stated-preference values. EPA is still considering whether the underlying studies in the current analysis are close enough to the policy context to warrant benefits transfer and requests comment on this issue.

For the proposed rule analysis, EPA used a ''50 percent'' rule to estimate nonuse benefits from reducing impingement and entrainment losses (see the proposed rule Case Study Analysis for detail, available at *http://www.epa.gov/waterscience/316b/*). The Agency received numerous comments on this approach. Specifically, commenters argued that the ''50 percent rule'' is outdated and that EPA needs to revise this approach based on more recent studies of use and nonuse benefits associated with environmental quality improvements.

In response to public comments, EPA has developed a revised analysis of nonuse benefits and is requesting comment in the NODA on this revised methodology. First, the Agency developed a benefit transfer approach that combines an estimate of the amount of habitat required to offset impingement and entrainment losses (including forage species and the unlanded portion of commercial and recreational species) by means of wild fish production with a benefits transfer estimate of WTP for aquatic habitat preservation/restoration. The following section briefly summarizes this approach. Second, EPA reviewed available evidence concerning total benefits (including use and nonuse values) from the surface water valuation studies that are potentially applicable to the section 316(b) regulation. Section E.2 below discusses EPA's review of these studies and outlines further steps in analyzing nonuse and use benefits from available economic literature.

1. Benefit Transfer Approach

The methodology used in this analysis uses values that survey respondents indicated for preservation/restoration of eelgrass (submerged aquatic vegetation, SAV), and wetlands to evaluate losses of fishery resources. Because one of the results of aquatic habitat preservation/restoration is increased production of fish and shellfish, it may be appropriate to use valuation of habitat restoration as a proxy for the value of the fish and shellfish lost due to impingement and entrainment. The method used by EPA in this NODA for such indirect valuation first assesses respondents' values for habitats that play a significant role in the production of fish or shellfish, and then estimates the quantity of such habitat required to replace fish and shellfish lost to impingement and entrainment. These data are then combined to yield an indirect estimate of household values for fish and shellfish. Survey respondents were asked to value acres of habitat (*e.g.*, eelgrass or wetlands) without knowing the exact quantities of each species produced by the habitat. These values per acre were then translated, using estimates of fish abundance in these habitats, into values for specific species and quantities of fish or shellfish. The habitat valuation study used in this analysis specifically described eelgrass as ''habitat for fish and shellfish.'' The authors of this study concluded, based on comments made by participants in focus groups, that the survey population was familiar with both eelgrass and wetlands, and that they associated both of these habitats with production of and habitat for fish and shellfish. Another study (Johnston *et al.*, 2002) found that ecological improvements to statewide fish and shellfish populations were among the attributes that affected respondents' relative valuation of various wetlands restoration projects. This suggests that respondents in the habitat valuation study were aware of the fish production ''services'' provided by SAV (eelgrass), and may have been aware of the fish production ''services'' provided by wetlands.

EPA's approach to estimating values for fish and shellfish habitats needed to offset impingement and entrainment losses of fish involves three general steps:

- Estimate the amount of wetland and eelgrass habitat needed to produce organisms to the level necessary to offset impingement and entrainment losses for the subset of species for which production information is available;
- Develop willingness to pay (WTP) values for the fish production services of the relevant habitat types; and
- Estimate the value of impingement and entrainment losses, based on values for the restored habitat required to offset impingement and entrainment losses, by multiplying the WTP values for the fish and shellfish production services per acre of restored eelgrass and wetland habitat by the required number of restored acres of each habitat type.

The Agency solicits comments on whether this approach provides a more comprehensive value that addresses all impingement and entrainment losses.

The following NODA sections briefly summarize this benefits transfer approach and its application to estimating the value of the fish habitat required to offset impingement and entrainment losses in the North Atlantic Region. Additional detail on the methods and data EPA will use throughout this analysis are provided in ''Estimating Total and Nonuse Values for Fish, Based on Habitat Values for Coastal Wetlands and Eelgrass'' (DCN 5–1010) that accompanies this NODA.

a. Estimating the Amount of Different Habitat Types Needed To Offset Impingement and Entrainment Losses for Specific Species

The first step in the analysis involves calculating the area of SAV or wetland habitat needed to offset impingement and entrainment losses, for the subset of species for which restoration of these habitats was identified by local experts as the preferred restoration alternative, and for which production information is available; *i.e.*, the habitat that will produce the equivalent quantity of fish impinged and entrained. Details on this analysis are provided in Estimating Total and Nonuse Values for Fish, Based on Habitat Values for Coastal Wetlands and Eelgrass, DCN 5–1010, that accompanies this NODA.

Table X–33 presents lower and upper bound estimates of the total wetland and SAV restoration required to offset North Atlantic impingement and entrainment. These estimates reflect the acreage needed for the species requiring the maximum quantity of habitat restoration to offset its impingement and entrainment losses. The amount of tidal wetland restoration in the North Atlantic region is based on the acreage required for winter flounder. The lower bound estimate is winter flounder restoration estimate derived for Brayton Point and the upper bound estimate is the estimate for Pilgrim. The lower bound estimate for regional SAV restoration is based on the acreage needed for northern pipefish at Pilgrim and the upper bound estimate is based on the acreage needed for scup at Brayton Point.

TABLE X–33.—LOWER AND UPPER BOUND ESTIMATES OF TOTAL WETLAND AND SAV RESTORATION REQUIRED TO OFFSET NORTH ATLANTIC IMPINGEMENT AND ENTRAINMENT

Habitat restoration category	Lower bound on required number of acres	Upper bound on required number of acres
Tidal wetland restoration	25,589	43,813
SAV restoration	151	1,205

These estimates are derived from abundance data for these species in wetland and SAV habitats. Abundance data were used because estimates of production rates in these habitats are not available for the species of interest. Individuals were counted within subsampling areas of the habitats (*e.g.*, 100 square meters), and the resulting counts were scaled up to derive per acre density estimates by species. Usable data were available for three species for which impingement and entrainment data were also available that were found in wetlands (winter flounder, Atlantic silverside, and striped killifish) and for three species that were found in SAV (threespine stickleback, northern pipefish, and scup). The amount of wetlands acreage needed to restore impingement and entrainment losses ranged from 11–12 acres for killifish to 25,589–48,813 acres for winter flounder. While it is not known how many acres would be needed for the many other species found in wetlands, it appears from the available data that the acreage needed for winter flounder significantly overstates the acreage needed for other species, and restoring this many acres would lead to more than offsetting increases in these other species. For SAV, the acreage estimated ranged from 105–180 acres for threespine stickleback, to 1205 acres for scup. EPA requests comment on using abundance data for these analyses. EPA also requests comment on using the species that require the maximum quantity of habitat to offset impingement and entrainment losses as the basis for estimating the total habitat required to offset regional losses. Finally, EPA requests comment on using estimates of fish production per acre as the basis for benefits transfer, given that respondents were likely not aware of the quantitative relationship between habitat and fish production when they provided valuation information.

b. Developing WTP Values for Fish Production Services Provided by Submerged Aquatic Vegetation and Wetlands for the North Atlantic Region

For the North Atlantic Region, EPA based the benefit transfer of both total and nonuse values for fish habitat provided by eelgrass and wetlands on a site-specific study of the Peconic Estuary, located on the East End of Long Island, New York (Johnston *et al.,* 2001a, Opaluch *et al.,* 1995, 1998; Mazzotta, 1996). For detail on the Peconic Estuary study used in this analysis see DCN's 5–1275, 5–1292, 5–1293, and 5–1284. Conducted in 1995, the study provides information for the Peconic Estuary Program's Comprehensive Conservation and Management Plan (see *http://www.savethepeconicbays.org/ccmp/*).

Both eelgrass and wetlands located in the Peconic Estuary support aquatic species that are found throughout the North Atlantic region and that are likely to be affected by impingement and entrainment (*e.g.,*bay anchovy, Atlantic silverside, scup, summer flounder, winter flounder, windowpane flounder, weakfish, tautog, bay scallops, and hard clams).[25] The Peconic Estuary study thus provides values for eelgrass and wetlands that may be representative of habitat needed to produce many of the species affected by impingement and entrainment at power plants. EPA will further evaluate applicability of the habitat in the Peconic study to other study regions such as the mid-Atlantic. EPA will also evaluate other aquatic habitat valuation studies for their applicability to the analysis of benefits of the section 316(b) rule in other regions.

EPA re-estimated the Peconic model with separate coefficients for users and nonusers of fishery resources in order to separate out nonuse values. The Agency defined users as those who stated that they either fish or shellfish. These individuals have both nonuse and indirect use values from the fish habitat services of eelgrass and wetlands. EPA estimated nonuse values only for those who do not fish or shellfish.[26] Table X–34 presents the Peconic model results. For eelgrass, the value for nonusers is 77.7 percent of the total value for users. For wetlands, the value for nonusers is 94.4 percent of the total value for users. Nonuse values, defined here as total values for nonusers of the fishery resources, represent a large portion of the total value estimated in the study. Nonusers assigned similar values to both types of habitat, while users assigned a slightly higher value to eelgrass, perhaps because it was explicitly identified on the survey as fish and shellfish habitat. It is difficult to determine ex post why the values for eelgrass and wetlands are similar for nonusers. However, the fact that nonusers assigned similar values to both types of habitat may indicate that they did not significantly differentiate the two habitat types on dimensions affecting valuation or, alternatively, they differentiated among habitat types, but assigned similar values. Since SAV was explicitly identified as fish and shellfish habitat and wetlands was not, this may mean that fish and shellfish services were not a significant attribute affecting respondents' valuation, or, alternatively that they were aware that wetlands also provide habitat for fish and shellfish based on knowledge external to the survey.

TABLE X–34.—ESTIMATED WTP VALUES PER HOUSEHOLD FROM THE PECONIC STUDY (2002$) [a]

	Wetlands [b]		Eelgrass (SAV)	
	$/HH/Acre/Year [c]	Nonuse value %	$/HH/Acre/Year [c]	Nonuse value %
All Residents	0.056	95.80	0.063	82.40
Users	0.057	94.40	0.067	77.70
Nonusers [d]	0.054	100.0	0.052	100.0

[a] EPA made dollar value adjustments using the Consumer Price Index for all urban consumers for the first half of 2002.

[25] Further detail on fish SAV in the North and mid-Atlantic can be found in Wyda, *et al*, 2002 ''The response of fishes to submerged aquatic vegetation complexity in two ecoregions of the Mid-Atlantic Bight: Buzzards Bay and Chesapeake Bay'' (see DCN 5–1318).

[26] Note that this is not strictly true for wetlands, because other services exist that allow for use values such as birdwatching. The value of wetlands is adjusted to reflect fish production services only in the section on wetlands below.

[b] Note that wetlands values presented here are WTP for all wetland services, not just fish habitat services. The adjustment for fish habitat values appears below.
[c] Values shown are WTP per household per additional (*i.e,* marginal) acre per year.
[d] Nonusers are defined as respondents who neither fish nor shellfish.

Because coastal wetlands provide a number of services (*e.g.*, habitat, water purification, storm buffering, and aesthetics), EPA attempted to separate values for fish habitat from values for other wetland services. Given survey data available from the Peconic Study, however, there is no direct means to estimate the proportion of total wetland value associated with fish and shellfish habitat services alone. EPA therefore used a stated preference study from Narragansett Bay, Rhode Island to adjust wetland values to reflect fish and shellfish habitat services (Johnston *et al.*, 2002, (DCN 5–1273). Based on the Johnston *et al.* (2002) study, the proportion of saltwater wetland value associated with fish habitat is 0.2564; and the proportion of value associated with shellfish habitat is 0.2778. For detail on estimating the proportion of wetland value associated with fish and shellfish habitat services see Estimating Nonuse Values for Fish Based on Habitat Values for Coastal Wetlands and Eelgrass (SAV), provided in DCN 5–1010.

