APPENDIX H

Donald R. Kobayashi and Jeffrey J. Polovina, NMFS Honolulu Laboratory, *Time/Area Closure Analysis for the Turtle Take Reductions*

Time/Area Closure Analysis for Turtle Take Reductions

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Introduction

This report documents the steps taken at the National Marine Fisheries Service Honolulu Laboratory in response to the Order issued by Chief U.S. District Court Judge David Alan Ezra, District of Hawaii, in the case of CMC et al. versus NMFS et al.; CIVIL NO. 99-00152; dated November 23, 1999, to complete an analysis of the temporal and spatial distribution of interactions between Hawaii-based longline vessels and sea turtles to determine time and area closures that would provide the greatest benefit to sea turtles. This report will also examine the predicted effects of the emergency spatial closure of the longline fishing grounds within the area north of 28°N latitude and between 168°W and 150°W longitudes.

The Hawaii based longline fishery is a year-round, limited entry, high seas fishery targeting various billfishes and tunas in the Central Pacific Ocean. Most fishing activity takes place in the region bounded by 0-45°N latitude, 180°-140°W longitude (Figure 1). There were 114 active vessels making 1140 fishing trips in this fishery in 1998 (Ito & Machado, 1999). Sea turtle interactions in the Hawaii based longline fishery primarily involve four species with wide geographic ranges throughout the Eastern and Indo-West Pacific Ocean: loggerhead (*Caretta caretta*), leatherback (*Dermochelys coriacea*), olive ridley (*Lepidochelys olivacea*), and green (*Chelonia mydas*). Loggerheads are the most commonly encountered species, with an average annual fleet wide take of 370 individuals over the time period 1994-1998 (Kleiber, 1999). Leatherbacks, olive ridleys, and greens followed with averages of 166, 110, and 32 individuals taken per year, respectively. Leatherbacks are presently considered to be the most threatened of all of these species (Spotila et al., 1996); therefore, closures most beneficial to leatherbacks will be the focus of this report.

Methods

Previous analyses of sea turtle take in the Hawaii based longline fishery have primarily focused on overall take numbers (e.g., Kleiber, 1998), with less emphasis on take by area and/or time. The latter types of data are essential, however, towards constructing a time/area closure that will benefit sea turtles. The first objective of this report was to create a database of turtle take structured over time and area. This was accomplished by applying predictive statistical models to the attributes of each set of longline gear. These attributes include variables reported in the mandated federal logbook such as latitude, longitude, trip-type (a 3-value index expressing the fish species targeting practice of that particular fishing trip: swordfish, tuna, or mixed), month, and year, as well as other variables such as moon phase and satellite measured sea surface temperature (weekly 0.1 degree lat./lon. resolution MCSST) which were merged with the logbook data independently for this analysis, using exact location and date to determine the corresponding values. The statistical models for predicting turtle take were constructed from

detailed observations gathered by NMFS-SWR observers, which monitor approximately 5% of the total longline fleet activity. Observers are required to tally all turtle takes, and other ancillary data. [Modeling fleet-wide turtle take from this small subset of the data is preferable to using logbook data verbatim for these controversial interactions with protected species. Earlier work has shown that logbook derived estimates of turtle take account for only about 9% of the total take; i.e., there are about 11 times more turtles being taken than logbook data alone would indicate (Dinardo, 1993).] It should be pointed out that not all turtles that are "taken" are dead or will necessarily die later. The kill rates (kills per take) vary by species with loggerhead, leatherback, olive ridley, and green having estimated values of 0.18, 0.07, 0.34, and 0.01, respectively, averaged over 1994-1998 (including turtles already dead and turtles expected to die later from hooking injuries; Kleiber, 1999). Fleet-wide average annual kills over the same time period were estimated to be 65, 37, 11, and 0.3, respectively. This report presents management scenario impacts in the form of a scale-free percent change which could apply to takes or kills interchangeably and, since the long term survival of hooked turtles is not well understood for all species, take rates were not adjusted with kill rate estimates.

The statistical models used are known as generalized additive models (GAM's, see Hastie & Tibshirani, 1990). GAM's differ from more conventional models in that they can easily incorporate complex nonlinear effects from multiple sources. Other commonly used models such as generalized linear models (GLM), analysis of variance (ANOVA), and multiple regressions all assume a form of linearity with the predictor variables. But if, for example, we are attempting to model the per-set take of loggerhead turtles against SST, we might *a-priori* expect that there is an optimal temperature where turtle take is high, and varying degrees of reduced take to either side of this optimum turtle habitat (see Polovina et al., 2000). Conventional linear approaches would fail to capture this effect, or could produce misleading and/or nonsensical predictions due to a forced linearization of the underlying process. Linearity remains a special case of the GAM, and can be accommodated if the data suggest such an effect. When dealing with a suite of unknown effects, a conservative or precautionary approach should include models that can handle complex nonlinear effects as well as the simpler linear effects. The nonlinear effects in a GAM are expressed as a "smoother" function of each variable, whose sum effect (hence "additive") results in the predicted value of interest; in our case species-specific per-set turtle take. There are several choices for smoother function specification in a GAM; in our application we chose to use smoothing splines since these generally perform better with regard to the bias-variance tradeoff than lowess or kernel smoothers (Trevor Hastie, pers. comm.[1]).

Turtle take GAM's were constructed using the software package S-Plus (v. 3.4) running under IRIX 6.5.4 on an SGI Challenge L workstation. All observer data (n=2812 sets) and logbook data from un-observed trips (n=55785 sets) from the years 1994-1998 were examined. A set of variables common to both the observer and logbook databases were evaluated in the GAM's: latitude, longitude, trip-type, month, year, as well as the added variables moon phase and satellite measured SST. Stepwise procedures were used to identify variables with a statistically significant contribution toward predicting turtle take. The stepwise procedure initially started out with a fully saturated model with all variables specified with smoother functions, then the model is simplified by eliminating variables or using linear functions instead of nonlinear smoother functions. The rearward stepwise approach is favored in this type of

[1] Trevor Hastie, Professor of Statistics and Biostatistics, Stanford University.

statistical model (Trevor Hastie, pers. comm.[2]). The statistical criteria used for the automated acceptance or rejection of terms in the GAM is called the Akaike Information Criterion (AIC, see Akaike, 1974), which is a goodness of fit index penalized by the number of parameters in the model. Individual GAM's were run for each turtle species: loggerhead, leatherback, olive ridley, and green. Degrees of freedom in the smoother functions were reduced manually to eliminate unnecessary curvature in the functions. The individual smoother functions for each of the final models are shown graphically in Figures 2-5. The final loggerhead GAM included smoothed nonlinear effects from latitude, longitude, moon phase, and SST; and categorical effects from each month and each year. The final leatherback GAM included smoothed nonlinear effects from latitude and moon phase, a linear effect from longitude; and categorical effects from each month. The final olive ridley GAM included a smoothed nonlinear effect from moon phase, and a linear effect from SST. The final green GAM included a linear effect from longitude, and a smoothed nonlinear effect from moon phase. These GAM's were used to make per-set take predictions across the entire logbook database using the selected variables for each turtle species. Exploratory plots summarizing turtle take by latitude, longitude, and month were created.

The logbook database of turtle take was then examined in a series of computer simulations mimicking the effects of various protective management scenarios. Management scenarios were restricted to seasonal and spatial closures of the longline fishing grounds. Seasonal closures consisted of single month and adjacent multi-month closures spanning all possible combinations from 1-11 months in duration. Spatial closures consisted of latitudinal closures (i.e., "no fishing north of..."), longitudinal closures (i.e., "no fishing east of..."), and box closures, which combined the characteristics of a latitudinal closure and a longitudinal closure. These constraints on fishing effort were chosen due to the predominantly northward and westward distributions of leatherback turtle take, and the orientation of the fishing grounds with respect to the Hawaiian island chain; hence, spatial closures were examined at the resolution of whole degrees with "north of" values ranging from 20°N-40°N latitudes and "east of" values ranging from 174°W-145°W longitudes. Seasonal and spatial closures were combined in two possible ways with the first being a "separated" mode where the seasonal closure impacts all areas for the duration of the closed season, while the spatial closure is in effect for all time. The second type of seasonal and spatial closure combination is a "merged" mode, where the seasonal closure only applies to the spatial closure region; similarly the spatial closure is only closed for the duration of the seasonal closure. In any given management action simulation, fishing effort, fish catch, fish catch revenue, and turtle take of all species were tabulated for two ways, the first being the "static" mode where the fishing activity is assumed to not adjust after any management action, and any lost fishing effort due to a spatial and/or seasonal closures is simply obliterated from existence. In the "dynamic" mode, the fishery is assumed to respond to the closures in a predictable manner. For spatial closures, it was assumed that complete spatial reallocation of lost fishing activity would occur, and this was modeled using monthly trip-type based expansions of open-area fishing activity. For seasonal closures, it was assumed that a maximum of one month's fishing activity could be reallocated symmetrically to adjacent months bounding the seasonal closure; operationally this was approximated by allocating each lost set with a multiplier of 0.5/(number of closed months) to each bounding month. For this report, all years of data were combined to provide an average historical effect of a given management scenario.

[2] Trevor Hastie, Professor of Statistics and Biostatistics, Stanford University.

It should be noted that reallocation is based upon existing fishing patterns and this leads to several important points: 1) reallocation could possibly *not* occur, if there were no entries in the appropriate month-trip-type-area strata, 2) unfished month-trip-type-area strata will remain unfished, i.e., we do not account for possible expansion of the fishing grounds, and 3) management mechanisms currently in place and reflected in the data are accounted for in the reallocation, i.e., protective influences of the existing 50 nautical mile longline closures around the Northwestern Hawaiian Islands are retained, and all predicted changes from *status-quo* are considered as supplemental to existing effects.

Fish catch revenue impacts of each closure scenario were calculated based upon the values of individual fish kept or lost due to the closure. These data were made available from recent economic analyses of the longline fishery (Sam Pooley, pers. comm.[3]). Ex-vessel prices ($ / pound) and values ($ / fish) were calculated for all major species by month and trip-type (broadbill, mixed, tuna) for the 1998 fishing year by merging the NMFS sample of wholesale market prices with trips identified in the NMFS logbook reports for 1998. These values were applied to estimated catches in each time-area strata to estimate ex-vessel revenues. The NMFS wholesale sample was roughly 30-35% of all longline transactions in 1998. Previous analysis has shown consistency with the HDAR longline price reports for recent years. Where no data were available for a species-month-trip-type strata, extrapolations for that month and species were used, weighted by annual average differences between trip-types. Economic values by area (1-degree square) were not available in time for the time-area analysis. While there are systematic differences in economic values by area, preliminary analysis of revenue by latitude did not indicate substantial differences between using aggregated and disaggregated price and value data. Economic values over time (e.g., 1994-98) were also unavailable. Again, however, preliminary comparison of 1998 with the 1994-98 average values did not show substantial differences in aggregate effects (although values for individual species may have varied substantially, these were usually smoothed when taking all species into account).

