

# Chapter D6: Benefits Analysis for Four Facilities on Tampa Bay

This chapter presents the results of EPA's evaluation of the economic benefits to fisheries that are associated with reductions in estimated current I&E at four facilities on Tampa Bay. The economic benefits reported here are based on the values presented in Chapter D4, and EPA's estimates of current I&E (discussed in Chapter D3). Section D6-1 presents a summary of I&E losses, and associated monetized losses, for Big Bend. Section D6-2 then describes the economic benefits from the reduced I&E and Section D6-3 discusses the uncertainties in the analysis.

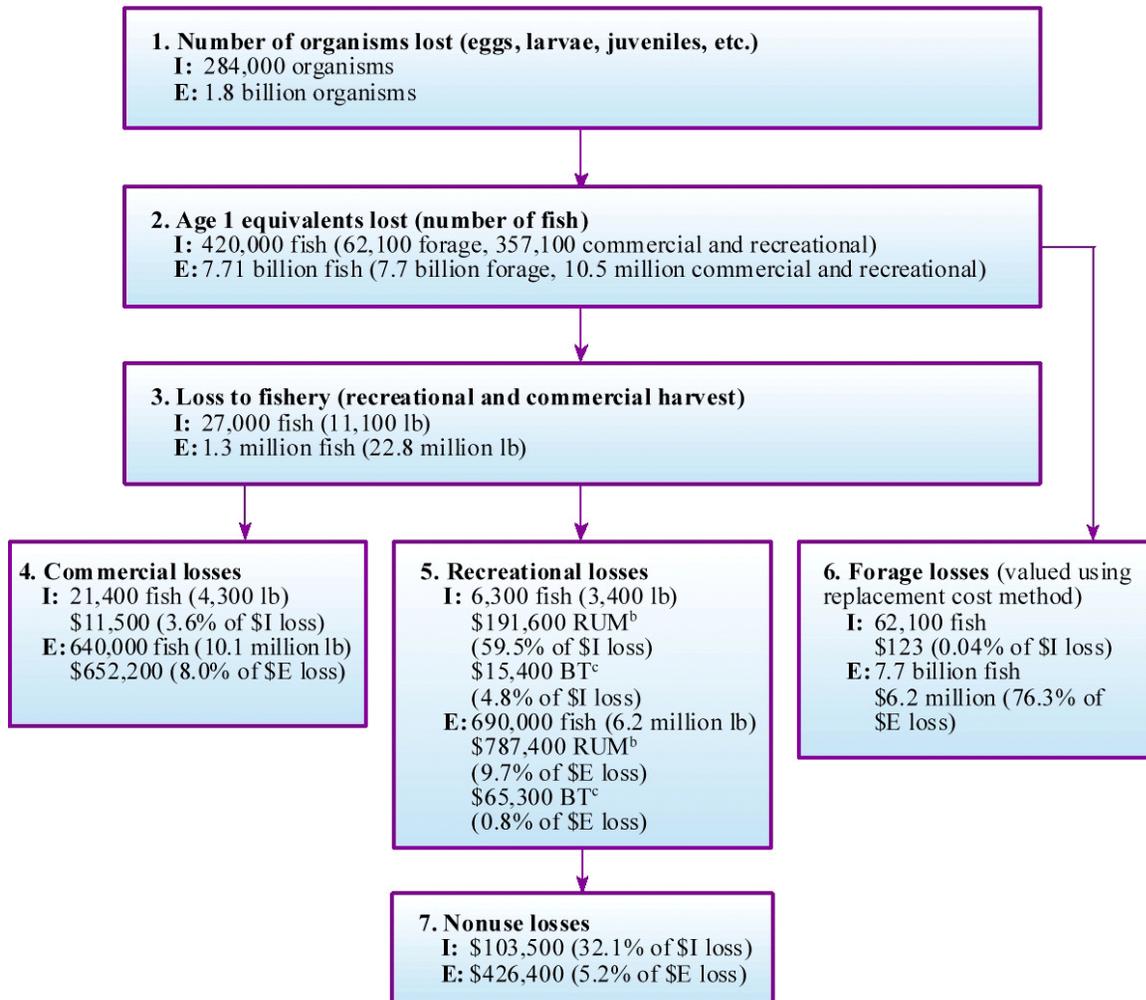
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## D6-1 OVERVIEW OF I&E AND ASSOCIATED ECONOMIC VALUES

The flowchart in Figure D6-1 reveals how the valuation of loss is derived, starting with data expressed as numbers of organisms lost from I&E. Figures D6-2 and D6-3 display the current impingement and entrainment impacts, respectively, on age 1 equivalents of the various fisheries. These piecharts reflect the baseline losses based on current technology, and all dollar values and percentages of losses reflect midpoints of the ranges for the categories of commercial, recreational, nonuse, and forage.

