Economic Effects of Amendment 24 to the Snapper Grouper Fishery Management Plan on the Recreational Sector

Introduction

The methodology employed in this assessment follows the methodology used in assessing the economic effects of the South Atlantic Comprehensive ACL Amendment (SAFMC 2011) and the Gulf Generic ACL Amendment (GMFMC 2011) on the recreational sector. Detailed discussions of the methodology may be found in those amendments and are incorporated herein by reference. A general description of this methodology is provided below.

This assessment evaluated the expected change in economic value relative to the no action alternative. The change in economic value is measured in terms of the consumer surplus (CS) to recreational anglers. The relatively sparse number of target trips for red grouper by anglers fishing through the for-hire vessels precluded the estimation of effects on the net operating revenues (NOR) of for-hire vessels. CS in the present case is the net benefit an angler derives from an additional fish kept on a fishing trip and is equivalent to the difference between the monetized benefit an angler receives and the actual cost. This value is an appropriate measure of economic effects on recreational anglers as a result of changes in fishing regulations.

In order to take account of certain direct relationships among the alternatives, the current economic assessment evaluated the combined effects of the rebuilding, allocation, and ACL alternatives. As the case with the economic assessment of the effects on the commercial sector, several scenarios were analyzed reflecting the various combinations of the alternatives.

The analysis relied on several key assumptions. In general, the historical fishery performance in 2005-2009 was considered to define the no action or baseline alternative. This assumption was partly modified because a January-April seasonal closure to recreational harvest of black grouper, gag, and red grouper was implemented through Amendment 16 starting in 2010. One possible baseline landing is the 2009 red grouper landing for May through December, as shown in Table 4-10. Landings in 2009, however, appear to be very low relative to landings in the last five years. Recreational red grouper landings steadily rose from 299,116 lb ww in 2005 to a peak of 1,099,141 lb ww in 2008, and then abruptly fell to 283,565 lb ww in 2009. The 2005-2009 average recreational red grouper landings stood at 564,213 lb ww. The abrupt fall in recreational red grouper landings in 2009 could be due to a variety of factors, some of which may not be present in the future. There is then a possibility landings could rise in the future although the four-month closure and the overfished status of the stock would still constrain landings below historical levels. The expected recreational red grouper landings under Amendment 16 are 326,553 lb ww (276,740 lb gw). These are below the 2005-2009 average but come relatively close to the 2009 landings. This analysis used the 2009 landings as the baseline landings. This choice of a baseline has more immediate consequence on the estimated

magnitude of effects than on the ranking of alternatives. Information from the 2010 fishing year appears to show relatively low recreational landings, so that the estimates in this assessment may understate the true results should future recreational performance mimic that of the 2010 fishing year in the absence of this plan amendment.

Another key assumption is that the recreational allocation (ACL) would be fully taken each year over the 10-year or 7-year rebuilding period. Unless the seasonal closure is modified or anglers shift their effort to the open months, it is possible the increasing allocation would not be fully taken over time. This creates certain issues related to the interpretation of the positive economic results. In general, the approach taken in this analysis is to consider the positive results as potential gains instead of forgone benefits. However, it may be noted that under the assumption that the aggregate ACL for black grouper, gag, and red grouper would remain and become actually constraining, positive results may be interpreted as forgone benefits.

In the event the economic results were negative, fishers were assumed not to shift their effort to target other species. Otherwise, the estimated CS changes may be considered overestimates of actual results.

The baseline CS value based on several studies was uniform across all fishing sectors, areas, and harvest levels. This may not necessarily be the case. Headboat anglers may value some snapper-grouper species differently, on average, than private and charterboat anglers. The direction and magnitude of such difference are unknown, though the higher cost of fishing to charterboat anglers suggests the CS to headboat anglers would be less than that to charterboat anglers. It is also possible CS values vary across geographic areas. No adjustments for these possibilities were introduced in the current analysis.

The basic data used in determining the changes in CS due to the various alternatives are summarized in Table A-1. The CS values are based on the recent estimates of willingness to pay (CS) for grouper species in the Southeast. The high value is based on Haab et al. (2009), the medium value on Gentner (2009), and the low value on Carter and Liese (2011). All CS values are expressed in 2010 dollars. These are similar values used in the economic analysis of the effects of the Gulf Generic ACL Amendment and the South Atlantic Comprehensive ACL Amendment. The pound per fish for each sector is the 2005-2009 average pounds per red grouper.

Table A-1. Consumer surplus (CS) and pounds per red grouper in 2010 dollars.

| Range[1] | Basic CS/Fish | Recreational[2] | |
		Pound/Fish	CS/Pound
High	121.94	10.04	12.15
Medium	102.01	10.04	10.17
Low	26.52	10.04	2.64

[1]High CS is based on Haab et al. (2009); medium CS is based on Gentner (2009); and, low CS is based on Carter and Liese (2011).
[2]Pounds per red grouper are 2005-2009 averages.

Results

Presented in the following tables are the changes in CS associated with the rebuilding strategy, allocation, and ACL alternatives. The CS effects are classified into High, Medium, and Low to reflect the range of CS values obtained in the studies cited above.

The CS effects are shown for a 4-year period and a 10-year period. Although the ACLs provided in Tables 2-15 through 2-17 are for 2012, 2013, and 2014 (and onwards), the 4-year horizon as well as the 10-year horizon included 2011 as the starting year of the rebuilding period. The 2011 ACLs were based on the 2011 projected ABCs. Similarly, the ACLs beyond 2014 were based on the projected ABCs for those years.

To enable proper comparison of CS values across all alternatives or combinations of alternatives, net present values of CS that would accrue over time were estimated. A rate of 7 percent was chosen as a discounting factor, although other discounting rates were explored to determine the sensitivity of results. All CS values are expressed in 2010 dollars.

The relative effects of the allocation and rebuilding strategy alternatives are shown in Table A-2a under the condition that ACL is equal to ABC (**Alternative 2**), Table A-2b for ACL equal to 90 percent of ABC (**Alternative 3**), and Table A-2c for ACL equal to 80 percent of ABC (**Alternative 4**). A 7-percent discount rate was used in generating these tables.

When ACL is equated to ABC (Table A-2a), all rebuilding strategies would result in positive CS changes under any of the allocation alternatives, except for the $65\%F_{MSY}$. For this rebuilding strategy, the recreational sector would experience CS reductions over the first four years of the rebuilding period and only under the lowest recreational allocation ratio (46%). This negative effect, however, would turn positive over a ten-year horizon. At an ACL equal to 90 percent of ABC, $F_{REBUILD}$ (7 years) and $65\%F_{MSY}$ would result in CS reductions under some allocation alternatives over a four-year period. However, all the effects would turn positive over a ten-year period. Under an ACL equal to 80 percent of ABC, all rebuilding strategies would result in CS reduction over a four-year period under most allocation alternatives. Again, all these effects would turn positive over a ten-year period, except for the $65\%F_{MSY}$ rebuilding strategy at the lowest recreational allocation ratio.

The effects across rebuilding strategies, given any ACL, allocation alternative, and timeframe provide a measure for consistent ranking of alternatives. Regardless of the allocation or ACL alternatives or time horizon, $F_{REBUILD}$ (10 years) would consistently rank first, followed by $F_{REBUILD}$ (8 years), $75\%F_{MSY}$, $F_{REBUILD}$ (7 years), and $65\%F_{MSY}$. At the current preferred alternative for rebuilding strategy of $75\%F_{MSY}$, increases in CS (HIGH) over a four-year horizon would range from $1.94 million under the lowest recreational allocation ratio to $5.79 million under the highest recreational allocation ratio, given an ACL equal to ABC. The corresponding range over a ten-year period would be $8.76 million to $18.07 million. Naturally, the CS changes would be smaller but positive at lower ACLs.