Briefly, the Johnston *et al.* study asked survey respondents to choose among different hypothetical restoration projects based on attributes of these projects. Attributes of hypothetical restoration plans characterized relative statewide improvement in bird populations, fish populations, shellfish populations, and mosquito control. On average these attributes received roughly equal weight in the valuations (with bird populations being weighted a little less heavily, and mosquito control a little more heavily than the other two). Based on model results, the authors concluded that roughly one-fourth of the value derived from each project was attributable to each type of services.

The Peconic survey described eelgrass specifically as fish and shellfish habitat. EPA is not aware of other direct uses of eelgrass. Based on focus groups during survey development and pretesting, the authors concluded that individuals were aware of eelgrass and its importance for fish and shellfish production. Thus, EPA assigned all of the estimated WTP for SAV restoration to fish and shellfish production services. Based on these same focus groups and pretests the authors also concluded that, individuals were aware of and valued a number of functions of wetlands, including fish and other wildlife habitat, storm buffering, and aesthetics. Therefore, EPA assigned only a portion of the estimated WTP for wetlands restoration to fish habitat services, based on results from the Johnston *et al.* study described above. EPA requests comment on its methodology for assigning a share of WTP to ''fish production services'' for each habitat type.

EPA estimated the value of saltwater wetlands associated with fish and shellfish habitat services by multiplying the proportions presented above by the total wetland values from the Peconic Estuary study. Table X–35 presents the final per household values for an acre of wetlands that were ascribed to fish and shellfish habitat services. Because the overall values of Peconic Estuary residents for eelgrass and wetlands are similar, once adjustments are made to wetlands values to ascribe a portion to fish habitat services, the values for fish and shellfish habitat of eelgrass are estimated as four times higher than those for fish habitat only for wetlands. EPA requests comments on whether such adjustments are appropriate and whether further adjustments are needed for eelgrass values.

TABLE X–35.—ESTIMATED WTP VALUES PER HOUSEHOLD FOR FISH AND SHELLFISH HABITAT SERVICES OF WETLANDS (2002$) FROM THE PECONIC STUDY

	$/HH/ Acre/ Year [a]	Fish habitat %	$/HH/ Acre/ Yearfor fish habitat [b]	Shellfish habitat %	$/HH/ Acre/Year for shellfish habitat [c]
All Residents	0.056	25.64	0.014	27.78	0.016
Users	0.057	25.64	0.015	27.78	0.016
Nonusers [d]	0.054	25.64	0.014	27.78	0.015

[a] Values shown are WTP per household per additional (*i.e,* marginal) acre per year.
[b] Total value per acre per year times 25.64 percent.
[c] Total value per acre per year times 27.78 percent.
[d] Note that wetland values for fish and shellfish services are not linearly additive within the same acreage, due to the functional form use in Johnston *et al* (2002).

c. Estimating Total and Nonuse Values for Fish Production Services Provided by Submerged Aquatic Vegetation and Wetlands in the North Atlantic Region

The SAV and wetland values from the Peconic study presented in Table X–34 and Table X–35 are per household values for individuals residing in towns bordering the Peconic Estuary. Estimating the total value per acre of SAV and wetlands requires defining and using the affected population for the study area. The Peconic study defined the affected population as the total number of households (both year-round and seasonal) in the towns bordering the Peconic Estuary. Similarly, EPA defines the affected population as households residing in the counties that abut the water bodies in the North Atlantic Region. These households are likely to value gains of fish or shellfish in the nearby water body due to their close proximity to the affected resource.

Analysis of data from the Rhode Island Salt Marsh Restoration Survey (Johnston *et al.* 2002) reveals that values were ascribed to even relatively small-scale salt marsh restoration actions (*i.e.*, 3–12 acres) were stated by respondents from various parts of the state. EPA thus assumed for the current analysis that residents within a similar distance from the coast as residents in the Johnston *et al.* (2002) study would have positive values for improving fish habitat. EPA calculated the average distance from Johnston's studied locations to the farthest edges of Rhode Island, which totaled 32.43 miles. The Agency then assumed that all households living within the same distance of the affected resource as Rhode Island residents from the studied resource would also value fish habitat improvements in their affected water body.

Additionally, EPA notes that a study by Pate and Loomis (1997) found that respondents outside the political jurisdiction in which a study site is located were also willing to ascribe stated preference values to the amenity being studied. The study was designed to determine the effect of distance on WTP for public goods with large nonuse values. Specifically, the study evaluated environmental programs designed to improve wetlands habitat and wildlife in the San Joaquin Valley. It compared WTP values for households residing in the San Joaquin Valley, California, to values for California households outside the Valley, and to households in Washington State, Oregon, and Nevada. The study found that WTP values for California residents outside the Valley were 97.7 percent of the WTP of the Valley residents. WTP values for Oregon residents were approximately 27 percent of the WTP of the Valley residents. As with the Rhode Island study, care should be taken in interpreting these results.

In this analysis, EPA calculated per acre WTP values using two different definitions of affected populations: (1) The average number of households residing in counties abutting the affected water body and (2) the average number of households living within the 32.4 mile radius of each affected water body in the region. Average per acre values for SAV and wetlands were calculated based on these estimates of the average affected population for each facility. The average number of affected households in counties abutting affected water bodies is 210,357 and the average number of households within a 32.4 mile radius of each facility is 737,711. Detailed information used in calculating the average number of affected households in counties abutting affected water bodies and the average number of households within a 32.4 mile radius of each facility is provided in DCN 5–1008.

Table X–36 presents an average value per acre per year for restored SAV for households in the counties abutting the affected water bodies and for households within the larger radius (32.4 miles), for the North Atlantic Region. The total annual value per acre for eelgrass (SAV) for households living in counties abutting the region's affected water bodies is $13,341 for all residents; and the total nonuse only value is $10,993. The table also shows two estimates of the values for households living within the larger area. EPA calculated these values based on the findings of Pate and Loomis (1997), as shown below. EPA assigned the value per household from the Peconic study to the average number of households residing in the counties abutting the affected water bodies in the North Atlantic Region (210,357 households). For households beyond these coastal counties (an additional 527,354 households), EPA multiplied the Peconic values by 97.7 percent and 27 percent to provide a range of WTP values.

TABLE X–36.—HOUSEHOLD WTP VALUES FOR SAV FOR THE NORTH ATLANTIC REGION (2002$)

Value category	$/HH/Acre/Year [a]	Total WTP/Acre/Year for HH in Counties abutting affected water bodies [b]	Total WTP/Acre/Year for HH within 32.4 mile radius of affected water body [c]	
			97.7%	27.0%
Total Value	$0.063	$13,341	$45,949	$22,371
Nonuse Value [d]	0.052	10,993	37,863	18,434

[a] Values shown are WTP per household per additional (*i.e,* marginal) acre per year from the Peconic study.
[b] Total WTP per acre is calculated as household WTP per acre times the average of 210,357 households in the counties abutting affected water bodies.
[c] Total WTP per acre is calculated as household WTP per acre times 737,711, the average number of households within a 32.43-mile radius of affected water bodies. Adjustments to WTP values are described in the text.
[d] Total nonuse value is calculated as value per acre for nonusers only times all households in the study area.

Table X–37 presents the values per acre per year for the fish and shellfish habitat services of wetlands for the total affected population for the regional study area. For the counties abutting the affected water bodies, the total annual value per acre for fish habitat services provided by wetlands is $3,017 for all households, whereas the total nonuse only value is $2,891. For the larger area, the total annual value per acre for fish habitat services provided by wetlands ranges from $5,059 to $10,390 for all households, whereas the total nonuse only value ranges from $4,848 to $9,958.

The table also shows the corresponding values if the estimated WTP share for ''shellfish production services'' rather than the WTP for ''fish production services'' is used.

TABLE X–37.—ESTIMATED WTP VALUES FOR FISH AND SHELLFISH IN WETLANDS FOR THE NORTH ATLANTIC REGION (2002$)

	$/HH/Acre/Year [a]	Total WTP/Acre/Year for HH in Counties abutting affected waterbody [b]	Total WTP/Acre/Year for HH within 32.4 mile radius of affected water body [c]	
			97.7%	27%
Fish				
Total Value	$0.014	$3,017	$10,390	$5,059
Nonuse Value [c]	0.014	2,891	9,958	4,848

TABLE X–37.—ESTIMATED WTP VALUES FOR FISH AND SHELLFISH IN WETLANDS FOR THE NORTH ATLANTIC REGION (2002$)—Continued

	$/HH/ Acre/ Year [a]	Total WTP/ Acre/Year for HH in Counties abutting affected waterbody [b]	Total WTP/Acre/Year for HH within 32.4 mile radius of affected water body [c]	
			97.7%	27%
Shellfish				
Total Value	$0.016	$3,268	$11,258	$5,481
Nonuse Value [d]	0.015	3,132	10,789	5,253

[a] Values shown are WTP per household per additional (*i.e,* marginal) acre per year from the Peconic study.
[b] Total WTP per acre is calculated as household WTP per acre times the average of 210,357 households in the counties abutting affected water bodies.
[c] Total WTP per acre is calculated as household WTP per acre times 737,711, the average number of households within a 32.43-mile radius of affected water bodies.
[d] Total nonuse value is calculated as value per acre for nonusers only times all households in the region.

d. Estimates of the Value of Baseline Impingement and Entrainment Losses for the North Atlantic Region

EPA multiplied the estimated number of acres of SAV and wetlands needed to offset impingement and entrainment losses for the North Atlantic region by the estimated per acre values of SAV and wetlands to assess the value of baseline impingement and entrainment losses. As discussed above, EPA performed this analysis on the SAV—and wetlands-dependent species requiring the maximum restoration acres among these for which productivity estimates are available.

Table X–38 presents the estimated values for SAV restoration for the North Atlantic Region. EPA estimated that between 151 and 1,204 acres of revegetated SAV (eelgrass) is required to offset average annual impingement and entrainment losses of scup and northern pipefish, depending on whether Brayton Point or Pilgrim is used for the productivity estimates. Based on the estimated value per acre to residents of counties abutting the affected water bodies, the total value of restoring 151 acres of eelgrass is $2,014,450. Nonuse only value is $1,659,930. The estimated total value to all households residing within 32.43 miles from the affected water bodies, ranges from $3,377,982 to $6,938,316 per year. Nonuse only value ranges from $2,783,496 to $5,717,253. Figures are given in 2002 dollars.