After accounting for all possible combinations of seasonal and spatial closures under separated, merged, static, and dynamic modes; a total of 361,194 possible management scenarios were evaluated. Evaluation was based on several important criteria such as percent change in turtle take by species or in aggregate, percent of fishing activity (longline gear sets) disrupted by the management action (i.e., static), percent of fishing activity lost after reallocation (i.e., dynamic), and percent change in fish catch revenue. For simplicity all scenarios were firstly partitioned into bins (e.g., 0-5%, 5%-10%, 10%-15%, etc.) based upon values of the dynamic percent change in leatherback turtle take, since this appears to be the primary species of concern for protective measures. Within these bins of leatherback take, the results were further sorted to discover optimal scenarios based on the criteria mentioned above, particularly the static value of fishing effort impact. This value of fishing effort disruption is an attractive criterion for gauging the impact of a time/area closure because it makes no assumptions about reallocation of lost fishing effort and is, therefore, useful in comparing different types of closure scenarios. We feel that fishing effort disrupted by the closure provides a basic measure of the impact of the closure because it provides a measure of the fraction of the effort which is impacted by the closure but stops short of making further assumptions about how the fleet responds to that disruption and the economic impacts of this hypothetical response. Our economist, Region staff, and some industry members are not confident that we can model the fleet response and resulting economics with

[3] Sam Pooley, Chief of Fishery Management & Performance Investigation, NMFS Honolulu Laboratory.

sufficient accuracy to use it as the basis to optimize the best closures. Several multi-criteria optimizations were also attempted, such as simply summing static percent fishing activity lost and dynamic percent fishing activity lost to form a sum of percents. This particular optimization would search for a scenario with a minimal combined effect of disruption of fishing activity and net loss of fishing activity after adjustment to a seasonal and/or spatial closure. Another multi-criteria optimization summed the individual turtle species' take change together. This optimization would search for a scenario that best reduced the take of all turtle species, in an equally weighted fashion. A larger multi-criteria optimization was formed by appropriately combining the two previously mentioned optimizations while paying close attention to arithmetic sign, so that the final criterion can both minimize disruption/loss while maximizing aggregate take reduction. For a given optimization, there were often many scenarios that nearly equally well met the optimization criteria, even at the resolution of whole degrees of latitude/longitude and whole months of time. The output from these exercises is lengthy, and it is difficult to pick a clearly superior solution for a given optimization. Scenarios that differ in only a few percentage points are probably not significantly different from each other based upon some preliminary analyses of variability. For this reason, many scenarios should be evaluated together with additional input and criteria from fishermen, industry, and other concerned parties.

Variability was estimated by constructing 95% variability bands around the values of interest using a randomization bootstrap procedure (see Efron & Gong, 1983). In this procedure, individual longline sets in the observer database were randomly resampled with replacement to construct a new database of the same original size. The GAM's were evaluated with this new dataset, and a new fleet-wide set of predicted turtle takes generated. This process was repeated 100 times and the distributions of the final values were used to address variability. The nonparametric or empirical variability bands were constructed by sorting the values from low to high and using the $2.5\%^{th}$ and the $97.5\%^{th}$ values to identify the medial 95% of the distribution. This approach was used to explore variability of optimal management scenarios for leatherback turtle take.

The predicted effect of the Emergency[4] closure was examined using the same fleet-wide turtle take database. The effects on fish catch and fish catch revenue were also examined, under both static and dynamic reallocation modes. These results were compared to the results from the optimizations.

Results & Discussion

The results of this report will focus on optimal time/area closures with emphasis on leatherback turtles. The exploratory graphical analyses (Figures 6-7) indicated that April and May accounted for the highest monthly leatherback takes, with a relatively widespread spatial distribution. This is in contrast to olive ridleys and especially loggerheads, which have relatively well defined latitudinal ranges. Olive ridleys tend to be taken more in the southerly regions of the fishing grounds, while loggerheads are primarily taken in the northerly regions.

Results from all scenarios are plotted graphically in Figure 8, using leatherback turtle take on the x-axis, and fishing effort disruption on the y-axis. This method of presenting the data

[4] David Alan Ezra, Chief U.S. District Court Judge, District of Hawaii.

is very similar to the "efficient frontier", a financial concept used in Modern Portfolio Theory (Markowitz, 1991). The graph displays an envelope of points representing the hyperspace of possible outcomes. The efficient frontier is the point at which one quantity of interest is optimized at some preset value of another quantity of interest (in finance the plot would be of risk versus return). In Figure 8, fishing effort disruption is the quantity to be optimized, and the efficient frontier is the trace of points at the highest elevation for a given value of leatherback turtle take. Further examination of the management scenarios focused upon values along several of these efficient frontiers.

The 5 best scenarios per take reduction bin for each of the 10 different types of management regimes are broken down in Figure 9 for leatherback turtle take and fishing effort disruption. This shows the performance and capability of various types of time and/or area closures. Note that, to achieve optimal solutions at high levels of turtle take reduction, separated mode combinations of seasonal and spatial closures are required. At lower levels of turtle take reduction, simpler merged mode combinations or spatial closures only may be adequate. Generally, combinations of seasonal and spatial closures provide the best solutions when targeting a particular level of turtle take reduction, at least when best is defined as having the least impact of fishing effort disruption.

The efficient frontier margin for leatherbacks, estimated with a high degree polynomial fit to 1% bin points, is shown in Figure 10. Variability along the leatherback turtle efficient frontier is shown in Figure 11, where each best scenario per 1% take bin is bootstrapped 100 times, with the medial 95% of values bounded by a variability band. This approach will allow construction of nonparametric or empirical variability bands around not only the efficient frontier, but also to any specific output for a given management scenario. Revenue values from the efficient frontier for fishing effort disruption are shown in Figure 12. Note that this plot does not show an efficient frontier since revenue was not the value under optimization (earlier attempts at this approach were unsuccessful due to unstable boundary solutions, i.e., proposing nearly 100% fishing effort disruption to inflate low sample size revenue values). This figure is presented to indicate how revenue is predicted to change for targeted levels of leatherback turtle take reduction at optimal values of fishing effort disruption. This is only revenue changes from changes in fish catch quantity and composition, and does not include potential additional costs associated with compliance to a management scenario (e.g., transit costs, loss of fishing days). Figures 13-15 show how the takes of other turtle species change along the efficient frontier for leatherback turtle take and fishing effort disruption. These are also not true efficient frontiers since the take rates for loggerhead, olive ridley, and green were not optimized. These show predicted changes in take for other turtle species along the leatherback efficient frontier with respect to optimized fishing effort disruption. Figure 13 is particularly interesting because it highlights some closures that reduce leatherback takes and also substantially reduce loggerhead takes. Specifically for the closures that reduce leatherback takes by 20-30% and by 50-60% there are some closures that also reduce loggerhead takes by 40-55% (Figure 13). Additionally, the true efficient frontiers of other turtle takes are plotted on Figures 13-15, these are easily distinguished from the above by their relative smoothness and magnitude of turtle take reductions. These scenarios, however, tend to disrupt the fishery to a greater extent (see Appendix 3).

Appendix 1 shows the best 10 results for 19 bins of leatherback turtle take reduction. The optimization criterion in these scenarios was to minimize disruption of fishing effort. Other

criteria, including multi-criteria, were attempted, but until they are better refined, the simple disruption of fishing effort appears to provide the best optimization index. Some problems with the multi-criteria optimizations included high fishing effort disruption balanced by an assumed complete spatial reallocation to a small area; this optimization needs to be constrained to minimize disruption and loss separately, summing these two changes resulted in lost information content. The aggregated turtle take reduction optimization suffered from excessive weighting towards loggerhead solutions, since these were the most easily reduced; again, summing the take changes resulted in lost information content, a penalty function for asymmetry may be the solution. For the fishing effort disruption criterion, even this small subset of the simulation output comprises 190 management scenarios, each one worthy of consideration for a particular level of targeted leatherback turtle take. These 190 scenarios represent the most efficient management actions to consider with regard to leatherback turtle protection. It is important to present many scenarios that, while differing in only a degree of latitude or a degree of longitude or a single month, fall upon a similar location on the efficient frontier because subtle differences in management tactic may be very important from the perspective of a longline fisherman. For example, the transit time/expense for a single degree of latitude/longitude is non-trivial. If travel time increases by only a single day per trip, the net loss to a fisherman was estimated to be $4,000 per year in 1993 (Hamilton et al., 1996). The loss of a single day of fishing (i.e., approximately one longline set) per trip was estimated to incur an annual cost of $16,000.

Several scenarios from Appendix 1 will be discussed, focusing on several arbitrary leatherback take reduction bins. In sub-table #11 (50%-55%), all 10 scenarios are separated mode seasonal spatial combinations, which close the months of April and May. All 10 have similar effects on fishing effort disruption as well as fishing effort loss and fish catch revenue after reallocation. Of interest is that only the latitudinal closures allow a reduction in green turtles, and they also tend to reduce loggerheads and leatherbacks the most. In sub-table #12 (55%-60%), there are several entries that produce double-digit reductions in all four turtle species while minimizing fishing effort disruption. Considering the highly different spatial and temporal patterns of take among the turtle species, it is surprising that a single closure type can be effective for all species, while still qualifying as "best" with respect to fishing effort disruption. Several other types of separated latitudinal closures (see Appendix 1 sub-tables #5 and #6) prove to be highly effective at reducing leatherback and loggerhead turtle take simultaneously along the efficient frontier. These closures take advantage of the predictable latitudinal patterns of loggerhead turtle take.

The predicted effects of the Emergency closure are summarized in Table 1. Firstly, turtle take effects are presented with FE, LO, LE, RI, and GR referencing changes in fishing effort, loggerhead, leatherback, olive ridley, and green sea turtle takes, respectively. The additional notations 1 and 2 refer to static and dynamic mode, respectively, i.e., without and with reallocation. Since this is a strictly spatial closure, the simulation reallocated 100% of the disrupted fishing effort. The second table presents the fish catch effects for some of the major species, where SW, BI, AL, YE, and BL reference changes in swordfish, bigeye tuna, albacore tuna, yellowfin tuna, and bluefin tuna catch. The RE references the total fish catch revenue change using the entire catch, including many minor species not listed in the table. The effects are broken down by year (YY) and the multi-year average (AVG) is presented at the bottom of each table. This scenario is predicted to be somewhat detrimental to olive ridley and green turtles, while producing a relatively small protective effect for leatherback turtles, the species for which it was originally intended. It disrupts approximately 13% of the fishing effort with a small

decrease in fish catch revenue. The Emergency closure scenario is quite distant to the efficient frontier for all species, when compared to other management scenarios found in Appendix 1 at these levels of turtle take reduction. The symbol "E" is plotted on Figures 9-10 to indicate the predicted location of the Emergency closure in comparison to the other scenarios. Appendix 2 lists 25 management scenarios that disrupt longline fishery effort to approximately the same extent as the Emergency closure, but with more effective leatherback turtle take reduction.

As this report was being finalized, another appendix was prepared which includes optimizations for other turtle species within each bin of leatherback turtle take reduction. Appendix 3 lists 3 management scenarios each for optimal loggerhead, olive ridley, and green turtle take reductions, as well as a multi-criteria index representing aggregate turtle take reduction. This index was created by summing all 4 turtle species' percent change with an asymmetry penalty defined as twice the difference between the maximum and minimum percent change. The asymmetry penalty was used to avoid solutions that were highly effective at reducing only a single turtle species. Thusly, solutions were discovered which resulted in an approximately uniform reduction in all 4 turtle species at each level of leatherback turtle take reduction. Appendix 3 shows that for any level of leatherback take reduction it is possible to find closures that also greatly reduce takes of other turtles but with a very major adverse impact to the fishery

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Table 1. Predicted consequences of the Emergency closure.
See text for details.