For each rebuilding strategy, the CS changes would directly correlate with the size of the recreational allocation. That is, the larger the recreational allocation of the total ACL, the larger

would be the expected change in CS. This result would hold true regardless of the ACL chosen and whether a 4-year or 10-year horizon was considered. For example, at $F_{REBUILD}$ (10 years) with ACL equal to ABC, the CS change (HIGH) would range from $1.94 million under the lowest allocation of 46 percent to $5.79 million under the highest allocation of 59 percent over four years, or from $8.76 million to $18.07 million over ten years (Table A-2a). At $F_{REBUILD}$ (10 years) and ACL equal to 90 percent of ABC, the CS change (HIGH) over four years would range from $1.75 million to $5.21 million, or from $7.88 million to $16.27 million over ten years (Table A-2b). The corresponding ranges in CS change (HIGH) with ACL equal to 80 percent of ABC would be $1.55 million to $4.63 million over four years and $7.01 million to $14.46 million over ten years (Table A-2c). Thus, regardless of the rebuilding strategy, ACL alternative, and timeframe, the allocation alternatives may be ranked in descending order as follows: Alternative 2d, Alternative 2e, Alternative 2c, Alternative 2a, and Alternative 2b. At the current preferred allocation alternative of 56 percent for the recreational sector, the CS change (HIGH) over a four-year period would range from $2.23 million under 65%$F_{MSY}$ to $4.90 million under $F_{REBUILD}$ (10 years), given an ACL equal to ABC. The corresponding range over a ten-year period would be $11.10 million to $15.92 million. As may be expected, CS effects would be smaller at lower ACLs.

Table A-2a. Net present value of changes in CS to the recreational sector associated with the rebuilding strategy and recreational allocation alternatives over **4 years and 10 years**, assuming **ACL=ABC** and using a 7% discount rate. Dollar amounts are in million 2010 dollars.

Rebuilding Strategy	**4-Year Horizon**					**10-Year Horizon**				
	Recreational Allocation of ACL					Recreational Allocation of ACL				
	Alt 2a	Alt 2b	Alt 2c	Alt 2d	Alt 2e	Alt 2a	Alt 2b	Alt 2c	Alt 2d	Alt 2e
	48%	46%	51%	59%	56%	48%	46%	51%	59%	56%
High										
$F_{REBUILD}$(10)	$2.54	$1.94	$3.42	$5.79	$4.90	$10.19	$8.76	$12.34	$18.07	$15.92
75%F_{MSY}	$1.64	$1.08	$2.47	$4.69	$3.86	$8.62	$7.26	$10.68	$16.15	$14.10
65%F_{MSY}	$0.25	-$0.25	$0.99	$2.98	$2.23	$6.06	$4.80	$7.95	$12.99	$11.10
$F_{REBUILD}$(7)	$1.10	$0.57	$1.90	$4.03	$3.23	$7.66	$6.33	$9.65	$14.96	$12.97
$F_{REBUILD}$(8)	$1.77	$1.21	$2.61	$4.85	$4.01	$8.87	$7.49	$10.94	$16.45	$14.38
Medium										
$F_{REBUILD}$(10)	$2.12	$1.63	$2.86	$4.84	$4.10	$8.53	$7.33	$10.32	$15.12	$13.32
75%F_{MSY}	$1.37	$0.91	$2.07	$3.92	$3.23	$7.21	$6.07	$8.93	$13.51	$11.79
65%F_{MSY}	$0.21	-$0.21	$0.83	$2.49	$1.87	$5.07	$4.01	$6.65	$10.87	$9.29
$F_{REBUILD}$(7)	$0.92	$0.48	$1.59	$3.37	$2.70	$6.41	$5.30	$8.08	$12.52	$10.85
$F_{REBUILD}$(8)	$1.48	$1.01	$2.18	$4.06	$3.36	$7.42	$6.27	$9.15	$13.76	$12.03
Low										
$F_{REBUILD}$(10)	$0.55	$0.42	$0.74	$1.26	$1.07	$2.22	$1.91	$2.68	$3.93	$3.46
75%F_{MSY}	$0.36	$0.24	$0.54	$1.02	$0.84	$1.88	$1.58	$2.32	$3.51	$3.07
65%F_{MSY}	$0.05	-$0.05	$0.22	$0.65	$0.49	$1.32	$1.04	$1.73	$2.83	$2.41
$F_{REBUILD}$(7)	$0.24	$0.12	$0.41	$0.88	$0.70	$1.67	$1.38	$2.10	$3.25	$2.82
$F_{REBUILD}$(8)	$0.39	$0.26	$0.57	$1.06	$0.87	$1.93	$1.63	$2.38	$3.58	$3.13

Table A-2b. Net present value of changes in CS to the recreational sector associated with the rebuilding strategy and recreational allocation alternatives over **4 years and 10 years**, assuming **ACL=90% of ABC** and using a 7% discount rate. Dollar amounts are in million 2010 dollars.

Rebuilding Strategy	4-Year Horizon					10-Year Horizon				
	Recreational Allocation of ACL					Recreational Allocation of ACL				
	Alt 2a	Alt 2b	Alt 2c	Alt 2d	Alt 2e	Alt 2a	Alt 2b	Alt 2c	Alt 2d	Alt 2e
	48%	46%	51%	59%	56%	48%	46%	51%	59%	56%
	High									
$F_{REBUILD}(10)$	$1.11	$0.58	$1.91	$4.04	$3.25	$6.75	$5.46	$8.69	$13.85	$11.91
$75\%F_{MSY}$	$0.31	-$0.19	$1.06	$3.05	$2.30	$5.34	$4.11	$7.19	$12.11	$10.27
$65\%F_{MSY}$	-$0.94	-$1.39	-$0.27	$1.51	$0.84	$3.03	$1.90	$4.74	$9.27	$7.57
$F_{REBUILD}(7)$	-$0.17	-$0.65	$0.54	$2.46	$1.74	$4.48	$3.28	$6.27	$11.05	$9.25
$F_{REBUILD}(8)$	$0.43	-$0.08	$1.18	$3.20	$2.44	$5.56	$4.32	$7.42	$12.38	$10.52
	Medium									
$F_{REBUILD}(10)$	$0.93	$0.49	$1.60	$3.38	$2.72	$5.65	$4.57	$7.27	$11.58	$9.96
$75\%F_{MSY}$	$0.26	-$0.16	$0.88	$2.55	$1.93	$4.47	$3.44	$6.01	$10.13	$8.59
$65\%F_{MSY}$	-$0.79	-$1.16	-$0.23	$1.27	$0.70	$2.54	$1.59	$3.96	$7.76	$6.33
$F_{REBUILD}(7)$	-$0.15	-$0.55	$0.45	$2.06	$1.46	$3.74	$2.74	$5.24	$9.24	$7.74
$F_{REBUILD}(8)$	$0.36	-$0.06	$0.99	$2.68	$2.04	$4.65	$3.62	$6.21	$10.36	$8.80
	Low									
$F_{REBUILD}(10)$	$0.24	$0.13	$0.42	$0.88	$0.71	$1.47	$1.19	$1.89	$3.01	$2.59
$75\%F_{MSY}$	$0.07	-$0.04	$0.23	$0.66	$0.50	$1.16	$0.89	$1.56	$2.63	$2.23
$65\%F_{MSY}$	-$0.21	-$0.30	-$0.06	$0.33	$0.18	$0.66	$0.41	$1.03	$2.02	$1.65
$F_{REBUILD}(7)$	-$0.04	-$0.14	$0.12	$0.53	$0.38	$0.97	$0.71	$1.36	$2.40	$2.01
$F_{REBUILD}(8)$	$0.09	-$0.02	$0.26	$0.70	$0.53	$1.21	$0.94	$1.61	$2.69	$2.29

Table A-2c. Net present value of changes in CS to the recreational sector associated with the rebuilding strategy and recreational allocation alternatives over **4 years and 10 years**, assuming **ACL=80% of ABC** and using a 7% discount rate. Dollar amounts are in million 2010 dollars.