TABLE X–38.—WTP VALUES FOR SAV RESTORATION OF FISH FOR THE NORTH ATLANTIC REGION (2002$)

Species benefitting from SAV restoration	Acres of required SAV restoration	Total willingness to pay per acre per year	
Counties Abutting Affected Water Bodies			
Scup	151 acres	Total Value	$2,014,450
Threespine stickleback		Nonuse Value	1,659,243
Northern pipefish	1,205 acres	Total Value	16,075,574
		Nonuse Value	13,246,458
All Households Residing Within 32.43 Miles of Affected (High Estimate)			
Scup	151 acres	Total Value	$6,938,316
Threespine stickleback		Nonuse Value	5,717,253
Northern pipefish	1,205 acres	Total Value	55,368,683
		Nonuse Value	45,624,433
All Households Residing Within 32.43 Miles of Affected Water Bodies (Low Estimate)			
Scup	151 acres	Total Value	$3,377,982
Threespine stickleback		Nonuse Value	2,783,496
Northern pipefish	1,205 acres	Total Value	26,956,743
		Nonuse Value	22,212,667

Table X–39 presents the estimated values for wetlands restoration for the North Atlantic Region. EPA estimated that between 25,589 and 43,813 acres of restored tidal wetlands is required to offset average annual impingement and entrainment losses to winter flounder. Based on the estimated value per acre to residents of counties abutting affected water bodies, the total value of restoring 25,589 acres of coastal wetlands (after adjusting for the estimated portion attributable to fish production services) is $77 million per year, whereas nonuse only value is $74 million. For all households residing within 32.43 miles of affected water bodies, the total value of restoring 25,589 acres of coastal wetlands ranges from $129 million to $266 million per year, whereas the nonuse only value ranges from $124 million to $254 million for fish habitat only. Figures are given in 2002 dollars.

Based on the estimated value per acre to residents of counties abutting affected water bodies, the total value of restoring 43,813 acres of coastal wetlands is $132 million per year, whereas nonuse only value is $127 million, adjusted to fish production services only. For all households residing within 32.43 miles of affected water bodies, the total value of restoring 43,813 acres of coastal wetlands ranges from $222 to $455 million per year, whereas the nonuse only value ranges from $212 to $436 million, adjusted to fish production services only. Figures are given in 2002 dollars. This analysis does not include fish or shellfish losses caused by thermal discharges which are covered under section 316(a).

EPA estimated the total WTP value for the amount of habitat required to offset baseline impingement and entrainment losses in the North Atlantic region by adding the SAV and wetland values presented in Table X–38 and Table X–39. Based on the estimated value per acre to residents of counties abutting the affected water bodies, the total value of habitat required to offset impingement and entrainment losses in the North Atlantic region ranges from $79 million to $511 million per year, whereas nonuse only value ranges from $76 million to $482 million.

TABLE X–39.—WTP VALUES FOR WETLANDS RESTORATION OF FISH FOR THE NORTH ATLANTIC REGION (2002$)

Species Benefitting from tidal wetlands restoration	Acres of required wetlands restoration	Total willingness to pay per acre per year	
Counties Abutting Affected Water Bodies			
Winter flounder		Total Value	$77,194,196
Atlantic silverside	25,589 acres	Nonuse Value	73,982,015
Striped killifish		Total Value	132,170,436
	43,813 acres	Nonuse Value	126,670,601
All Households Residing Within 32.43 Miles of Affected (Low Estimate)			
Winter flounder		Total Value	$265,877,962
Atlantic silverside	25,589 acres	Nonuse Value	254,814,331
Striped killifish		Total Value	455,231,200
	43,813 acres	Nonuse Value	436,288,260
All Households Residing Within 32.43 Miles of Affected Water Bodies (Low Estimate)			
Winter flounder		Total Value	$129,445,085
Atlantic silverside	25,589 acres	Nonuse	124,058,656
Striped killifish		Total Value	221,633,417
	43,813 acres	Nonuse Value	212,410,876

The values in Table X–39 do not account for all species lost to impingement and entrainment in the North Atlantic Region (*e.g.*, tautog) and include benefits for species not affected by impingement and entrainment. EPA continues to evaluate this approach as an alternative for estimating comprehensive non-use benefits associated with this regulation.

e. Estimates of the Value of the Preferred Option for the North Atlantic Region

Table X–40 shows the percent reduction in impingement and entrainment losses for each of the affected species included in this analysis. The preferred option is expected to reduce impingement and entrainment losses by 18.4 to 23.8 percent, depending on species. EPA applied the percent reduction for the species that determined the number of acres of restoration required. For tidal wetlands, winter flounder required the largest number of acres of restoration. Accordingly, EPA used the 18.73% reduction in impingement and entrainment for winter flounder to calculate the benefits of the preferred technology. Similarly, EPA used the 18.97% reduction for northern pipefish to estimate benefits of the lower bound estimate of SAV restoration, and the 23.75% reduction for scup to estimate upper bound benefits for SAV.

TABLE X–40.—REDUCTIONS IN IMPINGEMENT AND ENTRAINMENT LOSSES WITH THE PREFERRED OPTION

Species	Percent reduction
Winter flounder	18.73
Atlantic silverside	21.78

TABLE X–40.—REDUCTIONS IN IMPINGEMENT AND ENTRAINMENT LOSSES WITH THE PREFERRED OPTION—Continued

Species	Percent reduction
Striped killifish	18.43
Threespine stickleback	31.17
Northern pipefish	18.97
Scup	23.75

Table X–41 gives the range of WTP values for the preferred option for the North Atlantic region. Summing the values for wetlands and SAV restoration, the total benefits of the preferred option for the six species identified above range from $15 to $98 million (2002$). Nonuse value only ranges from $14 to $92 million (2002$).

TABLE X–41.—WTP VALUES FOR WETLANDS AND SAV RESTORATION OF FISH FOR THE NORTH ATLANTIC REGION, BASED ON THE PREFERRED OPTION (2002$)

	Lower bound	Upper bound
Counties Abutting Affected Water Bodies		
Total Value	$14,840,614	$28,573,472
Nonuse Value	14,171,720	26,871,437
All Households Residing Within 32.43 Miles of Affected Water Bodies (High Estimate)		
Total Value	$51,115,141	$98,414,866
Nonuse Value	48,811,287	92,552,594
All Households Residing Within 32.43 Miles of Affected Water Bodies (Low Estimate)		
Total Value	$24,885,868	$47,914,165
Nonuse Value	23,764,215	45,060,065

f. Per Household Values of Changes in Impingement and Entrainment Losses for the North Atlantic Region

Another way of presenting these results is to calculate the implied per household WTP for households residing in the two different definitions of the study area. Table X–42 presents results of these calculations. A total of 3.65 million households live in the counties abutting affected water bodies while 4.2 million households live within a 32.4 mile radius of affected water bodies. This implies a total WTP to eliminate all I&E losses of $21.70 to $40.62 and non-use WTP of $20.73 to $33.97 per household residing in the counties abutting affected water bodies.

If a 32.4 mile radius is used in these calculations, the implied WTP values to reduce all I&E losses range from $31.62 to $121.57 and non-use WTP range $29.92 to $113.68 per household residing in the 32.4 mile-radius area. All values are given in 2002$.

TABLE X–42.—VALUES PER HOUSEHOLD FOR TOTAL AFFECTED POPULATION OF THE NORTH ATLANTIC, FOR SAV AND WETLANDS RESTORATION

	Baseline losses		Preferred option	
	Lower bound	Upper bound	Lower bound	Upper bound
Households in Bordering Counties				
Total Value (nonuse + use)	$79,208,646	$148,246,010	$14,840,614	$28,573,472
Total value/hh	21.70	40.62	4.07	7.83
Total non-use value	75,641,944	139,917,060	14,171,720	26,871,437
Non-use value/hh	20.73	33.97	3.44	6.52
Households Within 32.4 Mile Radius (high estimate)				
Total Value (nonuse + use)	$272,816,278	$510,599,883	$51,115,141	$98,414,866
Total value/hh	64.96	121.57	12.17	23.43
Total non-use value	260,531,584	481,912,693	48,811,287	92,552,594
Non-use value/hh	61.46	113.68	11.51	21.83
Households Within 32.4 Mile Radius (low estimate)				
Total Value (nonuse + use)	$132,823,067	$248,590,160	$24,885,868	$47,914,165
Total value/hh	31.62	59.19	5.93	11.41
Total non-use value	126,842,152	234,623,543	23,764,215	45,060,065
Non-use value/hh	29.92	55.35	5.61	10.63

This calculation implies a total WTP to reduce impingement and entrainment losses of $4.07 to $7.83 and non-use WTP of $3.44 to $6.52 per household residing in the counties abutting affected water bodies. If a 32.4 mile radius is used in these calculations, the implied WTP values to reduce all I&E losses range from $5.63 to $23.43 and non-use WTP range from $5.61 to $21.83 per household residing in the 32.4 mile-radius area. All values are provided in 2002$.

2. Future Steps in Analyzing Nonuse Values

In addition to the nonuse valuation approach summarized in the preceding sections, EPA is also exploring and soliciting comment on alternative methodologies for estimating nonuse benefits for the Final rule.

a. Nonuse and Use Values: Literature Review

In response to public comments regarding the analysis of non-use values in the proposed rule, the Agency continues to review and summarize surface water valuation studies that estimate non-use and total use values for water resources. The purpose of this review is to report on the range of nonuse values for water resources in the economic literature, to compare estimates of use and nonuse values for users and nonusers, and explore the feasibility of deriving nonuse values based on these comparisons.

Based on comments received, EPA is re-evaluating past studies and their applicability to this rule. These studies summarized and compared nonuse and use values (*e.g.*, Fisher and Raucher's (1984) and Brown's (1993)). The Fisher and Raucher's (1984) comparison of nonuse and use values relies on eight contingent valuation studies of benefits of improved water quality published from 1974 to 1983. This analysis served as a basis for developing the 50 percent rule used for estimating non-use benefits in the proposed rule analysis. Brown (1993) conducts a similar assessment of nonuse and use values that relies on 31 contingent valuation studies published from 1980 to 1992.

EPA is also identifying a set of new studies that may contain information about the relative magnitude of use and nonuse values for aquatic resources affected by this rule. As of the publication of this NODA, EPA is reviewing 18 surface water valuation studies that meet a set of criteria for suitability and reliability (*e.g.*, the resource amenities valued in the study must be water bodies that provide recreational fishing, U.S. populations are surveyed in the study, research methods in the study are supported by literature). As a consequence of these criteria, EPA has identified fewer applicable studies than Brown (1993). These studies use either stated preference or a combination of stated and revealed preference techniques to elicit nonuse and use values associated with aquatic habitat improvements (see document ''Comparison of Nonuse and Use Values from Surface Water Valuation Studies'' (See DCN 5–1011)). These studies vary in several respects, including the specific environmental change valued, the types of values estimated, the magnitude of the change, the geographic region affected by environmental changes and survey administration methods. EPA is qualitatively analyzing these studies and interpreting relevant characteristics to determine their relevance for the analysis of nonuse values resulting from this rule.

These 18 valuation studies provide 27 observations of use and non-use values associated with various aquatic habitat improvements, because six studies generated more than one nonuse value estimate. A list of the studies being considered by EPA is provided in Table X–43; Appendix A in the document ''Comparison of Nonuse and Use Values from Surface Water Valuation Studies'' (See DCN 5–1011)'' that accompanies this NODA presents key information from each study compiled by EPA.