YY	FE	LO1	LO2	LE1	LE2	RI1	RI2	GR1	GR2
94	-19%	-48%	-13%	-37%	-14%	-6%	6%	-10%	46%
95	-9%	-42%	-21%	-19%	-3%	-5%	1%	-8%	1%
96	-14%	-60%	-33%	-21%	-1%	-3%	6%	-13%	0%
97	-13%	-66%	-27%	-19%	-1%	-3%	2%	-11%	-0%
98	-11%	-42%	-17%	-14%	-3%	-5%	2%	-10%	-1%
AVG	-13%	-51%	-22%	-22%	-4%	-4%	3%	-11%	9%

YY	SW1	SW2	BI1	BI2	AL1	AL2	YE1	YE2	BL1	BL2	RE1	RE2
90	-4%	-0%	-1%	1%	-0%	0%	-1%	1%	0%	0%	-1%	1%
91	-49%	-18%	-16%	3%	-38%	-25%	-17%	1%	0%	0%	-33%	-6%
92	-52%	-6%	-14%	11%	-56%	-34%	-29%	-2%	0%	0%	-40%	2%
93	-42%	-9%	-15%	7%	-25%	2%	-14%	5%	0%	0%	-29%	-1%
94	-46%	-6%	-5%	2%	-21%	-2%	-6%	4%	-32%	16%	-23%	-1%
95	-25%	-5%	-4%	2%	-6%	-1%	-5%	2%	-27%	-14%	-11%	0%
96	-45%	-22%	-4%	10%	-8%	-1%	-8%	9%	-41%	-26%	-17%	1%
97	-42%	-9%	-4%	2%	-4%	0%	-6%	1%	-21%	-10%	-15%	-1%
98	-29%	-5%	-6%	1%	-5%	1%	-6%	1%	-21%	1%	-12%	-0%
99	-31%	-5%	-7%	1%	-6%	1%	-11%	-4%	-27%	-17%	-15%	-2%
AVG	-37%	-9%	-8%	4%	-17%	-6%	-10%	2%	-17%	-5%	-20%	-1%

Figure captions

Figure 1. Map of Hawaii based longline fishing effort (1994-1998) and location of Emergency closure.

Figure 2. Smoother functions for loggerhead turtle GAM.

Figure 3. Smoother functions for leatherback turtle GAM.

Figure 4. Smoother functions for olive ridley turtle GAM.

Figure 5. Smoother functions for green turtle GAM.

Figure 6. Turtle take in the Hawaii based longline fishery by month, 1994-1998.

Figure 7. Turtle take in the Hawaii based longline fishery by latitude and longitude, 1994-1998.

Figure 8. All management scenarios evaluated in the leatherback turtle take reduction simulations, showing changes in turtle take and fishing effort disruption.

Figure 9. Best management scenarios evaluated in the leatherback turtle take reduction simulations, broken down by type of management regime, showing changes in turtle take and fishing effort disruption. The "E" denotes the predicted location of the Emergency closure.

Figure 10. Polynomial representation of the efficient frontier for leatherback turtles. Points represent best values per 1% bin of turtle take reduction. The "E" denotes the predicted location of the Emergency closure.

Figure 11. 95% variability envelope of the efficient frontier for leatherback turtle take reduction and fishing effort disruption from bootstrapping.

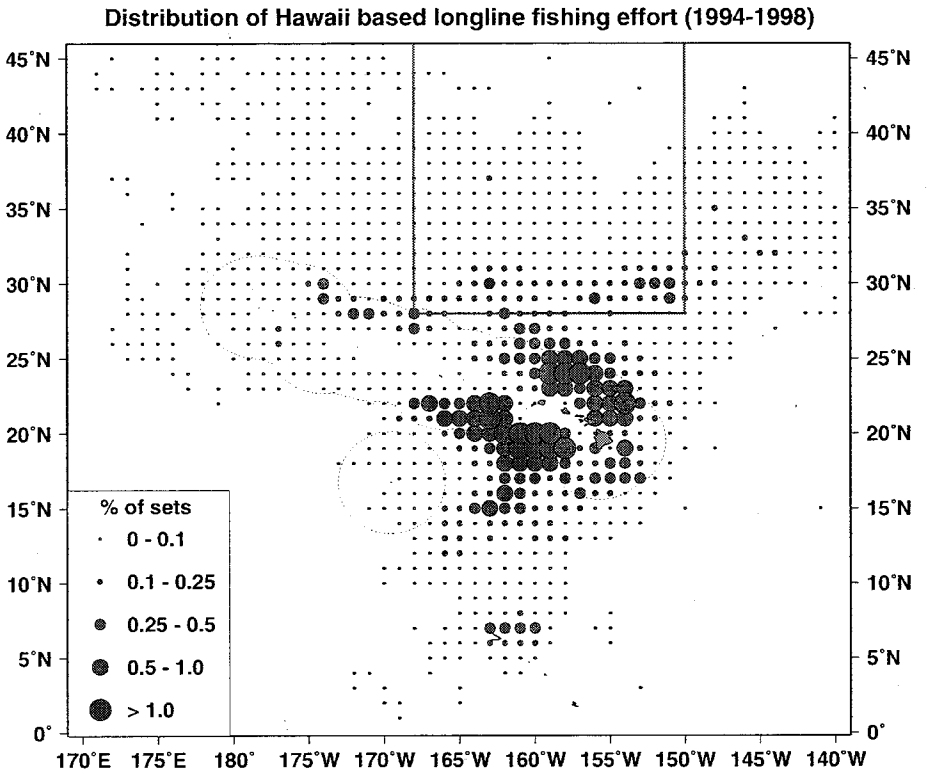
Figure 12. Polynomial representation of the revenue frontier for leatherback turtles. This represents the changes in fish catch revenue associated with scenarios optimized with respect to fishing effort disruption.

Figure 13. Polynomial representations of the loggerhead turtle take frontier for leatherback turtles. This upper data represents the changes in loggerhead turtle take associated with scenarios optimized with respect to fishing effort disruption. The lower data are optimized only for loggerhead turtle take reduction.

Figure 14. Polynomial representations of the olive ridley turtle take frontier for leatherback turtles. The upper data represents the changes in olive ridley turtle take associated with scenarios optimized with respect to fishing effort disruption. The lower data are optimized only for olive ridley turtle take reduction.

Figure 15. Polynomial representations of the green turtle take frontier for leatherback turtles. The upper data represents the changes in green turtle take associated with scenarios optimized

with respect to fishing effort disruption. The lower data are optimized only for green turtle take reduction.


Distribution of Hawaii based longline fishing effort (1994-1998)
45°N
40°N
35°N
30°N
25°N
20°N
15°N
10°N
5°N
0°
170°E
175°E
180°
175°W
170°W
165°W
160°W
155°W
150°W
145°W
140°W
% of sets
0 - 0.1
0.1 - 0.25
0.25 - 0.5
0.5 - 1.0
> 1.0