Rebuilding Strategy	4-Year Horizon					10-Year Horizon				
	Recreational Allocation of ACL					Recreational Allocation of ACL				
	Alt 2a	Alt 2b	Alt 2c	Alt 2d	Alt 2e	Alt 2a	Alt 2b	Alt 2c	Alt 2d	Alt 2e
	48%	46%	51%	59%	56%	48%	46%	51%	59%	56%
	High									
$F_{REBUILD}(10)$	-$0.31	-$0.78	$0.40	$2.30	$1.59	$3.31	$2.17	$5.03	$9.62	$7.90
75%F_{MSY}	-$1.02	-$1.47	-$0.36	$1.42	$0.75	$2.06	$0.96	$3.70	$8.08	$6.44
65%F_{MSY}	-$2.14	-$2.53	-$1.54	$0.05	-$0.55	$0.01	-$1.00	$1.52	$5.55	$4.04
$F_{REBUILD}(7)$	-$1.45	-$1.88	-$0.81	$0.89	$0.25	$1.29	$0.23	$2.88	$7.13	$5.54
$F_{REBUILD}(8)$	-$0.92	-$1.37	-$0.25	$1.55	$0.87	$2.25	$1.15	$3.91	$8.32	$6.66
	Medium									
$F_{REBUILD}(10)$	-$0.26	-$0.65	$0.34	$1.92	$1.33	$2.77	$1.81	$4.21	$8.05	$6.61
75%F_{MSY}	-$0.86	-$1.23	-$0.30	$1.18	$0.63	$1.72	$0.81	$3.10	$6.76	$5.38
65%F_{MSY}	-$1.79	-$2.12	-$1.29	$0.04	-$0.46	$0.01	-$0.84	$1.27	$4.65	$3.38
$F_{REBUILD}(7)$	-$1.21	-$1.57	-$0.68	$0.74	$0.21	$1.08	$0.19	$2.41	$5.97	$4.63
$F_{REBUILD}(8)$	-$0.77	-$1.14	-$0.21	$1.29	$0.73	$1.89	$0.96	$3.27	$6.96	$5.57
	Low									
$F_{REBUILD}(10)$	-$0.07	-$0.17	$0.09	$0.50	$0.35	$0.72	$0.47	$1.09	$2.09	$1.72
75%F_{MSY}	-$0.22	-$0.32	-$0.08	$0.31	$0.16	$0.45	$0.21	$0.80	$1.76	$1.40
65%F_{MSY}	-$0.46	-$0.55	-$0.34	$0.01	-$0.12	$0.00	-$0.22	$0.33	$1.21	$0.88
$F_{REBUILD}(7)$	-$0.32	-$0.41	-$0.18	$0.19	$0.05	$0.28	$0.05	$0.63	$1.55	$1.20
$F_{REBUILD}(8)$	-$0.20	-$0.30	-$0.05	$0.34	$0.19	$0.49	$0.25	$0.85	$1.81	$1.45

The ACT alternatives in this amendment are stated as some percent of the recreational ACL. If ACTs are used to trigger AMs, then ACTs would have economic implications on the recreational sector that would likely be more restrictive than those of the ACLs. For the current analysis, ACTs are assumed to have similar effects as ACLs in terms of constraining the harvest of red grouper. In this sense, the economic effects of ACTs may be analyzed in similar fashion as above.

Including the no action alternative, there are four ACT alternatives considered. The no action alternative is assumed to provide an ACT equal to ACL. For the current analysis, only the effects of ACTs under the condition that ACL is equal to ABC are evaluated. The nature of effects of the ACT alternatives, including the ranking of alternatives, would not change under other ACL values, although the magnitudes would be different. One alternative would set the ACT equal to 85 percent of ACL, another would set the ACT at 75% of ACL, and the last would set the ACT equal to (1-PSE) or 50 percent of ACL, whichever is larger. The estimated PSE is around 0.25, so the ACT under this last alternative would equal to 75 percent of ACL. In effect then, there are only two ACT alternatives exclusive of the no action alternative, namely, 85 percent of ACL and 75 percent of ACL. The economic effects of these two alternatives, using a 7 percent discount rate, are presented in Table A-3a and Table A-3b. These effects are expressed in 2010 dollars.

Under an ACT equal to 85 percent of ACL, negative CS changes would occur for all rebuilding strategies over a four-year period, particularly at the lower recreational allocation ratios (Table A-3a). Over a ten-year period, all effects would be positive for all rebuilding strategies and allocation alternatives.   More and larger negative effects would result when the ACT is set equal to 75 percent of ACL (Table A-3b). Some of these negative effects would even persist over a ten-year period, particularly for the $65\%F_{MSY}$ and $F_{REBUILD}$ (7 years) and to some extent, $F_{REBUILD}$ (10 years), at lower recreational allocation ratios. Given the preferred alternatives for rebuilding strategy ($75\%F_{MSY}$) and allocation ratio (56%), the CS change would amount to $1.53 million over four years or $8.35 million over ten years under an ACT equal to 85 percent of ACL. The corresponding CS change under an ACT equal to 75 percent of ACL would be -$.03 million over four years or $4.52 million over ten years. It can only be expected that an ACT equal to 85 percent of ACL would yield better economic results than an ACT equal to 75 percent of ACL.

Table A-3a. Net present value of changes in CS to the recreational sector associated with the rebuilding strategy and recreational allocation alternatives over **4 years and 10 years**, assuming ACL=ABC, **ACT=.85% of ACL**, and using a 7% discount rate. Dollar amounts are in million 2010 dollars.