TABLE X–43.—EXAMPLES OF STUDIES THAT PROVIDE INFORMATION ABOUT USE AND NONUSE VALUES

Author	Year	Title	Source
Clonts & Malone	1990	Preservation Attitudes and Consumer Surplus in Free Flowing Rivers.	In: Social Science and Natural Resource Recreation Management, Joanne Vining, editor. Westview Press, Boulder, CO. pp. 301–317.
Croke *et al*	1986–87	Estimating the Value of Improved Water Quality in an Urban River System.	Journal of Environmental Systems. Vol. 16, No. 1. pp. 13–24.
Cronin	1982	Valuing Nonmarket Goods Through Contingent Markets.	Pacific Northwest Laboratory, PNL–4255, Richland, WA.
Desvousges *et al*	1983	Contingent Valuation Design and Results: Option and Existence Values.	In: A Comparison of Alternative Approaches for Estimating Recreation and Related Benefits of Water Quality Improvements. U.S. Environmental Protection Agency, Economic Analysis Division, Washington, D.C.
Huang *et al*	1997	Willingness to Pay for Quality Improvements: Should Revealed and Stated Preference Data Be Combined?.	Journal of Environmental Economics and Management Vol. 34, No. 3. pp. 240–255.
Kaoru	1993	Differentiating Use and Nonuse Values for Coastal Pond Water Quality Improvements.	Environmental and Resource Economics. Vol. 3. pp. 487–494.
Lant & Roberts	1990	Greenbelts in the Cornbelt: Riparian Wetlands, Intrinsic Values, and Market Failure.	Environment and Planning. Vol. 22. pp. 1375–1388.
Magat *et al*	2000	An Iterative Choice Approach to Valuing Clean Lakes, Rivers, and Streams.	Journal of Risk and Uncertainty. Vol. 21, No. 1. pp. 7–43.
Mitchell & Carson	1981	An Experiment in Determining Willingness to Pay for National Water Quality Improvements.	Preliminary Draft of a report to the U.S. Environmental Protection Agency. Resources for the Future, Inc., Washington, D.C.
Olsen *et al*	1991	Existence and Sport Values for Doubling the Size of Columbia River Basin Salmon and Steelhead Runs.	Rivers. Vol. 2, No. 1. pp. 44–56.
Roberts & Leitch	1997	Economic Valuation of Some Wetland Outputs of Mud Lake.	Agricultural Economics Report No. 381, Department of Agricultural Economics, North Dakota Agricultural Experiment Station, North Dakota State University.
Rowe *et al*	1985	Economic Assessment of Damage Related to the Eagle Mine Facility.	Energy and Resource Consultants, Inc., Boulder, CO.

TABLE X–43.—EXAMPLES OF STUDIES THAT PROVIDE INFORMATION ABOUT USE AND NONUSE VALUES—Continued

Author	Year	Title	Source
Sanders *et al*	1990	Toward Empirical Estimation of the Total Value of Protecting Rivers.	Water Resources Research. Vol. 26, No. 7. pp. 1345–1357.
Sutherland & Walsh	1985	Effect of Distance on the Preservation Value of Water Quality.	Land Economics. Vol. 61, No. 3. pp. 282–291.
Walsh *et al*	1978	Option Values, Preservation Values and Recreational Benefits of Improved Water Quality: a Case Study of the Southe Platte River Basin, Colorado.	EPA–600/5–78–001, Socioeconomic Environmental Studies Series, Office of Research and Development, U.S. Environmental Protection, Research Triangle Park, NC.
Welle	1986	Potential Economic Impacts of Acid Deposition: A Contingent Valuation Study of Minnesota.	Dissertation, University of Wisconsin-Madison.
Whitehead & Groothuis.	1992	Economic Benefits of Improved Water Quality: a case study of North Carolina's Tar-Pamlico River.	Rivers. Vol. 3. pp. 170–178.
Whitehead *et al*	1995	Assessing the Validity and Reliability of Contingent Values: A Comparison of On-Site Users, Off-Site Users, and Non-users.	Journal of Environmental Economics and Management. Vol. 29. pp. 238–251.

The Agency is considering applying the results of this type of review and analysis to estimate nonuse value for aquatic resources potentially affected by impingement and entrainment for the final rule analysis, and recognizes that this approach requires careful accounting of factors that are likely to affect nonuse values of aquatic resources such as the geographic scale of environmental improvements, regional or national importance of the affected resources, and the magnitude of environmental quality changes. The Agency seeks comment on this general approach as well as the applicability and feasibility of estimating nonuse values that are based on (1) a percent or fraction of use values per household (see Section X B 4 of this preamble for summary of methods for assessing recreational use values) and/or (2) specific user and nonuser populations for this rule. The agency also solicits feedback about the studies reviewed by EPA as well as other studies that might be suitable.

b. Meta Analysis

In addition to simply reviewing available information about the relative magnitudes of nonuse and use values, EPA is also considering regression-based meta-analysis of nonuse WTP for water resources. Depending on the suitability of available data, a meta-analysis can provide information on the relative influence of various study, economic, and natural resource characteristics on nonuse willingness to pay. Economic literature characterize meta analysis as a rigorous alternative to the more casual, narrative discussion of research studies which typify many attempts to summarize available information about environmental values. The primary advantage of a regression-based approach is that it may account for differences among study sites that may contribute to changes in nonuse values, to the extent permitted by available data. The following discussion briefly summarizes EPA's approach to this analysis. DCN 5–1011 provides further detail.

The dependent variable in the regression-based meta-analysis may be either the estimated nonuse value or the total value (including use and nonuse value) of aquatic habitat improvements. The total value can be modeled as a function of explanatory variables that include (1) core economic variables and (2) study design effects variables. The core economic variables are used to characterize specifics of the resource(s) valued (*e.g.* whether they are estuarine or freshwater); the geographic scale of resource improvements (*e.g.*, single water body versus multiple water bodies); the estimated use values for environmental quality improvement, quantitative or categorical measures of environmental quality improvements, and survey respondents' characteristics such as mean income of survey respondents. Study design effects characterize the year in which a study was conducted, the elicitation format of the survey (*e.g.*, telephone and mail); the elicitation method (*e.g.*, open ended WTP method). DCN 5–1011 provides information on key variables available from the 18 studies reviewed by EPA.

EPA also notes potential limitations of this approach. Limitations of the regression analysis approach specifically stem from the number of studies that meet criteria for inclusion, the number of variables that could be included in the regression analysis (which depends on the number of and information available from the original studies), as well as degrees of freedom and statistical significance. For example, study differences often prevent the use of a single measure of the degree of environmental quality improvements. Prior meta-analyses of this type, including Woodward and Wui (2000) and Poe *et al.* (2001), lack a continuous and quantified measure of environmental quality improvement. The use of other economic variables that might be desirable from a theoretical perspective (*e.g.*, information on substitute goods) may complicate extraction of suitable data from the underlying studies. EPA also recognizes that clear and objective criteria are needed to determine which studies are suitable for inclusion in meta analysis; criteria should acknowledge issues related to potential bias associated with stated preference studies, and steps that the researchers should take to minimize bias, as noted in Section X B 1 of this preamble. One key challenge of both of the approaches discussed in this section is to determine the applicability of study results to the policy case of interest (*i.e.*, fish impacts due to impingement and entrainment in this rule) because of significant variations in study objectives and methodologies. The use (and interpretation) of the value estimates to predict WTP in specific cases will follow the methodologies from the benefits transfer literature (*e.g.*, Vandenberg *et al.* 2001; Desvousges *et al.*, 1998).

EPA seeks comments on appropriateness of the meta-analysis approach for calculating nonuse values for aquatic habitat improvements associated with reduced impingement and entrainment in this rule.

F. Regional-Level Benefit Cost Analysis

This section presents EPA's estimates of the total monetary value of the baseline impingement and entrainment losses at cooling water intake structures located in the North Atlantic and Northern California study regions. A comprehensive estimate of the value of the resource should include both use and nonuse values. However, EPA was able to estimate nonuse values for the North Atlantic region only due to data limitations. ''Nonuse values, like use values, have their basis in theory of individual preferences and the measurement of welfare changes. According to theory, use values and nonuse values are additive'' (M. Freeman, 1993). The following sections present the estimated monetary value of impingement and entrainment losses under the baseline scenario and the estimated impingement and entrainment reduction benefits under the preferred option for the two study regions. The Agency, however, points out the estimate of benefits for the Northern California region is incomplete and includes recreational and commercial fishing benefits only.

1. Benefit-Cost Analysis of the Preferred Option for the North Atlantic Region

a. Total Monetary Value of Baseline Impingement and Entrainment Losses in the North Atlantic Region

Table X–44 presents EPA's estimates of the total value of baseline impingement and entrainment losses at cooling water intake structures in the North Atlantic region. The estimated nonuse value of fishery resources lost to impingement and entrainment ranges from $75.64 million to $139.92 million per year (2002$). Note that EPA has provided two different estimates of total value in Table X–44. The first total value is the sum of aggregate use value and the nonuse component of restoration-based value. The second total value (*i.e.*, restoration-based total value) is simply the total value (including nonuse) for SAV and wetland restoration acres as presented in Section X E d of this preamble. The estimated total value of impingement and entrainment losses in the North Atlantic region ranges from $79 to $143 million (2002$) per year when commercial/recreational use values are added to the nonuse component of restoration-based values. The total value based on the total restoration-based value is similar in range ($79 to $148 million).

TABLE X–44.—ANNUAL VALUE OF BASELINE LOSSES FROM IMPINGEMENT AND ENTRAINMENT IN THE NORTH ATLANTIC REGION (MILLIONS 2002$)

	Before discounting		Discounted using 3% discount rate		Discounted using 7% discount rate	
	Low	High	Low	High	Low	High
Use Value of Resources Lost						
Commercial Use [a,b]	$0.28	$0.28	$0.24	$0.24	$0.20	$0.20
Recreational Use [a,b]	3.07	3.07	2.64	2.64	2.25	2.25
Aggregate Use Benefits	3.36	3.36	2.88	2.88	2.45	2.45
Nonuse Value of Resources Lost [c]						
Restoration-based nonuse value	75.64	139.92	75.64	139.92	75.64	139.92
Total Monetary Value of Resources Lost						
Total value (aggregate use + restoration-based nonuse)	79.00	143.28	78.52	142.80	78.09	142.37
Restoration-based total value [d]	79.21	148.25	79.21	148.25	79.21	148.25

Note: Sum of components may not equal totals due to rounding.
[a] Welfare losses represent losses due to both impingement and entrainment because recreational estimates cannot be presented separately for these categories. Commercial/recreational use values are annual values derived in Section X C.
[b] Commercial and recreational losses are presented undiscounted, and discounted at 3% and 7%. There are no low or high estimates for welfare losses.
[c] Nonuse values are not discounted. Values are based on nonuse values for SAV and wetland restoration for the populations in counties abutting affected water bodies. Low values assume lower bound restoration acreage and high values assume upper bound restoration acreage amounts (see Section X E d of this preamble).
[d] Total monetary value based on total values associated with restoration is not discounted (see Section E.2 for detail).

b. Estimated Benefits and Costs of the Preferred Option

Table X–45 presents the total annual costs of the preferred regulatory option for the North Atlantic region. The estimated pre-tax cost for facilities located on estuaries or tidal rivers is $17.58 million and, for ocean-located facilities, $0.57 million. The total annual cost is $18.15 million.

TABLE X–44.—TOTAL ANNUAL COSTS FOR THE NORTH ATLANTIC REGION (PRE-TAX) AS OF 2005 (IN 2002$, MILLIONS)

	Estuary/Tidal/ Total River	Ocean	Total
North Atlantic	$17.58	$0.57	$18.15

Table X–46 presents EPA's estimates of the total benefits from impingement and entrainment reduction in the North Atlantic region under the preferred option. The estimated impingement and entrainment reduction benefits under the preferred option range from $14.84 to $28.57 million per year (2002$).

Combining the estimated cost and benefit values, the estimated net benefits of installing the preferred option range from negative $3.31 million to positive $10.42 million (2002$).