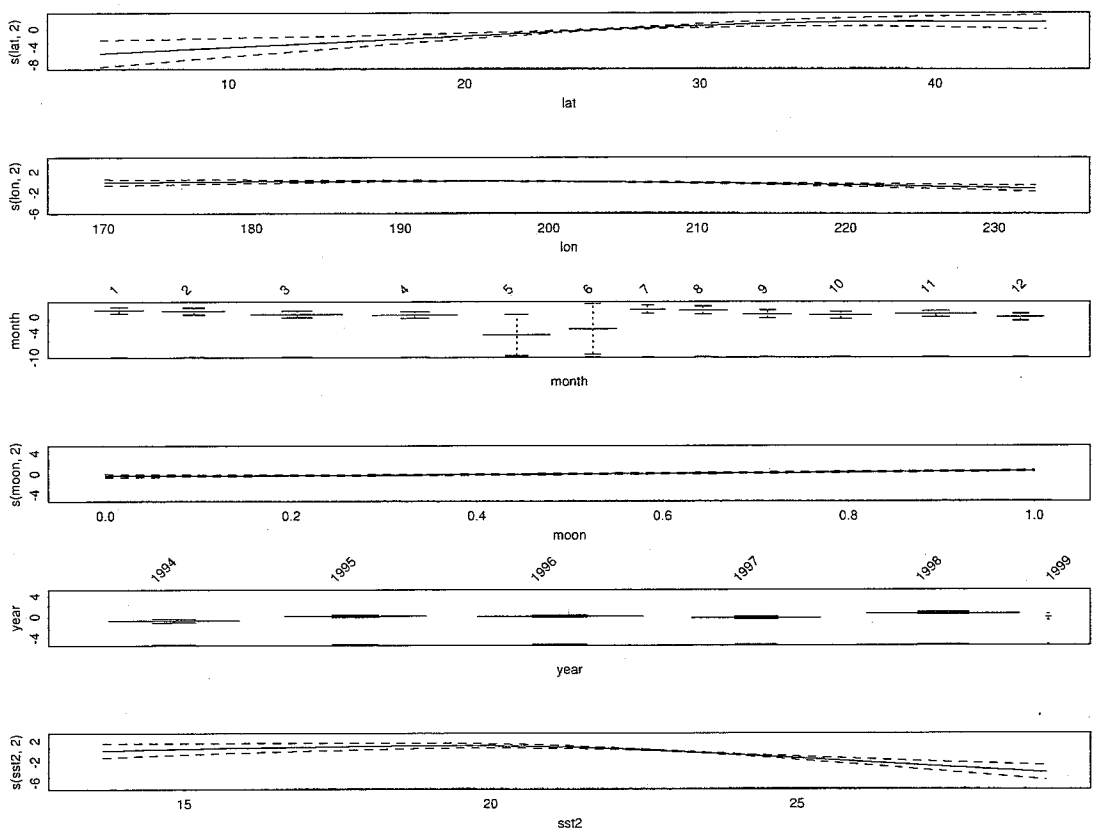


Figure 2 of 15

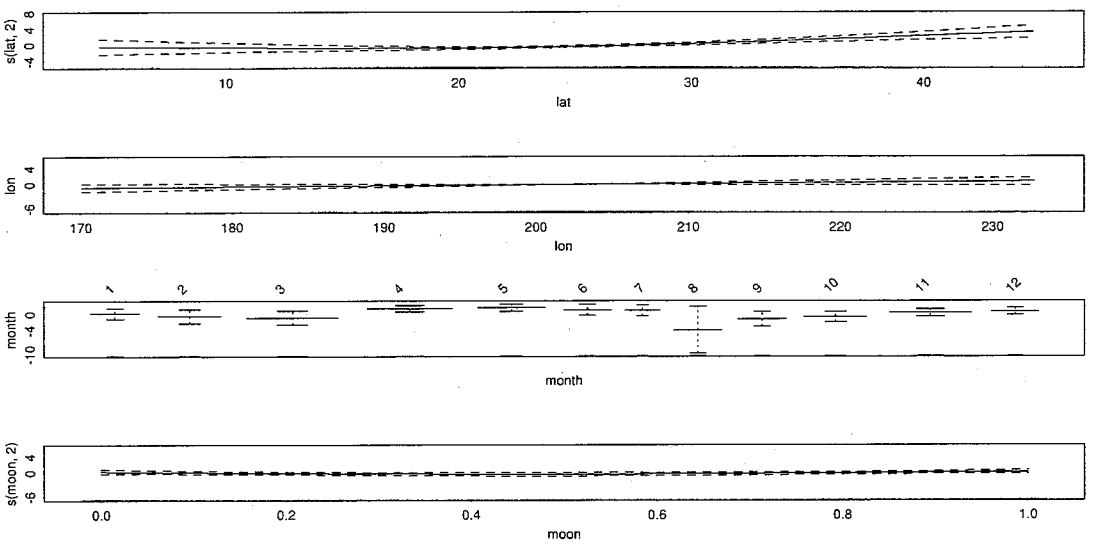


Figure 3 of 15

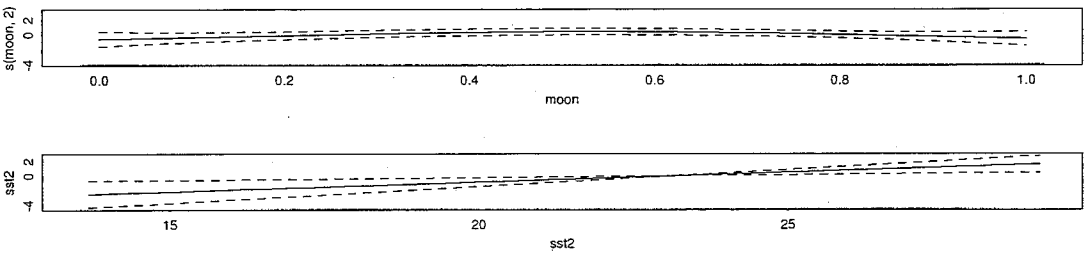


Figure 4 of 15

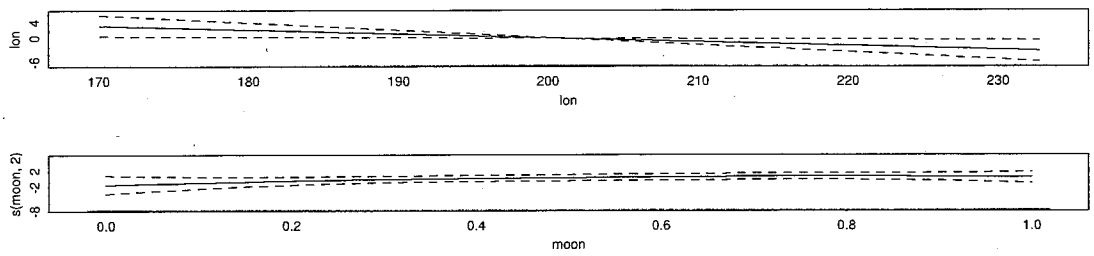


Figure 5 of 15

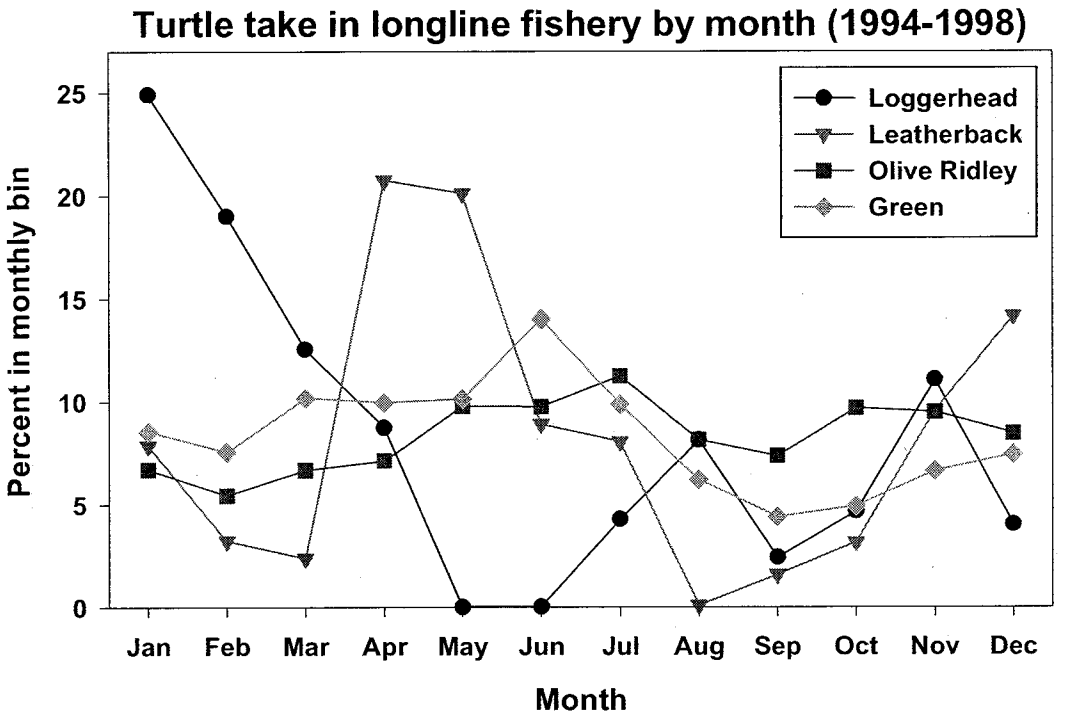
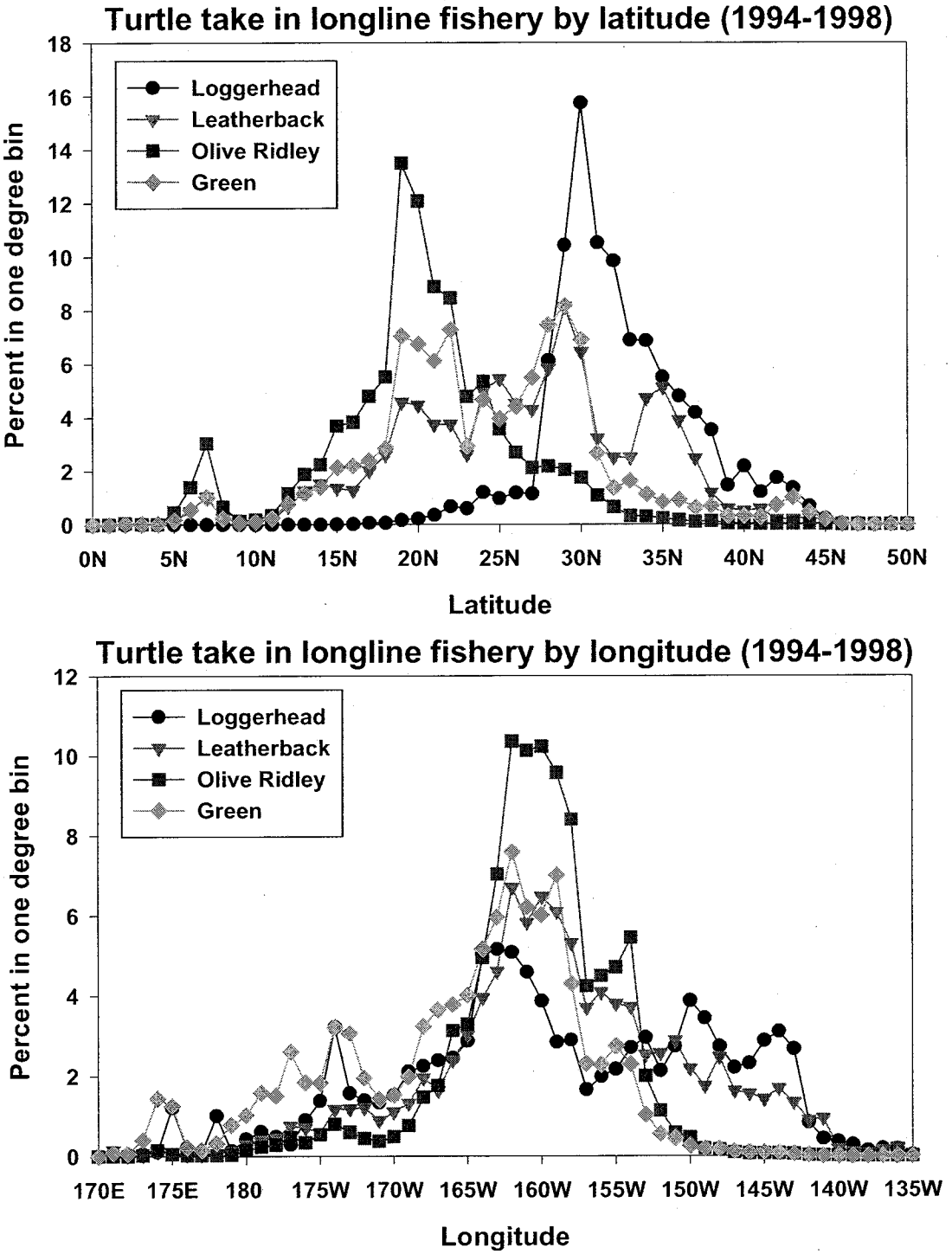
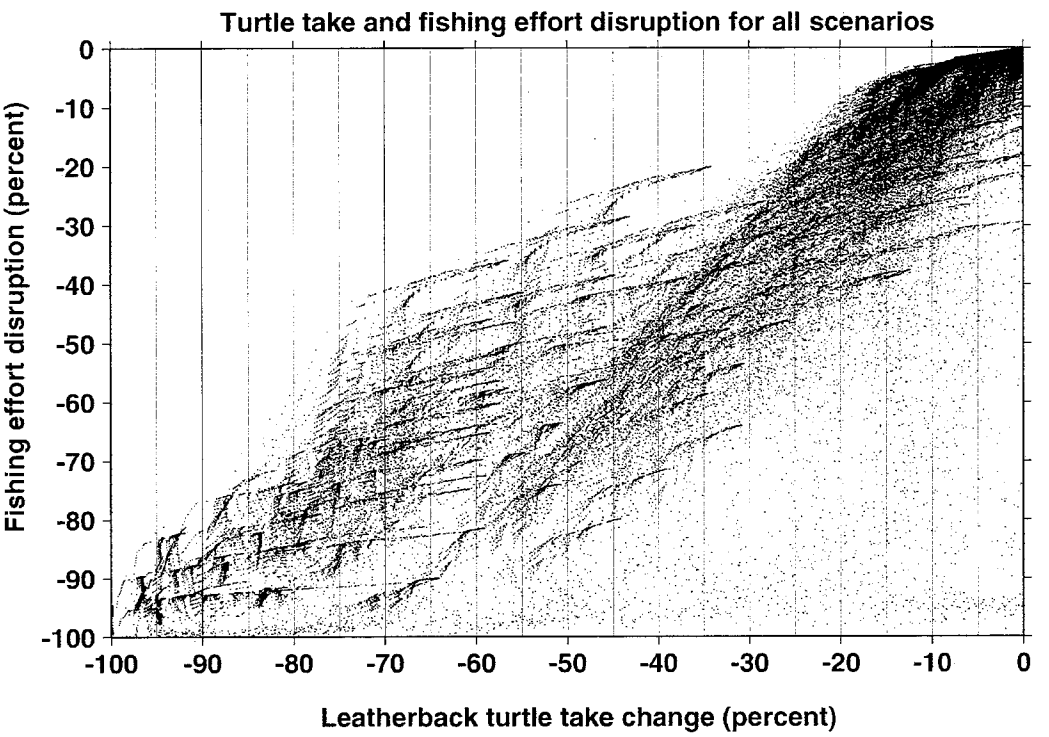


Figure 6 of 15


Turtle take in longline fishery by latitude (1994-1998)
Percent in one degree bin
Loggerhead
Leatherback
Olive Ridley
Green
0
2
4
6
8
10
12
14
16
18
0N
5N
10N
15N
20N
25N
30N
35N
40N
45N
50N
Latitude
Turtle take in longline fishery by longitude (1994-1998)
Percent in one degree bin
Loggerhead
Leatherback
Olive Ridley
Green
0
2
4
6
8
10
12
170E
175E
180
175W
170W
165W
160W
155W
150W
145W
140W
135W
Longitude