Rebuilding Strategy	**4-Year Horizon**					**10-Year Horizon**				
	Recreational Allocation of ACL					Recreational Allocation of ACL				
	Alt 2a	Alt 2b	Alt 2c	Alt 2d	Alt 2e	Alt 2a	Alt 2b	Alt 2c	Alt 2d	Alt 2e
	48%	46%	51%	59%	56%	48%	46%	51%	59%	56%
High										
$F_{REBUILD}(10)$	$0.40	-$0.10	$1.16	$3.17	$2.42	$5.03	$3.81	$6.86	$11.73	$9.91
$75\%F_{MSY}$	-$0.36	-$0.83	$0.35	$2.23	$1.53	$3.70	$2.54	$5.44	$10.09	$8.35
$65\%F_{MSY}$	-$1.54	-$1.96	-$0.91	$0.78	$0.15	$1.52	$0.45	$3.13	$7.41	$5.81
$F_{REBUILD}(7)$	-$0.81	-$1.27	-$0.14	$1.67	$1.00	$2.88	$1.75	$4.57	$9.09	$7.40
$F_{REBUILD}(8)$	-$0.25	-$0.72	$0.47	$2.37	$1.66	$3.91	$2.74	$5.67	$10.35	$8.59
Medium										
$F_{REBUILD}(10)$	$0.34	-$0.08	$0.97	$2.65	$2.02	$4.21	$3.19	$5.74	$9.81	$8.29
$75\%F_{MSY}$	-$0.30	-$0.69	$0.29	$1.87	$1.28	$3.10	$2.12	$4.55	$8.44	$6.99
$65\%F_{MSY}$	-$1.29	-$1.64	-$0.76	$0.65	$0.12	$1.27	$0.37	$2.62	$6.20	$4.86
$F_{REBUILD}(7)$	-$0.68	-$1.06	-$0.11	$1.40	$0.83	$2.41	$1.47	$3.83	$7.60	$6.19
$F_{REBUILD}(8)$	-$0.21	-$0.60	$0.39	$1.99	$1.39	$3.27	$2.29	$4.74	$8.66	$7.19
Low										
$F_{REBUILD}(10)$	$0.09	-$0.02	$0.25	$0.69	$0.53	$1.09	$0.83	$1.49	$2.55	$2.15
$75\%F_{MSY}$	-$0.08	-$0.18	$0.08	$0.49	$0.33	$0.80	$0.55	$1.18	$2.20	$1.82
$65\%F_{MSY}$	-$0.34	-$0.43	-$0.20	$0.17	$0.03	$0.33	$0.10	$0.68	$1.61	$1.26
$F_{REBUILD}(7)$	-$0.18	-$0.28	-$0.03	$0.36	$0.22	$0.63	$0.38	$1.00	$1.98	$1.61
$F_{REBUILD}(8)$	-$0.05	-$0.16	$0.10	$0.52	$0.36	$0.85	$0.60	$1.23	$2.25	$1.87

Table A-3b. Net present value of changes in CS to the recreational sector associated with the rebuilding strategy and recreational allocation alternatives over **4 years and 10 years**, assuming ACL=ABC, **ACT=75% of ACL**, and using a 7% discount rate. Dollar amounts are in million 2010 dollars.

Rebuilding Strategy	4-Year Horizon					10-Year Horizon				
	Recreational Allocation of ACL					Recreational Allocation of ACL				
	Alt 2a	Alt 2b	Alt 2c	Alt 2d	Alt 2e	Alt 2a	Alt 2b	Alt 2c	Alt 2d	Alt 2e
	48%	46%	51%	59%	56%	48%	46%	51%	59%	56%
High										
$F_{REBUILD}(10)$	-$1.02	-$1.46	-$0.35	$1.43	$0.76	$1.59	$0.52	$3.21	$7.50	$5.89
$75\%F_{MSY}$	-$1.69	-$2.11	-$1.07	$0.60	-$0.03	$0.42	-$0.61	$1.96	$6.06	$4.52
$65\%F_{MSY}$	-$2.73	-$3.11	-$2.17	-$0.68	-$1.24	-$1.51	-$2.45	-$0.09	$3.69	$2.28
$F_{REBUILD}(7)$	-$2.09	-$2.49	-$1.49	$0.10	-$0.49	-$0.30	-$1.30	$1.19	$5.17	$3.68
$F_{REBUILD}(8)$	-$1.59	-$2.01	-$0.96	$0.72	$0.09	$0.60	-$0.43	$2.15	$6.29	$4.74
Medium										
$F_{REBUILD}(10)$	-$0.85	-$1.22	-$0.29	$1.19	$0.64	$1.33	$0.43	$2.68	$6.28	$4.93
$75\%F_{MSY}$	-$1.41	-$1.76	-$0.89	$0.50	-$0.02	$0.35	-$0.51	$1.64	$5.07	$3.78
$65\%F_{MSY}$	-$2.29	-$2.60	-$1.82	-$0.57	-$1.04	-$1.26	-$2.05	-$0.07	$3.09	$1.90
$F_{REBUILD}(7)$	-$1.75	-$2.08	-$1.25	$0.09	-$0.41	-$0.25	-$1.09	$1.00	$4.33	$3.08
$F_{REBUILD}(8)$	-$1.33	-$1.68	-$0.80	$0.60	$0.08	$0.50	-$0.36	$1.80	$5.26	$3.96
Low										
$F_{REBUILD}(10)$	-$0.22	-$0.32	-$0.08	$0.31	$0.17	$0.35	$0.11	$0.70	$1.63	$1.28
$75\%F_{MSY}$	-$0.37	-$0.46	-$0.23	$0.13	-$0.01	$0.09	-$0.13	$0.43	$1.32	$0.98
$65\%F_{MSY}$	-$0.59	-$0.68	-$0.47	-$0.15	-$0.27	-$0.33	-$0.53	-$0.02	$0.80	$0.50
$F_{REBUILD}(7)$	-$0.45	-$0.54	-$0.32	$0.02	-$0.11	-$0.07	-$0.28	$0.26	$1.12	$0.80
$F_{REBUILD}(8)$	-$0.35	-$0.44	-$0.21	$0.16	$0.02	$0.13	-$0.09	$0.47	$1.37	$1.03

Use of Other Discount Rates

To determine the sensitivity of the foregoing results to the choice of a discount rate, the CS changes were re-estimated using two other discount rates. For this purpose, the five tables above were replicated using discount rates of 5 percent and 3 percent. Results using 5 percent discount rate are presented in Tables A-3a through A-3c for ACL-based analysis and Tables 6a and 6b for ACT-based analysis. Results using a 3 percent discount rate are presented in Tables A-4a through A-4c for ACL-based analysis and Tables 7a and 7b for ACT-based analysis.

The use of other discount rates resulted in changes to the magnitudes of all estimates and the direction of change for some estimates. However, the ranking of alternatives has been preserved.

Table A-4a. Net present value of changes in CS to the recreational sector associated with the rebuilding strategy and recreational allocation alternatives over **4 years and 10 years**, assuming **ACL=ABC** and using **5% discount rate**. Dollar amounts are in million 2010 dollars.

Rebuilding Strategy	4-Year Horizon					10-Year Horizon				
	Recreational Allocation of ACL					Recreational Allocation of ACL				
	Alt 2a	Alt 2b	Alt 2c	Alt 2d	Alt 2e	Alt 2a	Alt 2b	Alt 2c	Alt 2d	Alt 2e