TABLE X–46.—ANALYSIS OF COSTS AND BENEFITS OF THE PREFERRED OPTION FOR THE NORTH ATLANTIC REGION (MILLIONS 2002$)

	Before discounting		Discounted using 3% discount rate		Discounted using 7% discount rate	
	Low	High	Low	High	Low	High
Annual Use Benefits						
Commercial [a,b]	$0.08	$0.08	$0.07	$0.07	$0.06	$0.06
Recreational [a,b]	0.88	0.88	0.76	0.76	0.65	0.65
Aggregate Use Benefits	0.96	0.96	0.83	0.83	0.71	0.71
Annual Nonuse Benefits [c]						
Restoration-Based Nonuse Benfits [d]	14.17	26.87	14.17	26.87	14.17	26.87
Total Annual Benefits						
Total Benefits (aggregate use + restoration-based non-use values)	15.13	27.83	15.00	27.70	14.88	27.58
Total Restoration-based Benefits [d]	14.84	28.57	14.84	28.57	14.84	28.57
Annualized Costs						
Total Costs	18.15	18.15	18.15	18.15	18.15	18.15
Net Annual Benefits (Benefits—Costs)						
Net Benefits	(3.02)	9.68	(3.15)	9.55	(3.27)	9.43
Restoration-based Net Benefits	(3.31)	10.42	(3.31)	10.42	(3.31)	10.42

Note: Sum of components may not equal totals due to rounding.
[a] Welfare losses represent losses due to both impingement and entrainment because recreational estimates cannot be presented separately for these categories. Commercial/recreational use values are annual values derived in Section X C.
[b] Commercial and recreational losses are presented undiscounted, and discounted at 3% and 7%. There are no low or high estimates for welfare losses.
[c] Nonuse values are not discounted. Values are based on nonuse values for SAV and wetland restoration for the populations in counties abutting affected water bodies. Low values assume lower bound restoration acreage and high values assume upper bound restoration acreage amounts (see Section X E d of this preamble).
[d] Total monetary value based on total values associated with restoration is not discounted (see Section E.2 for detail).

2. Benefit-Cost Analysis of the Preferred Option for the Northern California Region

a. Total Monetary Value of Baseline Impingement and Entrainment Losses in the Northern California Region

Table X–47 presents EPA's estimates of the monetary value of baseline impingement and entrainment losses at cooling water intake structures in the Northern California region. As noted above, EPA did not estimate nonuse values of impingement and entrainment losses for the Northern California region analysis; data aren't available to support use of the restoration-based approach for the North California region. The estimated use value of fishery resources lost to impingement and entrainment in the Northern California region ranges from $1.1 million to $1.49 million per year (2002$).

TABLE X–47.—ANNUAL VALUES OF THE BASELINE FISHERY LOSSES FROM IMPINGEMENT AND ENTRAINMENT IN THE NORTHERN CALIFORNIA REGION (MILLIONS 2002$)

	Before discounted	Discounted using 3% discount rate	Discount using 7% discount rate
Use Value of the Resources Lost			
Commercial Use [a b]	$0.06	$0.05	$0.05
Recreational Use [a b]	1.43	1.22	1.05
Total Use Benefits	1.49	1.27	1.10

Note: Sum of components may not equal totals due to rounding.
[a] Welfare losses represent losses due to both impingement and entrainment because recreational estimates cannot be presented separately for these categories.
[b] Commercial and recreational losses are presented undiscounted, and discounted at 3% and 7%. There are no low or high estimates for welfare losses.

b. Estimated Benefits and Costs of the Preferred Option for the Northern California Region

Table X–48 presents the total annual costs of the preferred regulatory option for the Northern California region. The estimated pre-tax cost for facilities located on estuaries or tidal rivers is $6.6 million and, for ocean-located facilities, $13.5 million. The total annualized cost is $20.1 million.

TABLE X–48.—TOTAL ANNUAL COSTS FOR THE NORTHERN CALIFORNIA REGION (PRE-TAX) AS OF 2005 (IN 2002$, MILLIONS)

	Estuary/ Tidal River	Ocean	Total
Northern California	$6.60	$13.50	$20.10

Table X–49 presents EPA's estimates of the total use benefits from impingement and entrainment reduction at cooling water intake structures in the Northern California region under the preferred option. The estimated use benefits of impingement and entrainment reduction under the preferred option range from $0.62 to $0.81 million per year (2002$), depending on the factor for discounting the use value of lost resources. EPA did not estimate net benefits in CA due to the lack of information on nonuse.

TABLE X–49.—ANALYSIS OF COSTS AND BENEFITS OF THE PREFERRED OPTION IN THE NORTHERN CALIFORNIA REGION (MILLIONS 2002$)

	Before discounting	Discounted using 3% discount rate	Discounted using 7% discounted rate
Annual Use Benefits			
Commercial [a b]	$0.02	$0.02	$0.02
Recreational [a b]	0.79	0.66	0.60
Total Use Benefits	0.81	0.68	0.62
Nonuse Benefits	([c])		
Annualized Costs			
Total Costs	20.10	20.10	20.10
Net Annual Benefits (Benefits—Costs)			
Total Net Benefits	([c])	([c])	([c])

Note: Sum of components may not equal totals due to rounding.

[a] Welfare losses represent losses due to both impingement and entrainment because recreational estimates cannot be presented separately for these categories.

[b] Commercial and recreational losses are presented undiscounted, and discounted at 3% and 7%. There are no low or high estimates for welfare losses.

[c] Not estimated.

G. Break-Even Analysis

Estimating nonuse values is an extremely challenging and uncertain exercise, particularly when primary research using stated preference methods is not a feasible option (as is the case for this rulemaking). In the preceding section, EPA described possible alternative approaches for developing nonuse benefit estimates based on benefits transfer and associated methods. Due to the uncertainties of providing estimates of the magnitude of nonuse values associated with the regulation, this section provides an alternative context with which to consider the potential magnitude of nonuse values. The approach used here applies a ''break-even'' analysis to identify what nonuse values would have to be in order for the proposed option to have benefits that are equal to costs.

The break-even approach uses EPA's estimated commercial and recreational use benefits for the rule and subtracts them from the estimated annual costs. The resulting ''net cost'' enables one to work backwards to estimate what nonuse values would need to be (in terms of willingness to pay per household per year) in order for total annual benefits to equal annualized costs. Table X–50 provides such an assessment for the marine resources impacted in the two regions for which commercial and recreational benefit estimates are available to date. The table shows the values using a seven percent discount rate.

TABLE VII–50.—IMPLICIT NON-USE VALUE—BREAK-EVEN POINTS FOR REGIONAL BENEFIT-COST ANALYSIS, USING A 7% DISCOUNT RATE

Study region	Use benefits [1]	Compliance costs [1]	Net costs [2]	Number of households (millions) [3]	Break-even nonuse WTP per household
North Atlantic	$0.70	$18.15	$17.45		
Abutting Counties				3.65	$4.78
Within 32.4 Diles				4.20	4.15
Statewide				5.14	3.39
Northern California	0.64	20.10	19.46		
Abutting Counties				2.38	8.18
Within 32.4 Miles				2.50	7.78
All N. CA Counties				4.99	3.90
Statewide				11.51	1.69

[1] Millions of 2002$s per year, from 2/19/03 NODA: Tables X–53 and X–56

[2] Annualized compliance costs minus annual use benefits only (millions 2002$s)

[3] Millions of households:(a) in abutting counties only (b) within 32 miles of impacted marine resources, (c) and (d) statewide (or, for northern half of CA). Sources: US Census 2000 (BLS): http://factfinder.census.gov;

[4] Dollars per household per year that, when added to use benefits, would yield a total annual benefit (use plus nonuse) equal to the annualized costs.

As shown in Table X–50, nonuse values per household for the affected marine resources in the region would have to amount to at least $4.78 per year to residents in the North Atlantic region—if assuming that only households in abutting counties have nonuse values for the affected marine resources—in order for the proposed option to have total benefits (annual use plus nonuse values) that would equal or exceed the estimated annual compliance costs for the proposed option. For households within 32.4 miles of the impacted resources, nonuse values would have to equal $4.15 per year to have total benefits equal the costs of the proposed option. If nonuse values are considered for all households in the coastal states of the region (CT, ME, MA, NH, and RI), then the break-even nonuse value would need to be only $3.39 per household.

For the Northern California region, the ''break-even'' nonuse willingness to pay (WTP) per household would need to be $8.18, based solely on households in coast-abutting counties only. For households within 32.4 miles of the impacted resources, nonuse values would have to equal $7.78 per year to have total benefits equal the costs of the proposed option. This level of break-even nonuse value would decline to $3.90 if all households in the northern part of California are considered, and declines further to $1.69 per household per year if the costs are spread over all households statewide.

While this approach of backing out the ''breakeven'' nonuse value per household does not directly answer the question of what nonuse values might actually be worth for the 316b rulemaking, these results do frame the question with a useful perspective that appeals to common sense and facilitates policy-making decisions. The break-even approach poses the question: ''are the implicit non-use WTP estimates per household at plausible levels, given empirical evidence available from the existing body of empirical research?''. EPA requests comment on whether these values are plausible as an average across all households in the target area, and data or research that addresses this question.

XI. Implementation and Other Regulatory Refinements

A. Definition and Methods for Determining the ''Calculation Baseline''

EPA received a number of comments on the definition and methods associated with the calculation baseline during the comment period for the proposed Phase II rule. This calculation baseline sets a hypothetical baseline against which compliance with the proposed technology-based performance standards in § 125.94 is determined (see 67 FR 17176). The calculation provides facilities a consistent basis for determining compliance and allows them to take credit for fish protection technologies already in place at their facility. EPA proposed in § 125.93 (see 67 FR 17221) that the ''*calculation baseline* was an estimate of impingement mortality and entrainment that would occur at your site assuming you had a shoreline cooling water intake structure with an intake capacity commensurate with a once-through cooling water system and with no impingement and/or entrainment reduction controls.'' Some commenters stated that, in general, the proposed definition was too vague. They added that the regulated industry as well as the permitting authority would be better served if there were more specific design criteria included in the definition. In response to these comments, EPA is considering and is requesting comments on adding the following specifications to the definition:

- Baseline cooling water intake structure is located at, and the screen face is parallel to, the shoreline. EPA is considering that it may be appropriate to allow credit in reducing impingement mortality from screen configurations that employ angling of the screen face and currents to guide organisms away from the structure before they are impinged.
- Baseline cooling water intake structure opening is located at or near the surface of the source waterbody. This may be appropriate to allow credit in reducing impingement mortality or entrainment due to placement of the opening in the water column.
- Baseline cooling water intake structure has a traveling screen with the standard ⅜ inch mesh size commonly used to keep condensors free from debris. This would allow a more consistent estimation of the organisms that are considered ''entrainable'' vs. ''impingeable'' by specifying a standard mesh size that can be related to the size of the organism that may potentially come in contact with the cooling water intake structure.
- Baseline practices and procedures are those that the facility would maintain in the absence of any operational controls implemented in whole or in part for the purpose of reducing impingement mortality and entrainment. This would recognize and provide credit for any operational measures, including flow or velocity

reductions, a facility had adopted that reduce impingement mortality or entrainment.