Turtle take and fishing effort disruption for all scenarios
Fishing effort disruption (percent)
0
-10
-20
-30
-40
-50
-60
-70
-80
-90
-100
-100
-90
-80
-70
-60
-50
-40
-30
-20
-10
0
Leatherback turtle take change (percent)

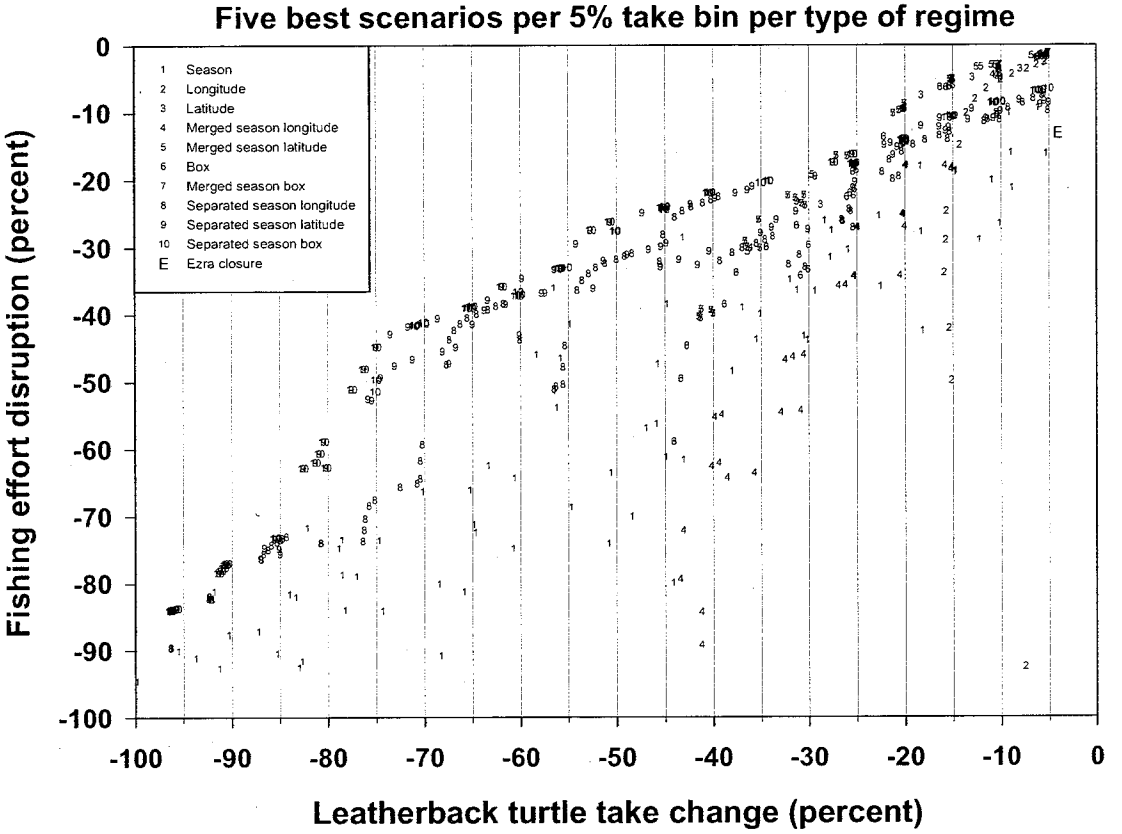


Figure 9 of 15

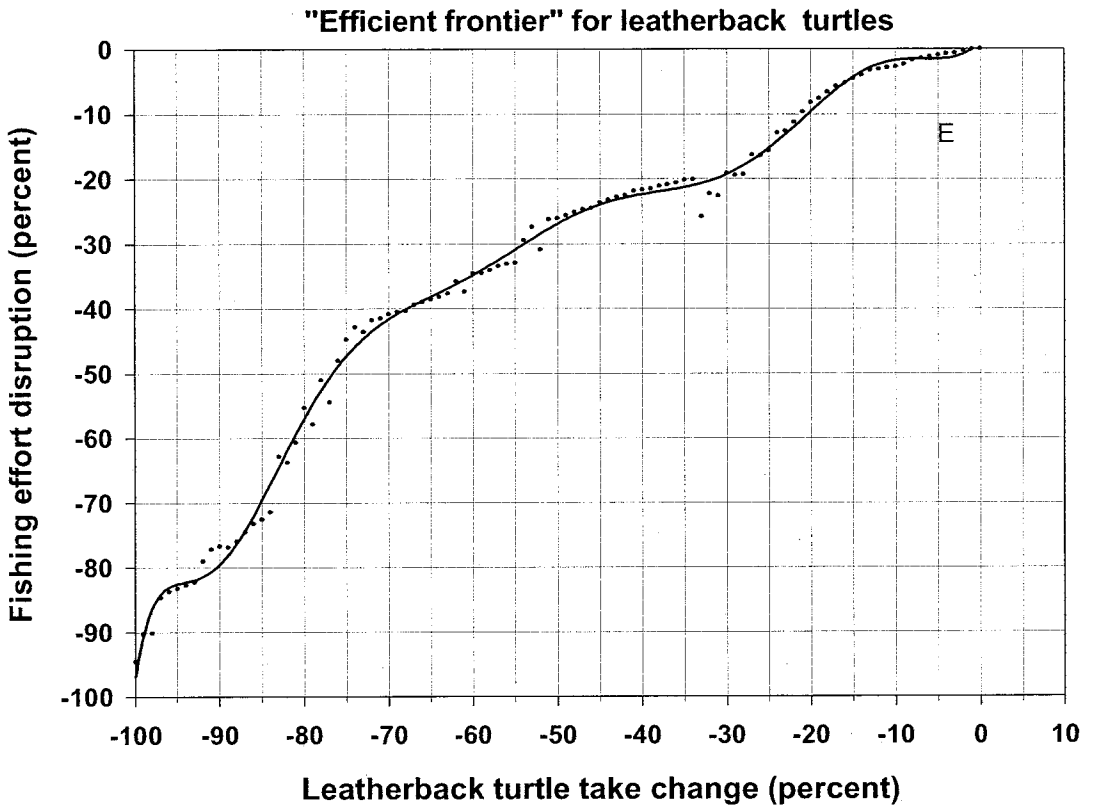


Figure 10 of 15

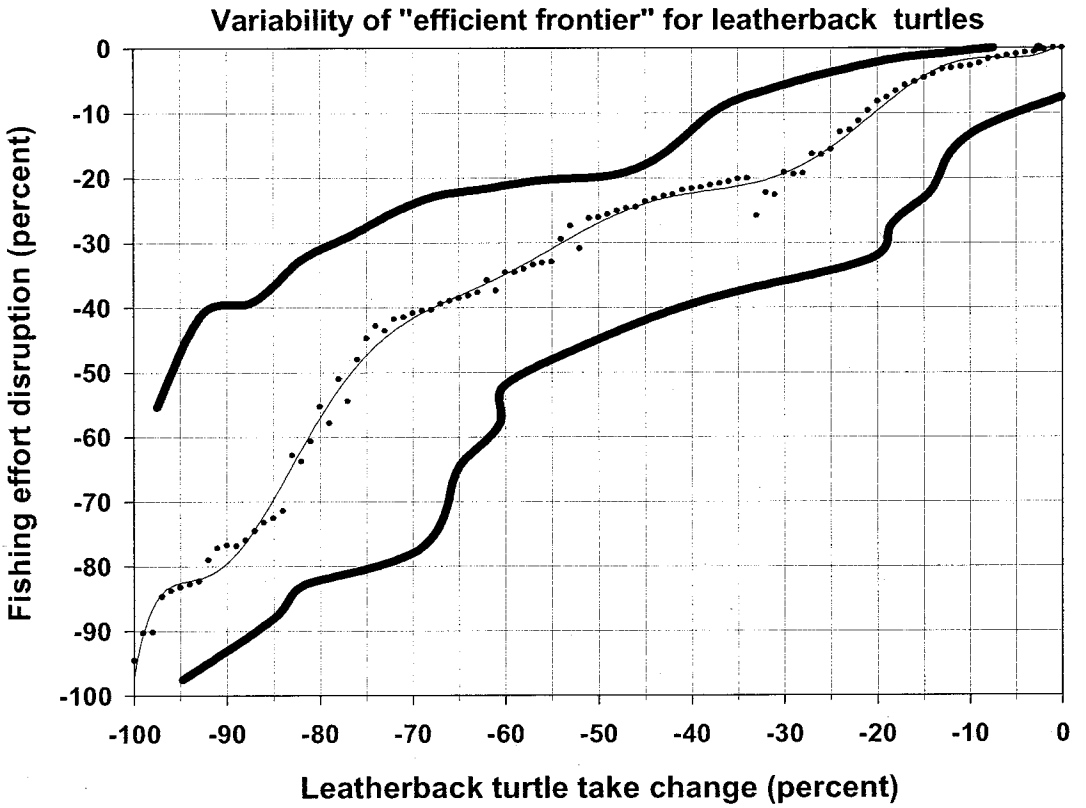


Figure 11 of 15

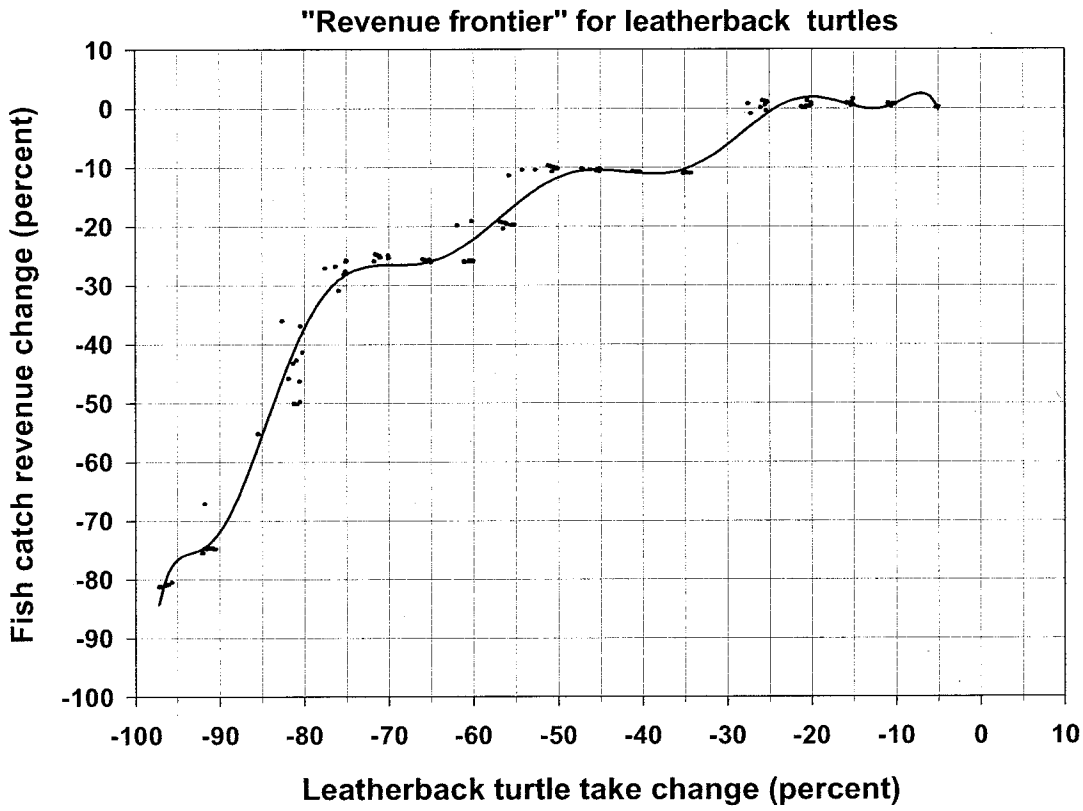


Figure 12 of 15

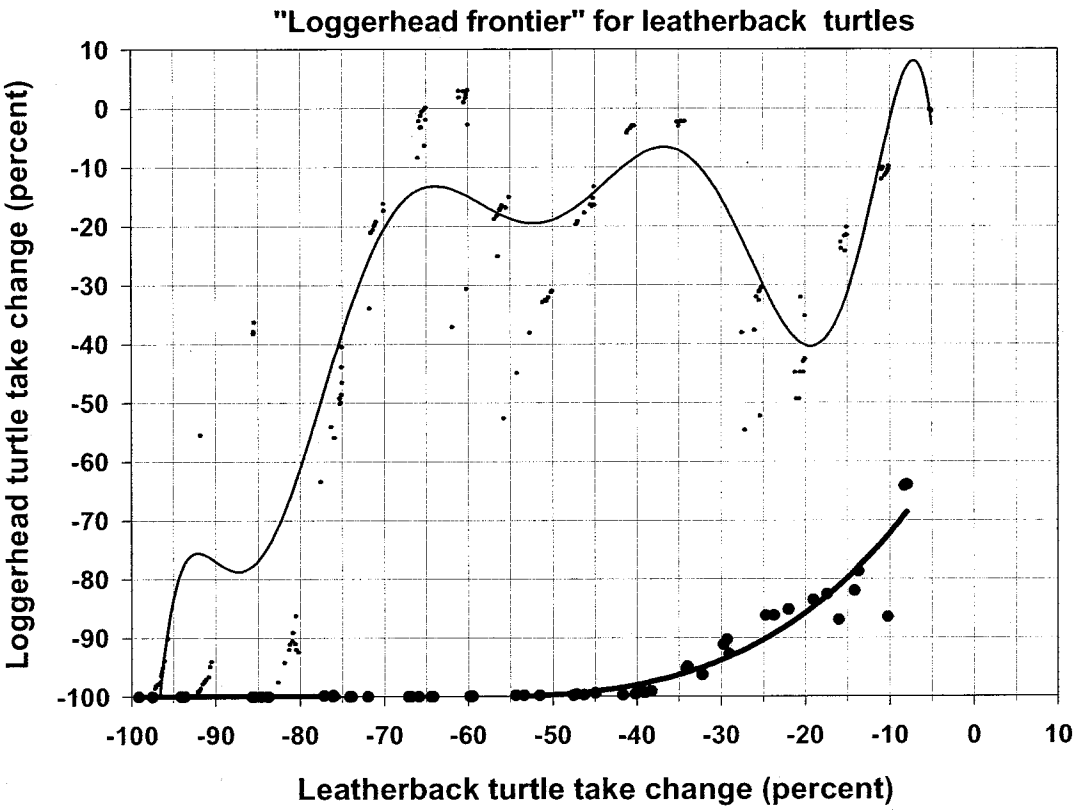


Figure 13 of 15

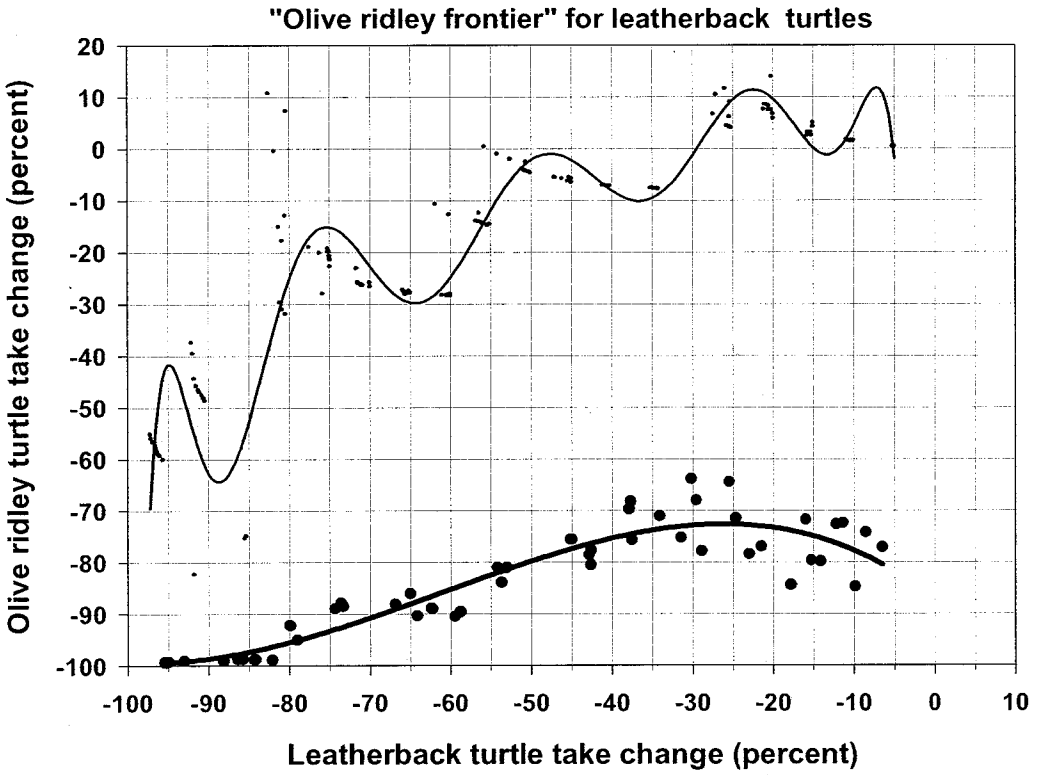


Figure 14 of 15

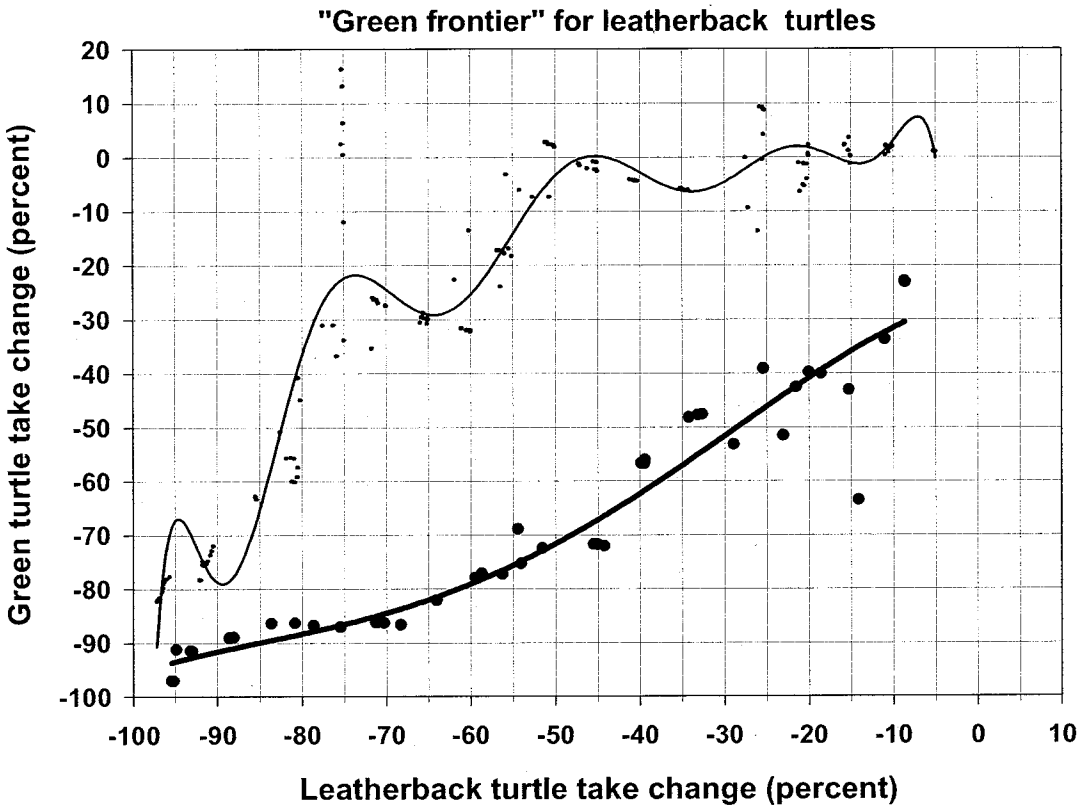


Figure 15 of 15

Appendix 1. Listings of ten best scenarios optimized for minimal fishing effort disruption per bin of leatherback turtle take reduction. Notations: #Mn = the number of months for a seasonal closure, Ms = the starting month of a seasonal closure, Lon/Lat = position of spatial closure, FED = fishing effort disruption, FEL = fishing effort lost, Rev = fish catch revenue change, Log = loggerhead turtle take change, Lea = leatherback turtle take change, Rid = olive ridley turtle take change, Gre = green turtle take change, Swo = swordfish catch change, Big = bigeye tuna catch change, Alb = albacore catch change, Yel = yellowfin tuna catch change, Blu = bluefin tuna catch change, Mah = mahi-mahi catch change, Opa = opah catch change. Other fish species included in the revenue calculations are not presented to save space. Results are not presented in any ordered sequence.

Leatherback turtle take reduction bin # 20 (-95% to %-100%)