	48%	46%	51%	59%	56%	48%	46%	51%	59%	56%
					High					
$F_{REBUILD}(10)$	$2.69	$2.07	$3.62	$6.10	$5.17	$11.52	$9.93	$13.90	$20.26	$17.87
$75\%F_{MSY}$	$1.75	$1.17	$2.62	$4.95	$4.08	$9.82	$8.30	$12.09	$18.16	$15.89
$65\%F_{MSY}$	$0.29	-$0.23	$1.07	$3.16	$2.38	$7.02	$5.62	$9.12	$14.72	$12.62
$F_{REBUILD}(7)$	$1.19	$0.63	$2.03	$4.26	$3.42	$8.77	$7.29	$10.98	$16.87	$14.66
$F_{REBUILD}(8)$	$1.89	$1.30	$2.77	$5.12	$4.24	$10.08	$8.55	$12.38	$18.49	$16.20
					Medium					
$F_{REBUILD}(10)$	$2.25	$1.73	$3.03	$5.11	$4.33	$9.64	$8.31	$11.63	$16.95	$14.95
$75\%F_{MSY}$	$1.46	$0.98	$2.19	$4.14	$3.41	$8.21	$6.94	$10.12	$15.19	$13.29
$65\%F_{MSY}$	$0.25	-$0.19	$0.90	$2.64	$1.99	$5.87	$4.70	$7.63	$12.32	$10.56
$F_{REBUILD}(7)$	$0.99	$0.53	$1.70	$3.56	$2.86	$7.33	$6.10	$9.18	$14.12	$12.27
$F_{REBUILD}(8)$	$1.58	$1.09	$2.32	$4.28	$3.55	$8.43	$7.16	$10.35	$15.47	$13.55
					Low					
$F_{REBUILD}(10)$	$0.58	$0.45	$0.79	$1.33	$1.12	$2.51	$2.16	$3.02	$4.41	$3.89
$75\%F_{MSY}$	$0.38	$0.25	$0.57	$1.08	$0.89	$2.13	$1.80	$2.63	$3.95	$3.46
$65\%F_{MSY}$	$0.06	-$0.05	$0.23	$0.69	$0.52	$1.53	$1.22	$1.98	$3.20	$2.74
$F_{REBUILD}(7)$	$0.26	$0.14	$0.44	$0.93	$0.74	$1.91	$1.59	$2.39	$3.67	$3.19
$F_{REBUILD}(8)$	$0.41	$0.28	$0.60	$1.11	$0.92	$2.19	$1.86	$2.69	$4.02	$3.52

Table A-4b. Net present value of changes in CS to the recreational sector associated with the rebuilding strategy and recreational allocation alternatives over **4 years and 10 years**, assuming **ACL=90% of ABC** and using **5% discount rate**. Dollar amounts are in million 2010 dollars.

Rebuilding Strategy	**4-Year Horizon**					**10-Year Horizon**				
	Recreational Allocation of ACL					Recreational Allocation of ACL				
	Alt 2a	Alt 2b	Alt 2c	Alt 2d	Alt 2e	Alt 2a	Alt 2b	Alt 2c	Alt 2d	Alt 2e
	48%	46%	51%	59%	56%	48%	46%	51%	59%	56%
					High					
$F_{REBUILD}(10)$	$1.20	$0.64	$2.03	$4.27	$3.43	$7.71	$6.28	$9.85	$15.57	$13.43
$75\%F_{MSY}$	$0.35	-$0.17	$1.14	$3.23	$2.45	$6.17	$4.81	$8.22	$13.69	$11.64
$65\%F_{MSY}$	-$0.96	-$1.43	-$0.25	$1.62	$0.92	$3.65	$2.39	$5.55	$10.59	$8.70
$F_{REBUILD}(7)$	-$0.15	-$0.66	$0.60	$2.61	$1.86	$5.23	$3.90	$7.22	$12.53	$10.54
$F_{REBUILD}(8)$	$0.48	-$0.05	$1.27	$3.39	$2.59	$6.41	$5.04	$8.48	$13.98	$11.92
					Medium					
$F_{REBUILD}(10)$	$1.00	$0.53	$1.70	$3.57	$2.87	$6.45	$5.25	$8.24	$13.03	$11.23
$75\%F_{MSY}$	$0.29	-$0.14	$0.95	$2.70	$2.05	$5.16	$4.02	$6.88	$11.45	$9.73
$65\%F_{MSY}$	-$0.80	-$1.19	-$0.21	$1.36	$0.77	$3.06	$2.00	$4.64	$8.86	$7.28
$F_{REBUILD}(7)$	-$0.13	-$0.55	$0.50	$2.19	$1.55	$4.37	$3.26	$6.04	$10.48	$8.81
$F_{REBUILD}(8)$	$0.40	-$0.04	$1.06	$2.83	$2.17	$5.36	$4.21	$7.09	$11.70	$9.97
					Low					
$F_{REBUILD}(10)$	$0.26	$0.14	$0.44	$0.93	$0.75	$1.68	$1.37	$2.14	$3.39	$2.92
$75\%F_{MSY}$	$0.08	-$0.04	$0.25	$0.70	$0.53	$1.34	$1.05	$1.79	$2.98	$2.53
$65\%F_{MSY}$	-$0.21	-$0.31	-$0.06	$0.35	$0.20	$0.79	$0.52	$1.21	$2.30	$1.89
$F_{REBUILD}(7)$	-$0.03	-$0.14	$0.13	$0.57	$0.40	$1.14	$0.85	$1.57	$2.72	$2.29
$F_{REBUILD}(8)$	$0.10	-$0.01	$0.28	$0.74	$0.56	$1.39	$1.10	$1.84	$3.04	$2.59

Table A-4c. Net present value of changes in CS to the recreational sector associated with the rebuilding strategy and recreational allocation alternatives over **4 years and 10 years**, assuming **ACL=80% of ABC** and using **5% discount rate**. Dollar amounts are in million 2010 dollars.

Rebuilding Strategy	4-Year Horizon					10-Year Horizon				
	Recreational Allocation of ACL					Recreational Allocation of ACL				
	Alt 2a	Alt 2b	Alt 2c	Alt 2d	Alt 2e	Alt 2a	Alt 2b	Alt 2c	Alt 2d	Alt 2e
	48%	46%	51%	59%	56%	48%	46%	51%	59%	56%
High										
$F_{REBUILD}(10)$	-$0.29	-$0.79	$0.45	$2.44	$1.69	$3.89	$2.62	$5.80	$10.88	$8.98
$75\%F_{MSY}$	-$1.05	-$1.51	-$0.35	$1.52	$0.82	$2.53	$1.32	$4.35	$9.21	$7.39
$65\%F_{MSY}$	-$2.21	-$2.63	-$1.58	$0.08	-$0.54	$0.29	-$0.83	$1.97	$6.46	$4.77
$F_{REBUILD}(7)$	-$1.49	-$1.94	-$0.82	$0.96	$0.29	$1.69	$0.51	$3.46	$8.18	$6.41
$F_{REBUILD}(8)$	-$0.93	-$1.40	-$0.23	$1.65	$0.95	$2.74	$1.52	$4.58	$9.47	$7.64
Medium										
$F_{REBUILD}(10)$	-$0.25	-$0.66	$0.38	$2.04	$1.42	$3.26	$2.19	$4.85	$9.10	$7.51
$75\%F_{MSY}$	-$0.87	-$1.26	-$0.29	$1.27	$0.68	$2.12	$1.10	$3.64	$7.70	$6.18
$65\%F_{MSY}$	-$1.85	-$2.20	-$1.32	$0.07	-$0.45	$0.24	-$0.69	$1.65	$5.40	$3.99
$F_{REBUILD}(7)$	-$1.25	-$1.62	-$0.69	$0.81	$0.25	$1.42	$0.43	$2.90	$6.84	$5.36
$F_{REBUILD}(8)$	-$0.78	-$1.17	-$0.19	$1.38	$0.79	$2.30	$1.27	$3.83	$7.92	$6.39
Low										
$F_{REBUILD}(10)$	-$0.06	-$0.17	$0.10	$0.53	$0.37	$0.85	$0.57	$1.26	$2.37	$1.95
$75\%F_{MSY}$	-$0.23	-$0.33	-$0.08	$0.33	$0.18	$0.55	$0.29	$0.95	$2.00	$1.61
$65\%F_{MSY}$	-$0.48	-$0.57	-$0.34	$0.02	-$0.12	$0.06	-$0.18	$0.43	$1.40	$1.04
$F_{REBUILD}(7)$	-$0.32	-$0.42	-$0.18	$0.21	$0.06	$0.37	$0.11	$0.75	$1.78	$1.39
$F_{REBUILD}(8)$	-$0.20	-$0.31	-$0.05	$0.36	$0.21	$0.60	$0.33	$1.00	$2.06	$1.66

Table A-5a. Net present value of changes in CS to the recreational sector associated with the rebuilding strategy and recreational allocation alternatives over **4 years and 10 years**, assuming **ACL=ABC** and using **3% discount rate**. Dollar amounts are in million 2010 dollars.