**Figure D6-1: Overview and Summary of Average Annual I&E at Big Bend Facility, Tampa Bay and Associated Economic Values (based on current configuration; all results are annualized)<sup>a</sup>**



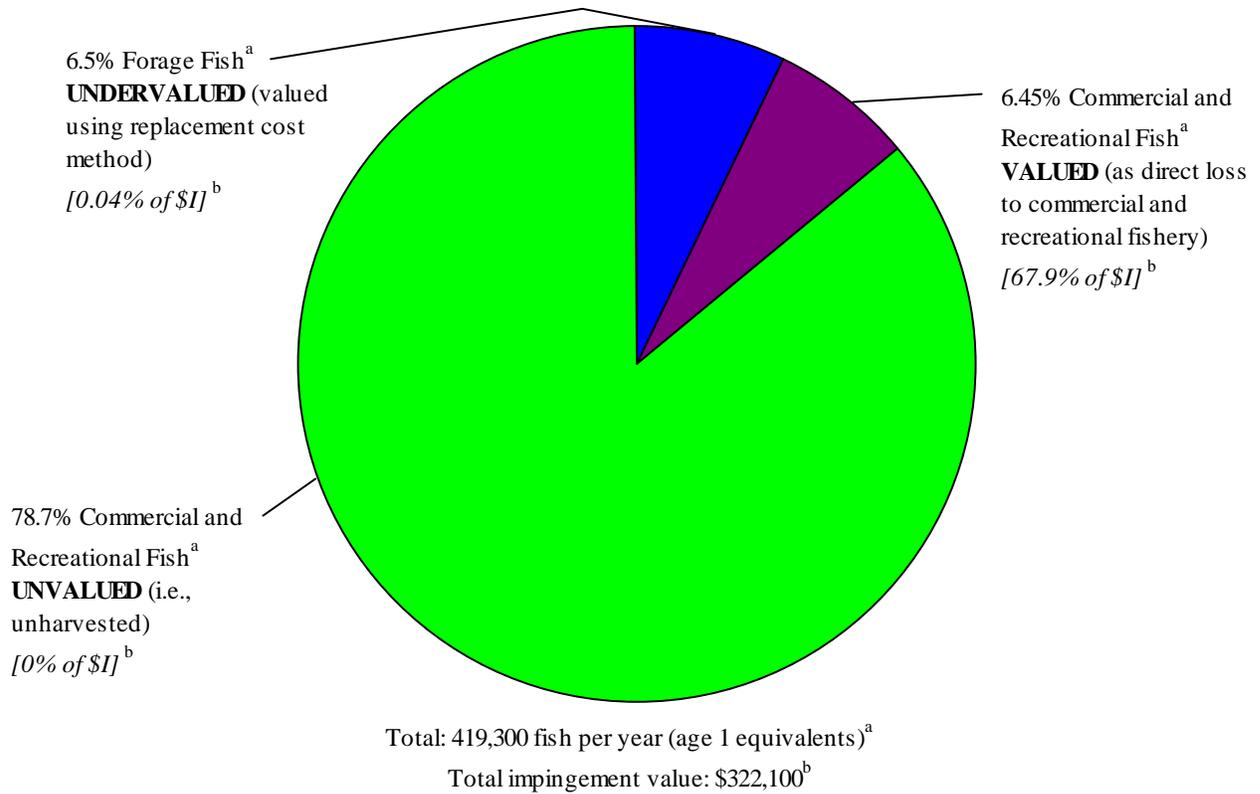
<sup>a</sup> All dollar values are the midpoint of the range of estimates.

<sup>b</sup> Random Utility Model.

<sup>c</sup> Benefits transfer.

Note: Species with I&E <1% of the total I&E were not valued.