10 best of 2327 scenarios at this take level with minimum fishing effort disruption

Type of management action	#Mn	Ms	Lon/Lat	FED	FEL	Rev	Log	Lea	Rid	Gre	Swo	Big	Alb	Yel	Blu	Mah	Opa
Separated season latitude	9	11	28	-85.96%	-73.03%	-81.28%	-98.52%	-97.22%	-55.09%	-82.28%	-97.08%	-78.36%	-77.93%	-76.98%	-54.02%	-68.94%	-60.67%
Separated season latitude	9	11	29	-85.44%	-73.03%	-81.11%	-98.20%	-97.15%	-55.93%	-82.00%	-96.52%	-77.67%	-78.27%	-76.87%	-54.00%	-65.06%	-61.27%
Separated season latitude	9	11	30	-85.13%	-73.03%	-81.25%	-97.92%	-96.95%	-56.59%	-81.69%	-96.17%	-77.29%	-78.46%	-76.88%	-53.91%	-61.64%	-61.70%
Separated season latitude	9	11	31	-84.68%	-73.03%	-81.05%	-97.53%	-96.58%	-57.26%	-80.45%	-95.45%	-76.57%	-78.76%	-77.25%	-52.95%	-59.83%	-62.18%
Separated season latitude	9	11	32	-84.27%	-73.03%	-81.03%	-96.41%	-96.47%	-57.87%	-79.77%	-94.80%	-75.96%	-78.96%	-77.44%	-53.11%	-55.99%	-62.48%
Separated season latitude	9	11	33	-84.09%	-73.03%	-80.89%	-95.94%	-96.40%	-58.37%	-78.97%	-94.56%	-75.68%	-79.09%	-77.65%	-53.24%	-55.00%	-62.63%
Separated season latitude	9	11	34	-83.99%	-73.03%	-80.92%	-95.67%	-96.36%	-58.65%	-78.75%	-94.11%	-75.51%	-78.95%	-77.70%	-51.59%	-55.10%	-62.72%
Separated season latitude	9	11	35	-83.91%	-73.03%	-80.96%	-95.12%	-96.30%	-58.89%	-78.59%	-93.41%	-75.72%	-78.84%	-77.91%	-51.55%	-55.18%	-62.89%
Separated season latitude	9	11	36	-83.86%	-73.03%	-80.86%	-93.91%	-96.08%	-59.22%	-78.15%	-92.73%	-75.97%	-78.59%	-78.17%	-51.57%	-55.55%	-63.05%
Separated season latitude	9	11	37	-83.74%	-73.03%	-80.50%	-90.17%	-95.69%	-59.98%	-77.72%	-91.30%	-76.27%	-77.16%	-78.36%	-49.84%	-55.04%	-63.15%