Rebuilding Strategy	4-Year Horizon					10-Year Horizon				
	Recreational Allocation of ACL					Recreational Allocation of ACL				
	Alt 2a	Alt 2b	Alt 2c	Alt 2d	Alt 2e	Alt 2a	Alt 2b	Alt 2c	Alt 2d	Alt 2e
	48%	46%	51%	59%	56%	48%	46%	51%	59%	56%
High										
$F_{REBUILD}(10)$	$2.85	$2.20	$3.83	$6.44	$5.46	$13.08	$11.31	$15.73	$22.81	$20.16
$75\%F_{MSY}$	$1.87	$1.26	$2.79	$5.23	$4.31	$11.22	$9.53	$13.76	$20.53	$17.99
$65\%F_{MSY}$	$0.34	-$0.20	$1.17	$3.36	$2.54	$8.15	$6.59	$10.50	$16.75	$14.41
$F_{REBUILD}(7)$	$1.28	$0.70	$2.16	$4.51	$3.63	$10.07	$8.43	$12.54	$19.12	$16.65
$F_{REBUILD}(8)$	$2.01	$1.40	$2.94	$5.41	$4.49	$11.51	$9.81	$14.07	$20.89	$18.33
Medium										
$F_{REBUILD}(10)$	$2.39	$1.84	$3.20	$5.39	$4.57	$10.94	$9.46	$13.16	$19.08	$16.86
$75\%F_{MSY}$	$1.56	$1.05	$2.33	$4.38	$3.61	$9.39	$7.97	$11.51	$17.17	$15.05
$65\%F_{MSY}$	$0.29	-$0.17	$0.98	$2.81	$2.12	$6.82	$5.51	$8.78	$14.02	$12.05
$F_{REBUILD}(7)$	$1.07	$0.58	$1.81	$3.77	$3.04	$8.43	$7.05	$10.49	$15.99	$13.93

$F_{REBUILD}(8)$	$1.69	$1.17	$2.46	$4.53	$3.75	$9.63	$8.20	$11.77	$17.47	$15.33
Low										
$F_{REBUILD}(10)$	$0.62	$0.48	$0.83	$1.40	$1.19	$2.84	$2.46	$3.42	$4.96	$4.38
$75\%F_{MSY}$	$0.41	$0.27	$0.61	$1.14	$0.94	$2.44	$2.07	$2.99	$4.46	$3.91
$65\%F_{MSY}$	$0.07	-$0.04	$0.25	$0.73	$0.55	$1.77	$1.43	$2.28	$3.64	$3.13
$F_{REBUILD}(7)$	$0.28	$0.15	$0.47	$0.98	$0.79	$2.19	$1.83	$2.73	$4.16	$3.62
$F_{REBUILD}(8)$	$0.44	$0.30	$0.64	$1.18	$0.98	$2.50	$2.13	$3.06	$4.54	$3.99

Table A-5b. Net present value of changes in CS to the recreational sector associated with the rebuilding strategy and recreational allocation alternatives over **4 years and 10 years**, assuming **ACL=90% of ABC** and using **3% discount rate**. Dollar amounts are in million 2010 dollars.

Rebuilding Strategy	**4-Year Horizon**					**10-Year Horizon**				
	Recreational Allocation of ACL					Recreational Allocation of ACL				
	Alt 2a	Alt 2b	Alt 2c	Alt 2d	Alt 2e	Alt 2a	Alt 2b	Alt 2c	Alt 2d	Alt 2e
	48%	46%	51%	59%	56%	48%	46%	51%	59%	56%
High										
$F_{REBUILD}(10)$	$1.29	$0.70	$2.17	$4.52	$3.63	$8.83	$7.24	$11.22	$17.59	$15.20
$75\%F_{MSY}$	$0.40	-$0.15	$1.23	$3.43	$2.60	$7.16	$5.63	$9.44	$15.53	$13.25
$65\%F_{MSY}$	-$0.97	-$1.46	-$0.23	$1.74	$1.00	$4.40	$2.99	$6.51	$12.14	$10.03
$F_{REBUILD}(7)$	-$0.13	-$0.66	$0.67	$2.78	$1.99	$6.13	$4.65	$8.35	$14.27	$12.05
$F_{REBUILD}(8)$	$0.53	-$0.02	$1.37	$3.59	$2.76	$7.42	$5.89	$9.72	$15.86	$13.56
Medium										
$F_{REBUILD}(10)$	$1.08	$0.58	$1.81	$3.78	$3.04	$7.39	$6.06	$9.39	$14.72	$12.72
$75\%F_{MSY}$	$0.34	-$0.13	$1.03	$2.87	$2.18	$5.99	$4.71	$7.90	$12.99	$11.08
$65\%F_{MSY}$	-$0.81	-$1.23	-$0.19	$1.46	$0.84	$3.68	$2.50	$5.44	$10.16	$8.39
$F_{REBUILD}(7)$	-$0.11	-$0.55	$0.56	$2.33	$1.66	$5.12	$3.89	$6.98	$11.93	$10.08
$F_{REBUILD}(8)$	$0.45	-$0.02	$1.14	$3.00	$2.31	$6.21	$4.92	$8.13	$13.27	$11.34
Low										
$F_{REBUILD}(10)$	$0.28	$0.15	$0.47	$0.98	$0.79	$1.92	$1.57	$2.44	$3.83	$3.31
$75\%F_{MSY}$	$0.09	-$0.03	$0.27	$0.75	$0.57	$1.56	$1.23	$2.05	$3.38	$2.88
$65\%F_{MSY}$	-$0.21	-$0.32	-$0.05	$0.38	$0.22	$0.96	$0.65	$1.42	$2.64	$2.18
$F_{REBUILD}(7)$	-$0.03	-$0.14	$0.14	$0.60	$0.43	$1.33	$1.01	$1.82	$3.10	$2.62
$F_{REBUILD}(8)$	$0.12	-$0.01	$0.30	$0.78	$0.60	$1.61	$1.28	$2.11	$3.45	$2.95

Table A-5c. Net present value of changes in CS to the recreational sector associated with the rebuilding strategy and recreational allocation alternatives over **4 years and 10 years**, assuming **ACL=80% of ABC** and using **3% discount rate**. Dollar amounts are in million 2010 dollars.