If all of the above specifications are determined to be appropriate for the baseline cooling water intake structure that is used to determine the calculation baseline, EPA would modify the regulatory definition at proposed § 125.93 to read as follows:

Calculation baseline means an estimate of impingement mortality and entrainment that would occur at your site assuming (1) the cooling water system has been designed as a once-through system; (2) the opening of the cooling water intake structure is located at, and the face of the standard 3⁄8-inch mesh traveling screen is oriented parallel to, the shoreline near the surface of the source waterbody; and (3) the baseline practices and procedures are those that the facility would maintain in the absence of any operational controls, including flow or velocity reductions, implemented in whole or in part for the purposes of reducing impingement mortality and entrainment.''

EPA also considered whether basing the calculation baseline on a shoreline intake would penalize facilities with constructed waterways such as intake canals or intake bays, if these configurations had a higher potential for impingement and entrainment than a ''shoreline'' intake located on the open waterbody. Basing calculations on this hypothetical open waterbody intake could potentially result in such facilities having to reduce impingement and entrainment by more than the specified performance ranges. This is not EPA's intent. Rather, facilities should demonstrate they have (or will) reduce impingement mortality or entrainment by the percentages established in the proposed performance ranges when compared to an intake at which no measures have been taken to reduce impingement mortality and entrainment. In the case of an intake located on the ''shoreline'' of an intake canal or intake bay, EPA would consider the intake's location on the constructed waterway to be the shoreline for purposes of the calculation baseline.

EPA solicits comment on these design specifications for inclusion or exclusion in the definition of the calculation baseline. In particular, EPA is interested in whether it would be redundant to include all of the hypothetical design criteria. EPA requests comments on any other design criteria that may be appropriate to set a consistent and reproducible baseline upon which to determine compliance with the proposed performance standards. EPA also requests comment on whether these design criteria will provide the intended credit in the compliance analyses to those facilities which have implemented technologies or operational measures that reduce impingement mortality and/or entrainment, without creating unintended consequences such as the opportunity to seek credit for hypothetical ''reductions'' from unreasonable claims regarding baseline operational measures.

One commenter suggested that determination of the calculation baseline for entrainment be supplemented with an optional alternative, ''As Built'' approach. Under this approach, a facility would determine the baseline for calculating entrainment reduction by either: (1) Using actual historical measurements of entrained organisms before installation of the new intake technology; or (2) sampling immediately in front of the new technology and enumerating organisms of a size that will pass through a standard 3⁄8-inch screen. To determine entrainment reduction, the facility would then sample and enumerate entrained organisms behind the new technology or at the outfall. This second option would eliminate the need for predictive estimates of baseline entrainment occurring at a facility and would not require collection of historical data nor the use of estimations that may increase uncertainty.

Potential benefits cited for using this alternative ''As Built'' approach for estimating compliance with performance included that (1) the facility would demonstrate entrainment reductions directly in an easily verifiable manner that does not rely on hypothetical calculations; (2) facilities could install new technologies sooner than they would under the other calculation baseline approach, because pre-deployment studies would not be necessary; and (3) the baseline numbers would be actual samples of entrained or entrainable organisms. EPA requests comments on providing this approach as an optional alternative for determining the calculation baseline for entrainment.

It should be noted that the commenter states that the ''As Built '' approach for determining the calculation baseline would not be appropriate for impingement as it is highly species-specific and life-stage specific with no reliable way to measure ''impingeable'' organisms outside of the cooling water intake structure. The commenter suggests that to determine the calculation baseline for impingement mortality the only valid approach would be to collect samples before the new intake technology is deployed so that the baseline impingement (pre-deployment) can be compared to the post-deployment impingement to estimate the percent reduction in impingement mortality attributable to the technology. EPA requests additional comment on the applicability of an ''As Built'' approach to estimate the calculation baseline for impingement mortality.

The proposed Phase II preamble language (see 67 FR 17176) stated that the calculation baseline could be estimated by evaluating existing data from a nearby facility. Some commenters requested that the calculation baseline be allowed to be estimated using data from facilities that are not located nearby or that are located on another waterbody as long as the two facilities had closely comparable environmental conditions including similar locations and similar species that would be impinged and entrained. These same commenters also requested that the proposed rule retain flexibility for the facility in choosing the location of the hypothetical shoreline intake as long as the location is one where an intake might have been placed in the exercise of sound engineering judgment, without regard for fish protection. Another commenter stated that assessing the mere presence or absence of organisms at a nearby facility or in the same waterbody may not accurately characterize the potential for impingement and entrainment at a future cooling water intake structure. This commenter also indicated that site-specific interactions of organisms with the hydrology of the source waterbody and the cooling water intake structure configuration would confound the assessment and that composition and abundance of impingement of organisms can be very different for two cooling water intake structures located close to one another.

EPA requests additional comment on the appropriateness of allowing facilities to define the calculation baseline using data from other facilities, what types of other facilities might be appropriate for this purpose, and whether the variability introduced due to site-specificity is greater than that due to normal fluctuations in natural systems.

B. Options for Evaluating Compliance With Performance Standards

EPA received numerous comments requesting clarification on how compliance with the proposed performance standards for reducing impingement mortality by 80–95% and entrainment by 60–90% would be determined. For both impingement mortality and entrainment, EPA is evaluating two basic methods for determining a percent reduction: (1) Consideration of all fish and shellfish species that have the potential to be impinged or entrained, or (2) consideration of fish and shellfish from only a subset of species determined to be representative of all the species that have the potential to be impinged or entrained. For either approach, species impinged or entrained may be measured by counting the total number of individual fish and shellfish, or by weighing the total wet or dry biomass of the organisms. These approaches are described in more detail below. EPA invites comments on these approaches and whether EPA should require facilities to use a specific method or only provide guidance.

All Species Approach

For determining compliance with the impingement mortality and entrainment standards, EPA is considering requiring that all species of fish and shellfish present at the cooling water intake structure and having the potential to be impinged be included in the measurement. Under this approach, the permittee would measure either the total number or the total biomass of the fish and shellfish impinged (without regard to their taxonomic grouping) and use this number to compare to the calculation baseline to determine compliance with the impingement mortality reduction performance standards. This approach would be the simplest conceptually to implement since only the total number or mass of impinged organisms would need to be measured. However, this approach would have the limitation that information on efficacy of the technology related to each species would not be collected, and all species would be treated as equivalent, without regard to their relative ecological, economic, recreational, or cultural importance.

EPA is similarly considering requiring that entrainment losses also be measured by counting the total numbers of organisms entrained. This approach has been commonly used in freshwater rivers and streams and produces either a total number of undifferentiated eggs and larvae entrained, or an identification of the entrained eggs and larvae by species or family. Several commenters emphasized that a permittee should not be required to prove reduced entrainment of every entrained species by at least 60 percent. These commenters also stated that the difficulty and cost of taxonomic classifications makes species-specific monitoring unreasonable, and that classification is not possible for early life stages of some species.

If EPA were to require the use of an approach that considers the total number of all fish and shellfish that have the potential to be impinged or entrained, regardless of species, language similar to the following would be added at proposed § 125.94(b)(5):

(5) Compliance with impingement mortality and entrainment performance standards in paragraphs (b)(1) through (4) above must be determined based on a comparison of the enumeration of all fish and shellfish impinged and killed and entrained with those estimated to be impinged and killed and entrained at the calculation baseline.

EPA requests comment on the approach of enumerating all fish and shellfish, regardless of their taxonomy in determining compliance with the performance standards for impingement mortality and entrainment and the regulatory language above. EPA is also accepting comment on the advantages and disadvantages of using the absolute number of organisms impinged or entrained as opposed to using wet or dry total weights of biomass.

For measuring compliance with the entrainment reduction performance standard, several commenters suggested that the entrained biomass could be measured by collecting entrained organisms from the outfall or other appropriate monitoring location where a representative sample can be taken. This mass would then be compared to the mass of eggs and larvae that would have been entrained at the calculation baseline to determine if there is a 60 percent reduction or better. However, EPA is concerned that if a facility uses biomass, the weights may not be substantial enough to yield useable data since most entrained organisms are at the egg or larval stage. EPA requests comment on the feasibility of using biomass for measuring compliance with the entrainment reduction standard.

Representative Species Approach

Another approach to determine compliance with the impingement mortality and entrainment performance standard involves considering a subset of the species that are representative of all species that are susceptible to impingement or entrainment in the waterbody that needs to be protected. This approach would require the permittee to identify representative important/indicator species (RIS), as opposed to considering all species present at the cooling water intake structure, for use in calculating compliance with the performance standards. If this approach were allowed, EPA is considering requiring that the list of RIS be developed by the facility, in consultation with the Director and Federal, State and Tribal fish and wildlife management agencies using available data. EPA might also require the concurrence of the Director.

Historically, the term RIS has been defined in different ways. EPA's 1977 Draft Guidance for Evaluating the Adverse Impact of Cooling Water Intake Structures on the Aquatic Environment: Section 316(b) P.L. 92–500 uses the concept of ''critical aquatic organisms.'' This term is used in a manner similar to RIS. The 1977 Guidance states that ''critical aquatic organisms'' are ''those species which would be involved with the intake structure and are: (1) Representative, in terms of their biological requirements, of a balanced, indigenous community of fish, shellfish, and wildlife; (2) commercially or recreationally valuable (*e.g.*, among the top ten species landed—by dollar value); (3) threatened or endangered; (4) critical to the structure and function of the ecological system (*e.g.*, habitat formers); (5) potentially capable of becoming localized nuisance species; (6) necessary, in the food chain, for the well-being of species determined in 1–4; (7) one of 1–6 and have high potential susceptibility to entrapment-impingement and/or entrainment; and (8) critical aquatic organisms based on 1–7, are suggested by the applicant, and are approved by the appropriate regulatory agencies '' (see DCN 4–0006).

In EPA's section 316(a) regulations, the term ''representative important species (RIS)'' is used and defined as ''species which are representative, in terms of their biological needs, of a balanced, indigenous community of shellfish, fish and wildlife in the body of water into which a discharge of heat is made'' (see 40 CFR 125.71). Under these same regulations, the term ''balanced, indigenous community'' is defined as ''a biotic community typically characterized by diversity, the capacity to sustain itself through cyclic seasonal changes, presence of necessary food chain species and by lack of domination by pollutant tolerant species.''(See 40 CFR 125.71). The section 316(a) regulations require that in selecting RIS, special consideration be given to species mentioned in applicable water quality standards. It further requires that after the discharger submits its detailed plan of study, the Director either approve the plan or specify any necessary revisions to the plan (see 40 CFR 125.72).

Other entities, including some States, use the concept of RIS defined as those species selected by a discharger and approved by the state that exhibit one or more of the following characteristics: Species that are sensitive to adverse harm from operations of the facility (for example, heat-sensitive species); species that use the local area as spawning or nursery grounds, or both, including those species that migrate past the facility to spawn; species of commercial or recreational value or both; species that are habitat formers and are critical to the functioning of the local ecosystem; species that are important links in the local food web; rare, threatened, or endangered species; or potential nuisance organisms likely to be enhanced by plant operations. In some cases, the permitting authority allows the permittee to identify RIS on a site-specific basis (see State of Maryland comments on proposed Phase II rule).