Leatherback turtle take reduction bin # 19 (-90% to -95%)
10 best of 3249 scenarios at this take level with minimum fishing effort disruption

Type of management action	#Mn	Ms	Lon/Lat	FED	FEL	Rev	Log	Lea	Rid	Gre	Swo	Big	Alb	Yel	Blu	Mah	Opa
Separated season latitude	8	12	25	-80.80%	-64.30%	-75.53%	-99.20%	-92.13%	-37.37%	-78.29%	-96.42%	-65.24%	-72.73%	-69.12%	-53.55%	-64.20%	-54.41%
Separated season latitude	8	12	26	-80.21%	-64.30%	-75.44%	-99.06%	-91.97%	-39.51%	-78.34%	-96.09%	-64.78%	-72.34%	-69.47%	-53.58%	-61.47%	-53.15%
Separated season latitude	8	12	27	-79.63%	-64.30%	-74.72%	-98.67%	-91.80%	-44.35%	-75.46%	-95.12%	-63.76%	-71.91%	-69.26%	-49.87%	-59.21%	-52.73%
Separated season latitude	8	12	28	-79.02%	-64.30%	-74.82%	-97.86%	-91.57%	-45.73%	-75.65%	-94.35%	-62.94%	-71.96%	-69.56%	-48.65%	-55.45%	-53.36%
Separated season latitude	8	12	29	-78.43%	-64.30%	-74.55%	-97.45%	-91.32%	-46.55%	-75.30%	-93.69%	-61.43%	-72.27%	-69.37%	-48.96%	-52.27%	-53.96%
Separated season latitude	8	12	30	-78.09%	-64.30%	-74.75%	-97.13%	-91.15%	-46.94%	-74.81%	-93.22%	-60.61%	-72.34%	-69.24%	-49.38%	-49.01%	-54.26%
Separated season latitude	8	12	31	-77.62%	-64.30%	-74.68%	-96.65%	-90.84%	-47.48%	-73.70%	-92.45%	-59.78%	-72.64%	-69.50%	-48.74%	-47.73%	-54.72%
Separated season latitude	8	12	32	-77.18%	-64.30%	-74.85%	-94.92%	-90.68%	-48.09%	-72.88%	-91.74%	-59.27%	-72.67%	-69.88%	-48.61%	-45.27%	-55.01%
Separated season latitude	8	12	33	-76.98%	-64.30%	-74.84%	-94.10%	-90.50%	-48.62%	-72.00%	-90.96%	-59.80%	-69.00%	-70.31%	-48.78%	-44.87%	-55.16%
Separated season box	10	4	162038	-81.20%	-73.08%	-67.12%	-55.50%	-91.80%	-82.24%	-74.86%	-67.93%	-73.58%	-82.16%	-71.62%	-38.80%	-75.87%	-81.26%

Leatherback turtle take reduction bin # 18 (-85% to -90%)
10 best of 2369 scenarios at this take level with minimum fishing effort disruption

Type of management action	#Mn	Ms	Lon/Lat	FED	FEL	Rev	Log	Lea	Rid	Gre	Swo	Big	Alb	Yel	Blu	Mah	Opa
Separated season box	9	4	159032	-73.27%	-63.69%	-55.27%	-38.24%	-85.53%	-75.26%	-62.80%	-62.07%	-60.20%	-75.97%	-59.22%	-26.26%	-70.30%	-75.14%
Separated season box	9	4	158032	-73.27%	-63.69%	-55.26%	-38.14%	-85.52%	-75.26%	-62.80%	-62.00%	-60.21%	-75.88%	-59.25%	-26.29%	-70.30%	-75.14%
Separated season box	9	4	157032	-73.27%	-63.69%	-55.26%	-38.14%	-85.52%	-75.26%	-62.80%	-61.94%	-60.24%	-75.59%	-59.32%	-26.51%	-70.31%	-75.15%
Separated season box	9	4	156032	-73.27%	-63.69%	-55.27%	-38.14%	-85.52%	-75.26%	-62.80%	-61.92%	-60.24%	-75.58%	-59.31%	-26.51%	-70.30%	-75.15%
Separated season box	9	4	155032	-73.27%	-63.69%	-55.27%	-38.14%	-85.52%	-75.26%	-62.80%	-61.92%	-60.24%	-75.58%	-59.30%	-26.51%	-70.31%	-75.14%
Separated season box	9	4	154032	-73.26%	-63.69%	-55.27%	-38.14%	-85.52%	-75.26%	-62.80%	-61.92%	-60.25%	-75.58%	-59.31%	-26.51%	-70.31%	-75.15%
Separated season box	9	4	153032	-73.26%	-63.69%	-55.27%	-38.14%	-85.52%	-75.26%	-62.81%	-61.81%	-60.29%	-75.59%	-59.29%	-26.56%	-70.31%	-75.17%
Separated season box	9	4	152032	-73.25%	-63.69%	-55.25%	-37.97%	-85.52%	-75.27%	-62.85%	-61.79%	-60.32%	-75.63%	-59.33%	-26.96%	-70.38%	-75.20%
Separated season box	9	4	151032	-73.23%	-63.69%	-55.23%	-37.88%	-85.52%	-75.28%	-62.89%	-61.73%	-60.32%	-75.64%	-59.28%	-26.52%	-70.41%	-75.21%
Separated season box	9	4	150032	-73.13%	-63.69%	-55.21%	-36.31%	-85.39%	-74.87%	-63.31%	-61.67%	-60.34%	-75.68%	-59.33%	-25.89%	-70.46%	-75.22%

Leatherback turtle take reduction bin # 17 (-80% to -85%)
10 best of 4485 scenarios at this take level with minimum fishing effort disruption

Type of management action	#Mn	Ms	Lon/Lat	FED	FEL	Rev	Log	Lea	Rid	Gre	Swo	Big	Alb	Yel	Blu	Mah	Opa
Separated season latitude	4	4	23	-62.82%	-26.95%	-36.06%	-97.58%	-82.59%	10.73%	-50.87%	-92.13%	-14.91%	-56.66%	-26.77%	-37.20%	-28.69%	-17.85%
Separated season latitude	4	4	24	-58.84%	-26.95%	-36.91%	-92.03%	-80.44%	7.33%	-40.79%	-87.62%	-12.45%	-51.53%	-23.56%	-37.38%	-14.95%	-17.33%
Separated season latitude	5	3	24	-63.77%	-36.70%	-45.85%	-94.24%	-81.87%	-0.41%	-55.67%	-88.80%	-20.24%	-54.93%	-30.73%	-37.15%	-24.00%	-24.95%
Separated season latitude	5	3	25	-61.95%	-36.70%	-43.28%	-92.02%	-81.32%	-15.04%	-55.60%	-84.05%	-18.23%	-51.99%	-30.44%	-37.35%	-23.87%	-24.44%
Separated season latitude	5	3	26	-60.63%	-36.70%	-42.79%	-90.54%	-80.91%	-17.71%	-55.73%	-81.49%	-17.87%	-49.85%	-28.18%	-36.80%	-24.89%	-23.88%
Separated season latitude	5	4	24	-62.67%	-33.11%	-41.39%	-92.44%	-80.19%	34.39%	-44.92%	-88.00%	-15.05%	-57.40%	-35.99%	-39.87%	-17.04%	-22.86%
Separated season latitude	6	2	27	-65.46%	-45.61%	-50.11%	-91.12%	-81.21%	-29.62%	-59.98%	-82.05%	-27.05%	-53.98%	-36.77%	-36.77%	-37.81%	-30.15%
Separated season latitude	6	2	28	-64.69%	-45.61%	-50.18%	-89.11%	-80.84%	-30.95%	-60.13%	-80.89%	-26.37%	-53.38%	-36.64%	-35.70%	-34.36%	-30.68%
Separated season latitude	6	2	29	-63.99%	-45.61%	-49.81%	-86.28%	-80.51%	-31.86%	-57.42%	-79.97%	-24.83%	-53.49%	-36.88%	-36.19%	-31.41%	-31.29%
Separated season latitude	6	3	26	-64.69%	-42.77%	-46.31%	-91.09%	-80.56%	-12.89%	-59.18%	-82.00%	-20.51%	-56.50%	-40.12%	-39.12%	-27.94%	-30.37%

Leatherback turtle take reduction bin # 16 (-75% to -80%)
10 best of 3965 scenarios at this take level with minimum fishing effort disruption

Type of management action	#Mn	Ms	Lon/Lat	FED	FEL	Rev	Log	Lea	Rid	Gre	Swo	Big	Alb	Yel	Blu	Mah	Opa
Separated season latitude	4	4	29	-51.04%	-26.95%	-27.11%	-63.45%	-77.56%	-18.90%	-31.03%	-63.49%	-6.80%	-39.76%	-16.95%	-29.53%	-9.04%	-17.55%
Separated season latitude	4	4	30	-48.03%	-26.95%	-26.79%	-54.10%	-76.30%	-20.03%	-31.06%	-55.72%	-7.06%	-38.79%	-16.72%	-25.00%	-4.18%	-18.27%
Separated season latitude	4	4	31	-44.74%	-26.95%	-25.80%	-46.54%	-75.00%	-21.38%	-33.81%	-48.50%	-7.45%	-38.64%	-18.05%	-20.97%	-9.24%	-19.03%
Separated season latitude	5	4	30	-52.49%	-33.11%	-30.94%	-55.95%	-75.88%	-27.93%	-36.77%	-58.13%	-10.47%	-45.07%	-27.16%	-28.86%	-12.72%	-24.74%
Separated season box	4	4	168026	-52.33%	-26.95%	-25.92%	-43.85%	-75.06%	-20.92%	0.50%	-49.14%	-10.18%	-36.27%	-21.02%	-20.71%	-21.75%	-18.95%
Separated season box	4	4	172027	-52.41%	-26.95%	-28.08%	-50.15%	-75.24%	-19.22%	16.33%	-59.51%	-9.86%	-36.96%	-19.14%	-22.51%	-17.21%	-17.94%
Separated season box	4	4	171027	-52.20%	-26.95%	-27.62%	-49.95%	-75.14%	-19.66%	13.15%	-56.89%	-10.19%	-36.16%	-19.58%	-22.16%	-18.26%	-18.21%
Separated season box	4	4	173028	-51.66%	-26.95%	-28.21%	-49.25%	-75.28%	-19.76%	2.44%	-59.82%	-8.68%	-35.36%	-18.82%	-19.01%	-13.38%	-18.15%
Separated season box	4	4	172028	-51.40%	-26.95%	-27.83%	-48.60%	-75.08%	-20.59%	6.38%	-58.03%	-8.90%	-35.22%	-18.92%	-21.06%	-14.80%	-18.21%
Separated season box	4	4	173029	-49.61%	-26.95%	-25.78%	-40.52%	-75.00%	-22.65%	-11.91%	-52.61%	-8.20%	-35.60%	-18.50%	-17.61%	-14.41%	-18.65%