Rebuilding Strategy	**4-Year Horizon**					**10-Year Horizon**				
	Recreational Allocation of ACL					Recreational Allocation of ACL				
	Alt 2a	Alt 2b	Alt 2c	Alt 2d	Alt 2e	Alt 2a	Alt 2b	Alt 2c	Alt 2d	Alt 2e
	48%	46%	51%	59%	56%	48%	46%	51%	59%	56%
High										
$F_{REBUILD}(10)$	-$0.28	-$0.80	$0.50	$2.59	$1.81	$4.58	$3.17	$6.71	$12.37	$10.25
$75\%F_{MSY}$	-$1.07	-$1.56	-$0.33	$1.62	$0.89	$3.10	$1.74	$5.13	$10.54	$8.51
$65\%F_{MSY}$	-$2.29	-$2.72	-$1.63	$0.12	-$0.53	$0.64	-$0.61	$2.52	$7.53	$5.65

$F_{REBUILD}(7)$	-$1.54	-$2.01	-$0.83	$1.05	$0.34	$2.18	$0.86	$4.15	$9.41	$7.44
$F_{REBUILD}(8)$	-$0.95	-$1.44	-$0.21	$1.77	$1.03	$3.33	$1.97	$5.38	$10.83	$8.78
Medium										
$F_{REBUILD}(10)$	-$0.23	-$0.67	$0.42	$2.17	$1.51	$3.84	$2.65	$5.61	$10.35	$8.57
$75\%F_{MSY}$	-$0.89	-$1.30	-$0.28	$1.36	$0.74	$2.59	$1.46	$4.29	$8.82	$7.12
$65\%F_{MSY}$	-$1.91	-$2.28	-$1.36	$0.10	-$0.45	$0.54	-$0.51	$2.11	$6.30	$4.72
$F_{REBUILD}(7)$	-$1.28	-$1.68	-$0.70	$0.88	$0.29	$1.82	$0.72	$3.47	$7.88	$6.22
$F_{REBUILD}(8)$	-$0.79	-$1.21	-$0.17	$1.48	$0.86	$2.79	$1.65	$4.50	$9.06	$7.35
Low										
$F_{REBUILD}(10)$	-$0.06	-$0.17	$0.11	$0.56	$0.39	$1.00	$0.69	$1.46	$2.69	$2.23
$75\%F_{MSY}$	-$0.23	-$0.34	-$0.07	$0.35	$0.19	$0.67	$0.38	$1.12	$2.29	$1.85
$65\%F_{MSY}$	-$0.50	-$0.59	-$0.35	$0.03	-$0.12	$0.14	-$0.13	$0.55	$1.64	$1.23
$F_{REBUILD}(7)$	-$0.33	-$0.44	-$0.18	$0.23	$0.07	$0.47	$0.19	$0.90	$2.05	$1.62
$F_{REBUILD}(8)$	-$0.21	-$0.31	-$0.05	$0.38	$0.22	$0.72	$0.43	$1.17	$2.36	$1.91

Table A-6a. Net present value of changes in CS to the recreational sector associated with the rebuilding strategy and recreational allocation alternatives over **4 years and 10 years**, assuming **ACT=85% of ACL,** ACL=ABC, and using **5% discount rate**. Dollar amounts are in million 2010 dollars.

Rebuilding Strategy	**4-Year Horizon**					**10-Year Horizon**				
	Recreational Allocation of ACL					Recreational Allocation of ACL				
	Alt 2a	Alt 2b	Alt 2c	Alt 2d	Alt 2e	Alt 2a	Alt 2b	Alt 2c	Alt 2d	Alt 2e
	48%	46%	51%	59%	56%	48%	46%	51%	59%	56%
High										
$F_{REBUILD}(10)$	$0.45	-$0.08	$1.24	$3.35	$2.56	$5.80	$4.45	$7.83	$13.23	$11.20
$75\%F_{MSY}$	-$0.35	-$0.84	$0.40	$2.37	$1.63	$4.35	$3.06	$6.29	$11.45	$9.51
$65\%F_{MSY}$	-$1.58	-$2.03	-$0.92	$0.85	$0.19	$1.97	$0.78	$3.76	$8.52	$6.74
$F_{REBUILD}(7)$	-$0.82	-$1.30	-$0.11	$1.79	$1.08	$3.46	$2.21	$5.34	$10.35	$8.47
$F_{REBUILD}(8)$	-$0.23	-$0.73	$0.52	$2.52	$1.77	$4.58	$3.28	$6.53	$11.73	$9.78
Medium										
$F_{REBUILD}(10)$	$0.38	-$0.06	$1.04	$2.81	$2.14	$4.85	$3.72	$6.55	$11.06	$9.37
$75\%F_{MSY}$	-$0.29	-$0.70	$0.33	$1.99	$1.36	$3.64	$2.56	$5.26	$9.58	$7.96
$65\%F_{MSY}$	-$1.32	-$1.70	-$0.77	$0.71	$0.16	$1.65	$0.65	$3.14	$7.13	$5.63
$F_{REBUILD}(7)$	-$0.69	-$1.09	-$0.09	$1.50	$0.90	$2.90	$1.85	$4.47	$8.66	$7.09
$F_{REBUILD}(8)$	-$0.19	-$0.61	$0.44	$2.11	$1.48	$3.83	$2.74	$5.46	$9.81	$8.18
Low										
$F_{REBUILD}(10)$	$0.10	-$0.02	$0.27	$0.73	$0.56	$1.26	$0.97	$1.70	$2.88	$2.44
$75\%F_{MSY}$	-$0.08	-$0.18	$0.09	$0.52	$0.35	$0.95	$0.67	$1.37	$2.49	$2.07
$65\%F_{MSY}$	-$0.34	-$0.44	-$0.20	$0.19	$0.04	$0.43	$0.17	$0.82	$1.85	$1.47
$F_{REBUILD}(7)$	-$0.18	-$0.28	-$0.02	$0.39	$0.23	$0.75	$0.48	$1.16	$2.25	$1.84
$F_{REBUILD}(8)$	-$0.05	-$0.16	$0.11	$0.55	$0.39	$1.00	$0.71	$1.42	$2.55	$2.13

Table A-6b. Net present value of changes in CS to the recreational sector associated with the rebuilding strategy and recreational allocation alternatives over **4 years and 10 years**, assuming **ACT=75% of ACL,** ACL=ABC, and using **5% discount rate**. Dollar amounts are in million 2010 dollars.

Rebuilding Strategy	**4-Year Horizon**					**10-Year Horizon**				
	Recreational Allocation of ACL					Recreational Allocation of ACL				
	Alt 2a	Alt 2b	Alt 2c	Alt 2d	Alt 2e	Alt 2a	Alt 2b	Alt 2c	Alt 2d	Alt 2e
	48%	46%	51%	59%	56%	48%	46%	51%	59%	56%
	High									
$F_{REBUILD}(10)$	-$1.04	-$1.51	-$0.34	$1.52	$0.82	$1.99	$0.80	$3.77	$8.54	$6.75
$75\%F_{MSY}$	-$1.74	-$2.18	-$1.09	$0.66	$0.00	$0.71	-$0.43	$2.42	$6.97	$5.26
$65\%F_{MSY}$	-$2.83	-$3.23	-$2.25	-$0.68	-$1.27	-$1.39	-$2.44	$0.19	$4.39	$2.81
$F_{REBUILD}(7)$	-$2.16	-$2.58	-$1.53	$0.14	-$0.49	-$0.08	-$1.18	$1.58	$6.00	$4.35
$F_{REBUILD}(8)$	-$1.64	-$2.08	-$0.98	$0.79	$0.12	$0.91	-$0.24	$2.63	$7.22	$5.50
	Medium									
$F_{REBUILD}(10)$	-$0.87	-$1.26	-$0.29	$1.27	$0.69	$1.66	$0.67	$3.16	$7.14	$5.65
$75\%F_{MSY}$	-$1.46	-$1.82	-$0.91	$0.55	$0.00	$0.59	-$0.36	$2.02	$5.83	$4.40
$65\%F_{MSY}$	-$2.37	-$2.70	-$1.88	-$0.57	-$1.06	-$1.16	-$2.04	$0.16	$3.67	$2.35
$F_{REBUILD}(7)$	-$1.81	-$2.16	-$1.28	$0.12	-$0.41	-$0.06	-$0.99	$1.32	$5.02	$3.63
$F_{REBUILD}(8)$	-$1.37	-$1.74	-$0.82	$0.66	$0.10	$0.76	-$0.20	$2.20	$6.04	$4.60
	Low									
$F_{REBUILD}(10)$	-$0.23	-$0.33	-$0.07	$0.33	$0.18	$0.43	$0.17	$0.82	$1.86	$1.47
$75\%F_{MSY}$	-$0.38	-$0.47	-$0.24	$0.14	$0.00	$0.15	-$0.09	$0.53	$1.52	$1.14
$65\%F_{MSY}$	-$0.62	-$0.70	-$0.49	-$0.15	-$0.28	-$0.30	-$0.53	$0.04	$0.95	$0.61
$F_{REBUILD}(7)$	-$0.47	-$0.56	-$0.33	$0.03	-$0.11	-$0.02	-$0.26	$0.34	$1.31	$0.95
$F_{REBUILD}(8)$	-$0.36	-$0.45	-$0.21	$0.17	$0.03	$0.20	-$0.05	$0.57	$1.57	$1.20