EPA is considering an approach that employs a RIS or ''critical aquatic organisms'' approach to determine compliance with the impingement mortality performance standards. Facilities would be required to identify all species being impinged (or having the potential to be impinged) by the cooling water intake structure. From that total list of species, the facility would then choose a limited number of organisms based on a definition of ''critical aquatic organisms'' provided in the regulations. EPA requests comment on whether 10 to 15 species might be an appropriate number to protect the types of species and ecosystem functions discussed in the above discussions of representative indicator species and critical aquatic organisms. EPA is considering using the same term ''critical aquatic organisms'' since it has been associated with section 316(b) requirements in the past. EPA is concerned that the RIS term, which has been used in other regulatory programs, may have conflicting programmatic issues and definitions associated with it that could not be anticipated. EPA would consider using the portions of the above language from the definition provided in the 1977 Guidance as it provides a reasonable, but flexible, framework for determining a list of fish and shellfish that are representative of all the species that have the potential to be impinged or entrained at cooling water intake structures. Changes to the language above might include modifying criteria number 8 to require the following:

(8) critical aquatic organisms based on 1–7, are developed by the applicant, with the concurrence of the Director and in consultation with Federal, State, and Tribal fish and wildlife management agencies with responsibility for fisheries and wildlife.

The definition would be added to the proposed rule at § 125.93. As discussed above, EPA is also considering a consultation role for the Director rather than one of concurrence.

Compliance with the impingement mortality and entrainment performance standards could then be measured by either counting the total number of individuals of all the critical aquatic organisms impinged and killed or entrained, or by measuring the total biomass (wet or dry) of the critical aquatic organisms impinged and killed or entrained. This value would then be compared to the calculation baseline to determine compliance with the performance standard.

EPA is also considering two options for making the compliance determination using the critical aquatic organism approach. The first option would be to determine compliance based on a total enumeration of individuals from all of the listed critical aquatic organism species, and the second option would be to base compliance on a separate analysis to determine the reduction in impingement mortality and entrainment for each species. If this critical aquatic organism approach is used, EPA might adopt regulatory language at § 125.94(b)(5) for Option 1 as follows:

(5) Compliance with the applicable impingement mortality and entrainment performance standards in paragraphs (b)(1) through (4) above must be determined based on a comparison of the enumeration of individuals from all of the listed critical aquatic organism species impinged and killed and entrained with the total number of listed critical aquatic organism species estimated to be impinged and killed and entrained at the calculation baseline.

If this critical aquatic organism approach is used for Option 2, EPA might adopt regulatory language at § 125.94(b)(5) for Option 2 as follows:

(5) Compliance with the applicable impingement mortality and entrainment performance standards in paragraphs (b)(1) through (4) above must be determined based on a comparison of the enumeration of individuals from each of the listed critical aquatic organism species impinged and killed and entrained with each of those estimated to be impinged and killed and entrained at the calculation baseline.

EPA invites comments on the use of critical aquatic organism approach, the above definition for critical aquatic organisms, the above regulatory language above, and the two options (a total enumeration of all organisms from the critical aquatic organism species or a separate analysis for each species) for determining compliance with the impingement mortality and entrainment performance standards. In addition to the potential refinements discussed above EPA is also considering and requests comment on whether the Agency should allow the Director to determine how best to measure compliance, either programmatically or as part of individual permit decisions.

EPA recognizes that a challenge in determining compliance with both the impingement mortality and entrainment performance standards is how to address the number of moribund or dead fish that wash up against the intake structure or become entrained. Under ideal circumstances, fish that were previously injured or killed from weather-related phenomena, or other episodic fish kills, would be removed from the measurement in order to more accurately determine the control technology performance. To ensure consistency with the use of the term moribund among permittees, EPA is considering adding the following definition of moribund (A Dictionary of Ecology, Evolution, and Systematics, Cambridge University Press, 1982) to § 125.93:

Moribund means dying; close to death.

EPA is considering placing in the regulatory language the ability for a facility to take into account moribund fish and shellfish for determining compliance with the impingement mortality and entrainment performance standard using actual or historical data (if representative of current conditions). If EPA allowed the exclusion of already moribund fish and shell fish in determining compliance with the performance standards, the Agency might adopt regulatory language at § 125.94(b)(5) as follows:

(5) Compliance with the applicable impingement mortality and entrainment performance standards in paragraphs (b)(1) through (4) above must be determined based on a comparison of * * *. The number of moribund organisms that were previously injured or killed prior to encountering the intake structure must be removed from the calculation if data are available.

EPA invites comments on including this regulatory language in the regulation at § 125.94 to allow facilities to exclude already moribund fish and shellfish, if data are available. EPA also invites comment on whether a facility should have the opportunity to remove the number of moribund organisms from the calculation but not be required to do so (as in the sample regulatory language above).

Other Issues

To calculate the mass of organisms entrained for the calculation baseline facility and the existing plant with new intake technology installed, several commenters proposed the following approach: The entrained biomass could be measured by sampling the waterbody near the intake (the hypothetical shoreline intake for the baseline plant and the existing or relocated intake for the future complying plant). To calculate the mass of organisms that would be entrained both by the hypothetical shoreline intake without any protective technology and by whatever new proposed intake technologies are being assessed, the density of entrainable organisms present in the samples would be used (number/volume). An important consideration in evaluating entrainment is the element of time, *i.e.*, the density of entrainable organisms will fluctuate. EPA is soliciting comment on the use of total biomass or density in predicting or determining the entrainment reduction that would occur at a cooling water intake structure.

EPA received numerous comments requesting clarification of the averaging period for determining the percent reduction required by the impingement mortality and entrainment performance standards. The commenters stated that due to significant natural temporal and spatial variability in fish abundance and distribution, a short-term averaging period may not be appropriate. Entrainment may be near zero during months when there are no entrainable organisms near the intake. Additionally, the density of aquatic populations varies naturally over the longer term. Some commenters suggested that the averaging period for determining reductions should be two to five years to verify that the technology is achieving reductions within the ranges specified for the performance standards. This could involve measuring the percent reductions over the entire monitoring period. EPA is considering specifying an averaging time for determining compliance with performance standards over 1 year, 3 years, or a running average over the entire permit term (5 years). In addition, EPA is considering requiring the use of basic arithmetic means as the averaging methodology. EPA is requesting comment on the time frames and averaging method discussed above. In addition, EPA requests comment on the appropriate methodology for determining the averaging period. EPA is also considering leaving it to the Director to determine appropriate averaging periods and methodologies, either programmatically or on a site-specific basis, and requests comment on this approach.

C. Compliance Timelines, Schedules, and Determination

The proposed rule states that Phase II existing facilities would have to comply with the proposed rule requirements when a NPDES permit containing requirements consistent with the proposed Subpart J requirements is issued to the facility (see proposed § 125.92). Under existing NPDES program regulations, this would occur following publication of the final rule when an existing NPDES permit is reissued, or when an existing permit is modified, or revoked and reissued. EPA is considering options that would require full compliance with the rule after the effective date, similar to what EPA did in the Concentrated Animal Feeding Operations Rule, to the extent the best technologies will not be available immediately after promulgation of the final rule. As discussed below, the nature of this regulation is such that facilities may need to test and verify the efficacy of the technology option that they choose. (68 FR 7176, 7214 Feb. 12, 2003). EPA requests comment on this approach.

Commenters raised numerous issues regarding the proposed implementation and compliance schedules. Key comments include concern that the proposed rule does not provide sufficient time for permittees to develop necessary information, prepare the permit application, and come into compliance; suggestions that each permit renewal need not encompass a complete re-application and re-development of the permit; questions regarding how the proposed requirements will be enforced (*i.e.*, what constitutes compliance); and a general request for additional clarification about implementation timing issues (*e.g.*, effective date).

Several commenters indicated that the proposed requirement to submit data associated with the Comprehensive Demonstration Study at least 180 days prior to permit renewal is unrealistic. These commenters indicated that sufficient time is needed to collect data and prepare the permit application, as well as to design and test equipment. Commenters suggested various means by which time could be built into the implementation schedule, including allowing for the use of compliance schedules, phased compliance requirements, and providing a fixed period of time for facilities to evaluate how they will comply and submit an application.

The proposed 180-day requirement is based on the existing NPDES permit program requirement for renewal of existing permits (40 CFR 122.21(d)(2)). EPA proposed this time period, in part, to ensure consistency with the existing NPDES program. The 180-day time period ensures that permit writers have sufficient time to review NPDES permit applications, which for Phase II existing facilities will often be complex and include considerable amounts of information.

Some commenters have suggested EPA allow for the use of compliance schedules for Phase II existing facilities to conform to newly promulgated section 316(b) requirements. NPDES regulations at § 122.47 allow for the use of compliance schedules in NPDES permits by allowing permittees additional time to achieve compliance with the CWA and applicable regulations. Examples of situations where compliance schedules have been used include, but are not limited to, where new or revised effluent limitations guidelines were promulgated prior to 1989, or where new water quality standards are developed. EPA believes that the use of compliance schedules in the context of section 316(b) warrants consideration because such schedules are intended to allow permittees additional time where it clearly is necessary to achieve compliance. Compliance schedules, in association with the proposed Phase II regulations, would allow facilities whose NPDES permit would be reissued within the first few years after promulgation, additional time during the term of the permit to collect the information needed for the analyses required for the permit application, and/or to design, install, and optimize technologies to meet the performance standards. For example, facilities that would be issued a revised NPDES permit six months after the Phase II rule was published may not have provided the Director with information on their cooling water intake structure, and even if they had, it may not have contained the regulation-specific information such as the Impingement Mortality and Entrainment Characterization Study, the Design and Construction Technology Plan, or the Verification Monitoring Plan. In addition, the facility may not have assessed feasibility and certainly would not have begun construction of technologies. Use of compliance schedules under the NPDES permit program would require that the permit writer develop a schedule that is reasonable and that will ensure that the facility is brought expeditiously towards compliance.

Some commenters suggested that EPA provide for a delayed or phased compliance date that would allow Phase II existing facilities to have, at least, a specified, minimum period of time to conduct their study and implement appropriate technologies. Commenters questioned whether facilities with permit renewal dates shortly after the Phase II rule becomes final would have sufficient time to conduct the required characterization studies and implement enhanced control technologies. As a result, they suggested that some specified period of time be provided to all Phase II existing facilities under the rule. Generally, suggestions regarding the specific amount of time necessary ranged from two or three years to a full 5-year permit term (*i.e.*, allow applicants to collect data and perform analyses within the term of the permit).[27]

EPA is considering and requests comment on whether the final rule should allow facilities required to apply for a permit renewal shortly after promulgation of the Phase II rule additional time to complete the studies associated with submitting a permit application. EPA is considering the following options: (1) Allowing applicants whose permits must be renewed in the first year after promulgation of the Phase II rule to submit application materials required by the Phase II rule one year after their current permit expires; and (2) allowing a two-year extension in the deadline for submitting Phase II application materials.

Commenters also questioned whether the study and data requirements specified under the proposed Phase II rule will be fully applicable to all subsequent 316(b) permit renewals for a given facility (*i.e.*, the second, third, or subsequent rounds of 316(b) permit renewals that take place following publication of the final Phase II rule). Some suggested that neither the preamble nor the proposed rule covering the Comprehensive Demonstration Study make clear whether the information required to be submitted is required with each NPDES permit renewal. Generally, commenters asserted that detailed permit evaluations should not be required every 5 years (*i.e.*, with each renewal cycle). One commenter suggested that a full re-assessment should only be required every third permit term (every 15 years).

EPA did not discuss alternative permit application requirements for permit renewals in the proposed Phase II rule. The proposed Phase II rule specifies that with each permit renewal the Director must review the application materials and monitoring data to determine whether requirements, or additional requirements, for design and construction technologies or operational measures should be included in the permit (see proposed § 125.98(a)(1)). EPA does not generally specify reduced permit application requirements for permit renewals under the NPDES program. Rather, permitted facilities and permit writers normally exchange the information specified in the relevant permit application requirements and the permit writer determines when the application is complete (see 40 CFR 122.21(d)). It is not uncommon, however, that some existing information (*i.e.*, information submitted as part of an earlier permit application) remains part of a renewal application. EPA expects this to be true for Phase II existing facilities as well.

