

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