Table A-7a. Net present value of changes in CS to the recreational sector associated with the rebuilding strategy and recreational allocation alternatives over **4 years and 10 years**, assuming **ACT=85% of ACL,** ACL=ABC, and using **3% discount rate**. Dollar amounts are in million 2010 dollars.

Rebuilding Strategy	**4-Year Horizon**					**10-Year Horizon**				
	Recreational Allocation of ACL					Recreational Allocation of ACL				
	Alt 2a	Alt 2b	Alt 2c	Alt 2d	Alt 2e	Alt 2a	Alt 2b	Alt 2c	Alt 2d	Alt 2e
	48%	46%	51%	59%	56%	48%	46%	51%	59%	56%
	High									
$F_{REBUILD}(10)$	$0.50	-$0.05	$1.33	$3.55	$2.72	$6.71	$5.20	$8.96	$14.98	$12.73
$75\%F_{MSY}$	-$0.33	-$0.85	$0.45	$2.53	$1.75	$5.13	$3.69	$7.28	$13.04	$10.88
$65\%F_{MSY}$	-$1.63	-$2.09	-$0.93	$0.93	$0.23	$2.52	$1.19	$4.51	$9.83	$7.84
$F_{REBUILD}(7)$	-$0.83	-$1.33	-$0.08	$1.91	$1.16	$4.15	$2.75	$6.25	$11.84	$9.74
$F_{REBUILD}(8)$	-$0.21	-$0.73	$0.58	$2.68	$1.89	$5.38	$3.93	$7.55	$13.34	$11.17
	Medium									
$F_{REBUILD}(10)$	$0.42	-$0.04	$1.12	$2.97	$2.28	$5.61	$4.35	$7.50	$12.53	$10.65
$75\%F_{MSY}$	-$0.28	-$0.71	$0.37	$2.11	$1.46	$4.29	$3.09	$6.09	$10.91	$9.10
$65\%F_{MSY}$	-$1.36	-$1.75	-$0.78	$0.78	$0.20	$2.11	$1.00	$3.78	$8.23	$6.56
$F_{REBUILD}(7)$	-$0.70	-$1.11	-$0.07	$1.60	$0.97	$3.47	$2.30	$5.23	$9.90	$8.15
$F_{REBUILD}(8)$	-$0.17	-$0.61	$0.48	$2.24	$1.58	$4.50	$3.29	$6.31	$11.16	$9.34

	Low									
$F_{REBUILD}(10)$	$0.11	-$0.01	$0.29	$0.77	$0.59	$1.46	$1.13	$1.95	$3.26	$2.77
$75\%F_{MSY}$	-$0.07	-$0.19	$0.10	$0.55	$0.38	$1.12	$0.80	$1.58	$2.84	$2.37
$65\%F_{MSY}$	-$0.35	-$0.46	-$0.20	$0.20	$0.05	$0.55	$0.26	$0.98	$2.14	$1.70
$F_{REBUILD}(7)$	-$0.18	-$0.29	-$0.02	$0.42	$0.25	$0.90	$0.60	$1.36	$2.58	$2.12
$F_{REBUILD}(8)$	-$0.05	-$0.16	$0.13	$0.58	$0.41	$1.17	$0.85	$1.64	$2.90	$2.43

Table A-7b. Net present value of changes in CS to the recreational sector associated with the rebuilding strategy and recreational allocation alternatives over **4 years and 10 years**, assuming **ACT=75% of ACL,** ACL=ABC, and using **3% discount rate**. Dollar amounts are in million 2010 dollars.

Rebuilding Strategy	**4-Year Horizon**					**10-Year Horizon**				
	Recreational Allocation of ACL					Recreational Allocation of ACL				
	Alt 2a	Alt 2b	Alt 2c	Alt 2d	Alt 2e	Alt 2a	Alt 2b	Alt 2c	Alt 2d	Alt 2e
	48%	46%	51%	59%	56%	48%	46%	51%	59%	56%
	High									
$F_{REBUILD}(10)$	-$1.06	-$1.55	-$0.33	$1.63	$0.89	$2.46	$1.13	$4.45	$9.76	$7.77
$75\%F_{MSY}$	-$1.80	-$2.26	-$1.11	$0.72	$0.03	$1.07	-$0.20	$2.97	$8.05	$6.14
$65\%F_{MSY}$	-$2.94	-$3.36	-$2.33	-$0.68	-$1.30	-$1.23	-$2.41	$0.52	$5.22	$3.46
$F_{REBUILD}(7)$	-$2.24	-$2.68	-$1.58	$0.18	-$0.48	$0.21	-$1.03	$2.06	$6.99	$5.14
$F_{REBUILD}(8)$	-$1.69	-$2.15	-$1.00	$0.86	$0.16	$1.29	$0.01	$3.20	$8.32	$6.40
	Medium									
$F_{REBUILD}(10)$	-$0.89	-$1.30	-$0.28	$1.36	$0.75	$2.06	$0.95	$3.72	$8.17	$6.50
$75\%F_{MSY}$	-$1.51	-$1.89	-$0.93	$0.60	$0.03	$0.89	-$0.17	$2.48	$6.73	$5.14
$65\%F_{MSY}$	-$2.46	-$2.81	-$1.95	-$0.57	-$1.09	-$1.03	-$2.01	$0.44	$4.36	$2.89
$F_{REBUILD}(7)$	-$1.87	-$2.24	-$1.32	$0.15	-$0.40	$0.17	-$0.86	$1.72	$5.85	$4.30
$F_{REBUILD}(8)$	-$1.41	-$1.80	-$0.83	$0.72	$0.14	$1.08	$0.01	$2.68	$6.96	$5.35
	Low									
$F_{REBUILD}(10)$	-$0.23	-$0.34	-$0.07	$0.35	$0.19	$0.54	$0.25	$0.97	$2.12	$1.69
$75\%F_{MSY}$	-$0.39	-$0.49	-$0.24	$0.16	$0.01	$0.23	-$0.04	$0.65	$1.75	$1.34
$65\%F_{MSY}$	-$0.64	-$0.73	-$0.51	-$0.15	-$0.28	-$0.27	-$0.52	$0.11	$1.13	$0.75
$F_{REBUILD}(7)$	-$0.49	-$0.58	-$0.34	$0.04	-$0.10	$0.04	-$0.22	$0.45	$1.52	$1.12
$F_{REBUILD}(8)$	-$0.37	-$0.47	-$0.22	$0.19	$0.04	$0.28	$0.00	$0.70	$1.81	$1.39

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