

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.