Under the proposed Phase II rule, EPA has identified several categories of permit application data and information requirements. These requirements, which are reasonably general in nature, provide certain flexibility to applicants to update only the key parts of the application that reflect changes in environmental conditions or operations. For example, the proposed rule would allow Phase II existing facilities to submit a proposal for information as the first step in identifying the scope of the Comprehensive Demonstration Study (see proposed § 125.95(b)(1)). This proposed requirement would provide applicants with an opportunity to identify the information in the study that has changed and must be updated, as well as existing information that remains representative of current conditions. In fact, it specifically provides for inclusion of historical studies where relevant. It also provides for the use of historical impingement and entrainment data, provided they are representative of the current operation and biological conditions. The proposed requirements do ensure that the Director retains sufficient flexibility to require Phase II existing facilities to submit data needed to assess source waterbody conditions and design and operational conditions at the facility. EPA is evaluating an additional option that it believes would maintain the Director's ability to obtain the information needed to make informed decisions when writing NPDES permits for existing facilities with cooling water intake structures. The proposed rule requires that facilities submit all of the information required in § 122.21(r) and § 125.95 (as applicable). EPA is considering whether to develop additional regulatory language that would allow the Director to relax the application information requirements if conditions at the facility and in the waterbody remain unchanged since the facility submitted their previous NPDES permit application, such that the information that they would submit would remain unchanged. Should this new regulatory language be implemented, the facility would be required to submit evidence that the conditions remain unchanged. This would serve to lessen the burden for information collection activities on the facility after the initial permit where section 316(b) requirements are placed in the NPDES permit as long as conditions remain unchanged. To demonstrate that operational conditions remain unchanged, the facility may rely upon data collected during the permit term, including facility operational data, monitoring, design information, and other data. To demonstrate that conditions in the waterbody remain unchanged, the facility may rely on monitoring and studies conducted by the facility, or data collected by other sources such as universities, federal, State, or local environmental and resource agencies, or other facilities located in close proximity. Determinations of unchanged conditions may rely upon demonstrations that there is no statistically significant changes in impingement and entrainment at the facility or in the densities of organisms in the vicinity of the cooling water intake structures, for example. If EPA decides to relax application requirements for permit renewals after a facility's initial permit implementing the Phase II regulations, the regulatory language of § 125.95(a) might be revised as follows:

(a)(1)You must submit to the Director the application information required by 40 CFR 122.21(r)(2), (3) and (5) and the Comprehensive Demonstration required by paragraph (b) of this section at least 180 days before your existing permit expires, in accordance with Sec. 122.21(d)(2).

(2) In subsequent permit terms, the Director may approve a request to reduce the information required to be submitted in your permit application on the cooling water intake structure and the source waterbody, if conditions at your facility and in the waterbody remain unchanged since your previous application. You should submit your request for reduced cooling water intake structure and waterbody application

[27] For example, one commenter suggested allowing two years for baseline ecological studies and economic studies; one year to proposed and install technologies; and two years to monitor effectiveness of changes.

information to the Director at least 1 year prior to the expiration of the permit term. Your request must contain a list and justification for each information item in § 122.21(r) or § 125.95 that you determine has not changed since the previous permit application.

EPA requests comment on the two options described above. EPA specifically requests comments on whether an option like that in the suggested regulatory language above is appropriate to reduce the burden for NPDES permit applicants in subsequent permit terms or whether the option that would provide guidance and allow resubmittal of existing data and hence a reconfirmation of the data through the application process is needed to ensure accurate data for the Director. There would be companion language in § 125.98 requiring the Director to review and approve, approve with comments, or disapprove the request within 60 days of submittal by the applicant. EPA also requests comment on the specific time frames that would be appropriate for this option, and whether they should be specified by EPA or left up to the discretion of the Director.

In addition to the concerns discussed above regarding the timing and content of application materials, some commenters also voiced concerns regarding how Directors will determine if a facility is in compliance with the requirements of the proposed rule. These commenters expressed concern that, given the difficulty of predicting the performance of distinct cooling water intake control technologies, it is not reasonable to expect every Phase II existing facility to be able to ensure that it will achieve reductions in impingement and entrainment that are consistent with the proposed performance standards within the first permit term and, therefore, it would be unfair to enforce the proposed standards until each facility has had a reasonable period to achieve compliance. One comment expressed by these groups is that proper design, installation, operation, and maintenance of technologies reasonably likely (based on appropriate characterization and study) to meet the performance standards should satisfy the permit terms and conditions (*i.e.*, be deemed compliance), at least until the second round of permitting occurs. Stated another way, commenters maintain that Phase II existing facilities should not be subject to immediate enforcement actions in the first permit term for failing to meet the proposed performance ranges (*i.e.*, a facility that properly designs, installs, operates and maintains cooling water intake structure control technologies but discovers, at or near the end of the first permit term, that it has not achieved the requisite level of impingement and entrainment reduction, should not be subject to enforcement for violating the section 316(b) requirements). EPA recognizes that significant variability in biological communities over seasons and other time periods (for example, a period of peak larval abundance that typically occurs in the spring months), may complicate optimization of the performance of technologies for reducing impingement mortality and entrainment. EPA is considering the need for regulatory language that would allow facilities time to come into compliance if they choose to install technologies to meet the performance standards in proposed § 125.94. This would allow facilities a period of time to optimize technology(ies) so that they operate to minimize impingement mortality and entrainment. EPA is currently evaluating and considering allowing six months, one year, two years, or five years (one permit term) for a facility to come into compliance after issuance of its permit. Example regulatory language for a new paragraph (e) in § 125.94 might read as follows:

(e) If you propose to implement design and construction technologies or operational measures to meet the performance standards in § 125.94(b) or (c), you will have an optimization period of [six months/one year/two years/five years] from the issuance of a permit requiring compliance with § 125.94(b) or (c) after which you must comply with the standards.

In this case, the proposed paragraphs § 125.94(e) and (f) would then become (f) and (g), respectively. EPA requests comments on these time frames and the suggested regulatory language above. EPA also requests comment on whether EPA should specify the length of the optimization period or whether the Director should make this decision.

D. Determining Capacity Utilization Rates

At § 125.94(b)(2), the proposed rule would require facilities with a capacity utilization rate of less than 15 percent to meet performance standards for reducing impingement mortality. § 125.94(b)(3) would require facilities with a capacity utilization rate of 15 percent or more to meet performance standards both for reducing impingement mortality and for reducing entrainment. (See 67 FR 17221.) As discussed in Section III above, the proposed Phase II rule defined capacity utilization based on the generation and capacity of the entire facility, including steam electric and non-steam generators. (See the proposed definition of ''capacity utilization rate'' at § 125.93, 67 FR 17220.) EPA is considering whether, for the purposes of implementing Section 316(b), defining capacity utilization based on the steam electric part of a facility better reflects a facility's potential for adverse environmental impact because only the steam electric generators use cooling water. Thus, EPA is considering refining its regulatory definition for ''capacity utilization rate'' at the proposed § 125.93 to reflect use of the steam electric part of a facility. If EPA were to make this change, the definition of ''capacity utilization rate'' in § 125.93 might be revised as follows (new language is underlined):

Capacity utilization rate means the ratio between the average annual net generation of the *steam electric part of a* facility (in MWh) and the total net capability of the *steam electric part of a* facility (in MW) multiplied by the number of available hours during a year. The average annual generation must be measured over a five year period (if available) of representative operating conditions.

EPA requests comment on this suggested refinement.

E. Clarifications and Corrections

1. Implementation Burden for Studies and Biological Data Collection

EPA received comments concerning the information collection, study, and monitoring costs presented in the supporting Information Collection Request for Cooling Water Intake Structures for the Phase II Existing Facility Proposed Rule (US EPA ICR No. 2060.01) (February 2002). Commenters stated that the format was confusing and the detail provided in the ICR was insufficient to enable them to review and comment on these costs. To assist reviewers, EPA has placed additional information into the record summarizing the general derivation of information collection, study, and monitoring activity costs associated with the Phase II rule. Labor categories, labor rates, monitoring components, and associated costs are outlined and additional cost details are presented in summary tables to facilitate ease of review and understanding.

Commenters also pointed out that EPA had inadvertently transposed the labor figures for statisticians and biological technicians when putting together the summary tables of costs. EPA has recalculated the ICR costs to rectify this error and has determined that costs will not change substantially. Labor costs associated with monitoring activities in the ICR were significantly higher than the labor for writing final reports and studies. Therefore, when the correction to the labor rates was made, the overall facility costs decreased.

However, the decrease in facility costs due to the correction to the labor rates was offset by other changes that EPA has made to the ICR costs since proposal. Some commenters stated that the burdens for impingement and entrainment monitoring were too low. EPA has reviewed these burden estimates and has increased the burdens associated with impingement and entrainment monitoring associated with the Impingement Mortality and Entrainment Characterization Study. In addition, EPA has revised capital and O&M costs associated with the pilot-scale studies some facilities may perform to reflect the assumption that only facilities which are projected to install new technologies will perform pilot studies, and to be proportional to the projected capital costs for installing these new technologies to comply with the rule. The following provides a summary of the effects of these corrections and updates on labor costs and overall costs for facilities, as well as total combined costs for States and facilities.

- Facility labor costs increased by 65% from $66,399,819 to $109,346,909 annually.
- Facility capital and O&M costs decreased by 61% from $63,633,640 to $24,801,777 annually.
- Total costs for facilities increased by 3.2% from $130,033,459 to $134,148,685 annually.
- Total facility and State costs increased by 2.8% from $135,990,706 to $139,820,531 annually.

The effects of the recalculation are summarized in more detail in a memorandum placed in the record (see ''Updated Information Collection Costs for the 316(b) Phase II Notice of Data Availability, January 31, 2002).

2. San Onofre Impacts Discussion

In response to comments received about inaccuracies related to facility-specific impacts caused by impingement and entrainment discussed in EPA's Information Collection Request (ICR), EPA provides the following clarification. Specifically, the ICR for the proposed rule described entrainment losses at San Onofre Nuclear Generating Station (SONGS). EPA received updated information from SONGS facility scientists that clarified actual entrainment losses in normal (non-El Nino) years and described trends in shallow-water and deepwater fish species affected by entrainment. In addition, prior to publication of the proposed rule, EPA concluded that kelp bed losses in proximity to the SONGS intake were attributable to turbidity increases caused by cooling water discharges, not cooling water withdrawals. The updated information for SONGS was placed in the preamble to the proposal (see 67 FR 17138–17139), but was inadvertently omitted from the ICR. The final ICR will reflect the changes described above.

XII. General Solicitation of Comments

EPA encourages public participation in this rulemaking and requests comments on this notice of availability supporting the proposed rule for cooling water intake structures for existing Phase II facilities. As stated in section II of this NODA, EPA is also reopening the comment period on all aspects of the proposal. EPA invites all parties to coordinate their data collection activities with the Agency to facilitate mutually beneficial and cost-effective data submissions.

Please refer to the **FOR FURTHER INFORMATION CONTACT** section at the beginning of this preamble for technical contacts at EPA.

Dated: March 12, 2003.

G. Tracy Mehan,

Assistant Administrator, Office of Water.

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