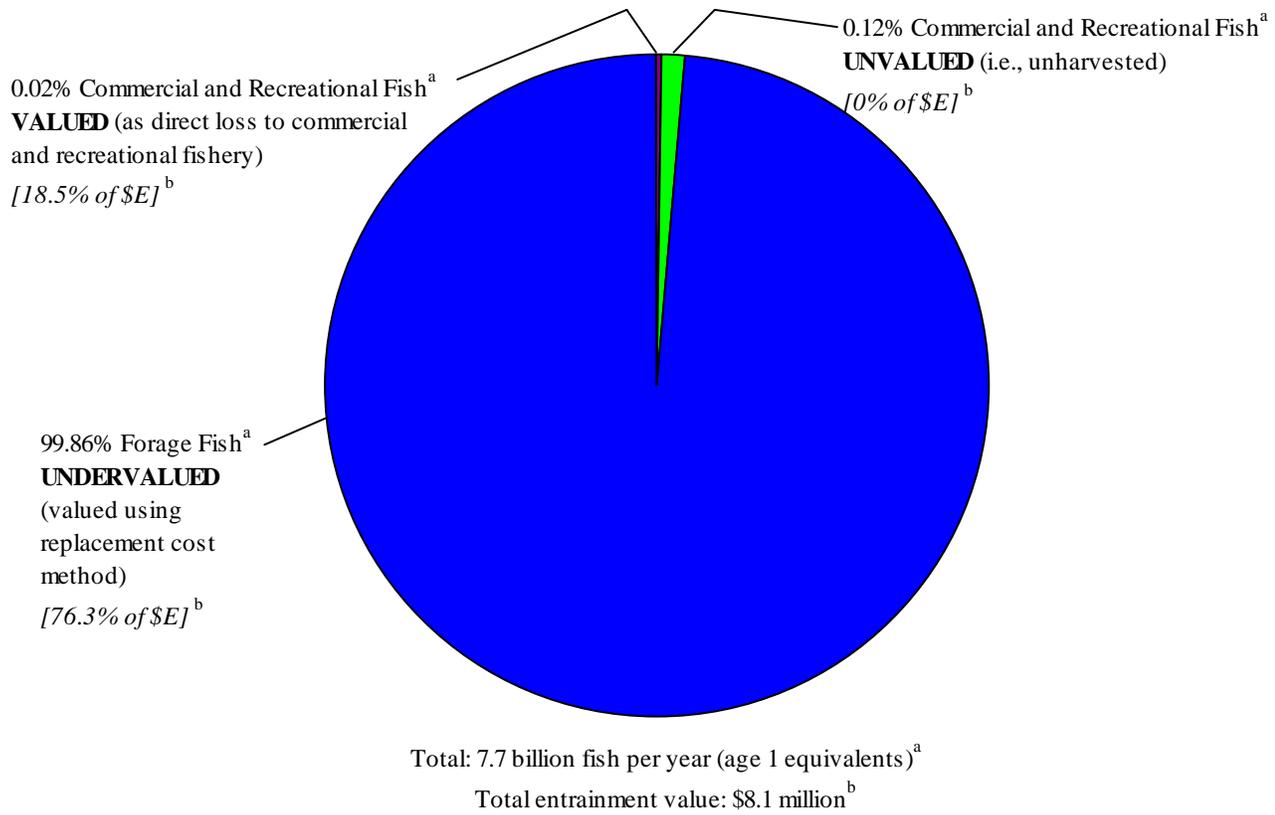
**Figure B6-2: Big Bend: Distribution of Impingement Losses by Species Category and Associated Economic Values**



<sup>a</sup> Impacts shown are to age 1 equivalent fish, except impacts to the commercially and recreationally harvested fish include impacts for all ages vulnerable to the fishery.

<sup>b</sup> Midpoint of estimated range. Nonuse values are 32.1% of total estimated \$I loss.

**Figure B6-3: Big Bend: Distribution of Entrainment Losses by Species Category and Associated Economic Values**



<sup>a</sup> Impacts shown are to age 1 equivalent fish, except impacts to the commercially and recreationally harvested fish include impacts for all ages vulnerable to the fishery.

<sup>b</sup> Midpoint of estimated range. Nonuse values are 5.2% of total estimated \$E loss.

## D6-2 ECONOMIC BENEFITS OF REDUCED I&E AT THE FOUR IN-SCOPE FACILITIES ON TAMPA BAY

Tables D6-1 and D6-2 provide the baseline monetized recreational loss estimates for impingement and entrainment, respectively. Both tables indicate results from the basic analysis (benefit transfer) from Chapter D4, and the RUM analysis from Chapter D5. The two approaches are combined to develop a range of estimates for recreational fishery losses at baseline.

**Table D6-1: EPA's Estimate of Current Recreational Economic Losses (benefits baseline) from Impingement for Recreational Species at Facilities Located on Tampa Bay (\$2000)**

Species	In-Scope Facilities (Big Bend, FJ Gannon, Hookers Point, PL Bartow)	
	Basic Analysis	Rum Analysis <sup>a</sup>
Black drum	\$23	\$0
Blue crab	\$24,081	NA
Pinfish	\$13,260	NA
Silver perch	\$228	NA
Spotted seatrout	\$46,020	\$471,751
Stone crab	\$301	NA
Total <sup>b</sup>	\$509,621	

<sup>a</sup> The RUM results include increased participation.

<sup>b</sup> RUM results used (in place of Basic Analysis results) where given.

NA = Not Available.

