

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 use; 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.