

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