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**Table D6-2: EPA's Estimate of Current Recreational Economic Losses (benefits baseline) from Entrainment For Recreational Species at Facilities Located on Tampa Bay (\$2000)**

Species	In-Scope Facilities (Big Bend, FJ Gannon, Hookers Point, PL Bartow)	
	Basic Analysis	Rum Analysis <sup>a</sup>
Black drum	\$169,567	\$274,451
Sheepshead	\$571	\$141,121
Silver perch	\$6,242	NA
Spotted seatrout	\$148,531	\$1,522,966
Stone crab	\$154,507	NA
Total <sup>b</sup>	\$2,099,287	

<sup>a</sup> The RUM results include increased participation.

<sup>b</sup> RUM results used (in place of Basic Analysis results) where given.

NA = Not Available.

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Table D6-3 summarizes the total current losses, plus the potential benefits of a range of I&E reductions. The benefits of reducing I&E at Tampa Bay in-scope facilities are expected to range from \$471,000 to \$480,000 for a 60% reduction in impingement and from \$13.7 million to \$14.3 million per year for a 70% reduction in entrainment.

<b>D6-3: Summary of Current Economic Losses and Benefits of a Range of Potential I&amp;E Reductions at Four In Scope Facilities on Tampa Bay (\$2000)</b>				
		<b>Impingement</b>	<b>Entrainment</b>	<b>Total</b>
Baseline Losses	low	\$785,000	\$19,615,000	\$20,400,000
	high	\$801,000	\$20,491,000	\$21,291,000
Benefits of 10% reductions	low	\$79,000	\$1,961,000	\$2,040,000
	high	\$80,000	\$2,049,000	\$2,129,000
Benefits of 20% reductions	low	\$157,000	\$3,923,000	\$4,080,000
	high	\$160,000	\$4,098,000	\$4,258,000
Benefits of 30% reductions	low	\$236,000	\$5,884,000	\$6,120,000
	high	\$240,000	\$6,147,000	\$6,387,000
Benefits of 40% reductions	low	\$314,000	\$7,846,000	\$8,160,000
	high	\$320,000	\$8,196,000	\$8,517,000
Benefits of 50% reductions	low	\$393,000	\$9,807,000	\$10,200,000
	high	\$400,000	\$10,245,000	\$10,646,000
Benefits of 60% reductions	low	\$471,000	\$11,769,000	\$12,240,000
	high	\$480,000	\$12,294,000	\$12,775,000
Benefits of 70% reductions	low	\$550,000	\$13,730,000	\$14,280,000
	high	\$561,000	\$14,343,000	\$14,904,000
Benefits of 80% reductions	low	\$628,000	\$15,692,000	\$16,320,000
	high	\$641,000	\$16,393,000	\$17,033,000
Benefits of 90% reductions	low	\$707,000	\$17,653,000	\$18,360,000
	high	\$721,000	\$18,442,000	\$19,162,000

### D6-3 SUMMARY OF OMISSIONS, BIASES, AND UNCERTAINTIES IN THE BENEFITS ANALYSIS

Table D6-4 presents an overview of omissions, biases, and uncertainties in the benefits estimates. Factors with a negative impact on the benefits estimate bias the analysis downward, and therefore would raise the final estimate if they were properly accounted.

**Table D6-4: Omissions, Biases, and Uncertainties in the Benefits Estimates**

<b>Issue</b>	<b>Impact on Benefits Estimate</b>	<b>Comments</b>
Long-term fish stock effects not considered	Understates benefits <sup>a</sup>	EPA assumed that the effects on stocks are the same each year, and that the higher fish kills would not have cumulatively greater impact.
Effect of interaction with other environmental stressors	Understates benefits <sup>a</sup>	EPA did not analyze how the yearly reductions in fish may make the stock more vulnerable to other environmental stressors. In addition, as water quality improves over time due to other watershed activities, the number of fish impacted by I&E may increase.
Recreation participation is held constant <sup>a</sup>	Understates benefits <sup>a</sup>	Recreational benefits estimated via benefits transfer only reflect anticipated increase in value per activity outing; increased levels of participation are omitted. RUM analyses do embody participation increases, however.
Boating, bird-watching, and other in-stream or near-water activities are omitted <sup>a</sup>	Understates benefits <sup>a</sup>	The only impact to recreation considered is fishing.
Effect of change in stocks on number of landings	Uncertain	EPA assumed a linear stock to harvest relationship, that a 13 percent change in stock would have a 13 percent change in landings; this may be low or high, depending on the condition of the stocks.
Nonuse benefits	Uncertain	EPA assumed that nonuse benefits are 50 percent of recreational angling benefits.
Use of unit values from outside Tampa Bay Estuary	Uncertain	The recreational and commercial values used are from the state and/or mid-Atlantic region, but are not from studies of Tampa Bay specifically.
Extrapolation from Big Bend to other facilities	Uncertain	Unknown whether \$/MGD basis for extrapolation over- or understates benefits of other facilities in the estuary.

<sup>a</sup> Benefits would be greater than estimated if this factor were considered.