Leatherback turtle take reduction bin # 15 (-70% to -75%)
10 best of 4145 scenarios at this take level with minimum fishing effort disruption

Type of management action	#Mn	Ms	Lon/Lat	FED	FEL	Rev	Log	Lea	Rid	Gre	Swo	Big	Alb	Yel	Blu	Mah	Opa
Separated season latitude	4	4	33	-41.75%	-26.95%	-25.90%	-33.93%	-71.73%	-23.06%	-35.41%	-41.80%	-9.08%	-35.00%	-20.35%	-14.05%	-9.75%	-19.87%
Separated season box	4	4	172032	-41.94%	-26.95%	-24.71%	-21.08%	-71.59%	-25.74%	-25.97%	-38.30%	-9.78%	-36.16%	-20.36%	-11.25%	-15.68%	-20.24%
Separated season box	4	4	171032	-41.87%	-26.95%	-24.76%	-21.06%	-71.50%	-25.88%	-26.30%	-37.82%	-9.92%	-35.33%	-20.46%	-11.62%	-15.86%	-20.31%
Separated season box	4	4	170032	-41.79%	-26.95%	-24.87%	-20.62%	-71.30%	-25.99%	-26.30%	-37.61%	-10.11%	-34.77%	-20.50%	-10.77%	-16.08%	-20.40%
Separated season box	4	4	169032	-41.69%	-26.95%	-24.99%	-19.90%	-71.12%	-26.12%	-26.33%	-37.24%	-10.34%	-34.43%	-20.62%	-10.50%	-16.39%	-20.43%
Separated season box	4	4	168032	-41.64%	-26.95%	-25.07%	-19.76%	-71.11%	-26.19%	-26.49%	-37.04%	-10.46%	-34.31%	-20.66%	-9.59%	-16.48%	-20.46%
Separated season box	4	4	167032	-41.58%	-26.95%	-25.19%	-19.60%	-71.04%	-26.24%	-26.73%	-36.94%	-10.60%	-34.10%	-20.79%	-9.96%	-16.65%	-20.47%
Separated season box	4	4	166032	-41.49%	-26.95%	-25.26%	-19.23%	-70.95%	-26.34%	-26.97%	-36.89%	-10.71%	-33.86%	-20.88%	-9.90%	-16.71%	-20.47%
Separated season box	4	4	165032	-41.30%	-26.95%	-25.39%	-17.39%	-70.04%	-26.55%	-27.54%	-36.47%	-11.01%	-33.29%	-21.05%	-10.52%	-16.91%	-20.54%
Separated season box	4	4	173033	-41.08%	-26.95%	-24.90%	-16.17%	-70.08%	-25.78%	-27.43%	-36.11%	-10.48%	-34.94%	-21.51%	-7.26%	-15.59%	-20.52%

Leatherback turtle take reduction bin # 14 (-65% to -70%)
10 best of 4977 scenarios at this take level with minimum fishing effort disruption

Type of management action	#Mn	Ms	Lon/Lat	FED	FEL	Rev	Log	Lea	Rid	Gre	Swo	Big	Alb	Yel	Blu	Mah	Opa
Separated season box	4	4	152032	-39.29%	-26.95%	-26.04%	-3.29%	-65.68%	-27.98%	-28.77%	-31.83%	-13.00%	-28.69%	-22.86%	-5.82%	-17.78%	-21.04%
Separated season box	4	4	151032	-39.24%	-26.95%	-26.05%	-3.19%	-65.56%	-28.01%	-28.85%	-31.74%	-13.05%	-28.75%	-22.88%	-4.35%	-17.94%	-21.07%
Separated season box	4	4	150032	-39.07%	-26.95%	-26.06%	-1.96%	-65.01%	-27.76%	-29.22%	-31.69%	-13.11%	-28.67%	-22.97%	-3.42%	-18.04%	-21.08%
Separated season box	4	4	161033	-39.12%	-26.95%	-25.70%	-2.20%	-65.84%	-27.56%	-29.64%	-31.56%	-12.72%	-29.36%	-22.84%	-4.52%	-17.99%	-21.02%
Separated season box	4	4	160033	-38.96%	-26.95%	-25.74%	-1.30%	-65.61%	-27.64%	-29.73%	-31.29%	-12.87%	-29.37%	-22.98%	-4.86%	-18.05%	-21.02%
Separated season box	4	4	159033	-38.89%	-26.95%	-25.80%	-0.61%	-65.49%	-27.68%	-29.83%	-31.22%	-12.94%	-29.33%	-23.05%	-5.13%	-18.15%	-21.03%
Separated season box	4	4	158033	-38.80%	-26.95%	-25.85%	-0.27%	-65.18%	-27.75%	-29.94%	-31.19%	-13.00%	-29.25%	-23.11%	-5.02%	-18.22%	-21.04%
Separated season box	4	4	157033	-38.72%	-26.95%	-25.89%	0.12%	-65.00%	-27.79%	-30.01%	-31.16%	-13.03%	-29.11%	-23.15%	-5.07%	-18.22%	-21.04%
Separated season box	4	4	165034	-39.28%	-26.95%	-25.58%	-8.39%	-65.99%	-27.23%	-30.60%	-33.95%	-12.03%	-31.90%	-22.78%	-2.95%	-17.35%	-20.84%
Separated season box	4	4	164034	-39.00%	-26.95%	-25.63%	-6.33%	-65.15%	-27.41%	-30.75%	-33.02%	-12.19%	-31.03%	-22.87%	-1.64%	-17.43%	-20.90%

Leatherback turtle take reduction bin # 13 (-60% to -65%)
10 best of 3720 scenarios at this take level with minimum fishing effort disruption

Type of management action	#Mn	Ms	Lon/Lat	FED	FEL	Rev	Log	Lea	Rid	Gre	Swo	Big	Alb	Yel	Blu	Mah	Opa
Separated season latitude	3	4	32	-35.79%	-19.00%	-19.83%	-37.12%	-61.90%	-10.68%	-22.69%	-36.01%	-4.20%	-29.07%	-7.62%	-15.69%	-8.73%	-14.33%
Separated season box	3	4	173031	-36.54%	-19.00%	-19.11%	-30.68%	-60.21%	-12.67%	-13.56%	-34.34%	-5.06%	-26.69%	-8.02%	-13.53%	-11.66%	-14.23%
Separated season box	4	4	146033	-37.51%	-26.95%	-26.10%	1.82%	-61.07%	-28.23%	-31.64%	-30.47%	-13.51%	-28.67%	-23.63%	-1.07%	-18.75%	-21.16%
Separated season box	4	4	148034	-37.36%	-26.95%	-25.93%	2.93%	-61.12%	-28.28%	-31.80%	-30.26%	-13.46%	-28.59%	-23.68%	-0.76%	-18.90%	-21.12%
Separated season box	4	4	147034	-37.13%	-26.95%	-25.97%	2.90%	-60.47%	-28.33%	-32.09%	-30.09%	-13.54%	-28.73%	-23.75%	-0.43%	-19.05%	-21.14%
Separated season box	4	4	146034	-36.96%	-26.95%	-26.00%	3.07%	-60.03%	-28.38%	-32.31%	-30.08%	-13.59%	-28.81%	-23.80%	-0.25%	-19.00%	-21.15%
Separated season box	4	4	161035	-37.37%	-26.95%	-25.80%	1.02%	-60.46%	-28.18%	-31.93%	-30.50%	-13.18%	-29.00%	-23.53%	-1.47%	-18.42%	-21.09%
Separated season box	4	4	160035	-37.26%	-26.95%	-25.81%	1.77%	-60.27%	-28.23%	-31.97%	-30.32%	-13.26%	-28.98%	-23.59%	-1.66%	-18.62%	-21.10%
Separated season box	4	4	159035	-37.21%	-26.95%	-25.84%	2.40%	-60.17%	-28.27%	-32.07%	-30.24%	-13.32%	-28.97%	-23.63%	-1.82%	-18.71%	-21.11%
Separated season box	4	4	165036	-37.47%	-26.95%	-25.85%	-2.76%	-60.02%	-28.02%	-32.00%	-31.23%	-13.09%	-30.36%	-23.53%	-0.64%	-18.29%	-21.04%

Leatherback turtle take reduction bin # 12 (-55% to -60%)
10 best of 3870 scenarios at this take level with minimum fishing effort disruption

Type of management action	#Mn	Ms	Lon/Lat	FED	FEL	Rev	Log	Lea	Rid	Gre	Swo	Big	Alb	Yel	Blu	Mah	Opa
Separated season latitude	2	4	30	-33.09%	-10.04%	-11.38%	-52.67%	-55.80%	0.46%	-3.19%	-37.68%	1.26%	-17.80%	0.78%	-21.89%	-0.75%	-5.40%
Separated season latitude	3	4	34	-33.25%	-19.00%	-20.38%	-25.10%	-56.48%	-12.36%	-23.95%	-31.47%	-6.31%	-25.00%	-10.02%	-9.62%	-10.23%	-14.98%
Separated season box	3	4	164032	-33.52%	-19.00%	-19.80%	-16.87%	-55.46%	-14.74%	-16.92%	-27.41%	-7.57%	-22.58%	-10.16%	-8.27%	-14.80%	-15.14%
Separated season box	3	4	171033	-33.53%	-19.00%	-19.21%	-18.83%	-56.86%	-13.92%	-17.24%	-27.96%	-6.80%	-24.46%	-10.28%	-8.37%	-14.04%	-15.14%
Separated season box	3	4	170033	-33.44%	-19.00%	-19.29%	-18.25%	-56.54%	-14.07%	-17.25%	-27.86%	-6.95%	-23.99%	-10.34%	-7.45%	-14.18%	-15.17%
Separated season box	3	4	169033	-33.31%	-19.00%	-19.41%	-17.28%	-56.17%	-14.21%	-17.32%	-27.55%	-7.17%	-23.75%	-10.48%	-7.17%	-14.43%	-15.20%
Separated season box	3	4	168033	-33.25%	-19.00%	-19.48%	-17.12%	-56.16%	-14.28%	-17.44%	-27.38%	-7.32%	-23.73%	-10.56%	-6.25%	-14.55%	-15.24%
Separated season box	3	4	167033	-33.20%	-19.00%	-19.57%	-16.96%	-56.09%	-14.32%	-17.62%	-27.33%	-7.45%	-23.60%	-10.65%	-6.60%	-14.74%	-15.25%
Separated season box	3	4	166033	-33.12%	-19.00%	-19.63%	-16.52%	-55.99%	-14.39%	-17.79%	-27.32%	-7.52%	-23.41%	-10.71%	-6.86%	-14.84%	-15.25%
Separated season box	3	4	165033	-32.95%	-19.00%	-19.71%	-15.08%	-55.15%	-14.54%	-18.32%	-27.08%	-7.68%	-23.03%	-10.81%	-7.51%	-15.04%	-15.27%

Leatherback turtle take reduction bin # 11 (-50% to -55%)
10 best of 3393 scenarios at this take level with minimum fishing effort disruption

Type of management action	#Mn	Ms	Lon/Lat	FED	FEL	Rev	Log	Lea	Rid	Gre	Swo	Big	Alb	Yel	Blu	Mah	Opa
Separated season latitude	2	4	31	-29.46%	-10.04%	-10.46%	-44.93%	-54.20%	-1.04%	-6.03%	-29.24%	0.81%	-17.55%	-0.58%	-17.96%	-5.04%	-6.14%
Separated season latitude	2	4	32	-27.43%	-10.04%	-10.46%	-38.12%	-52.67%	-1.99%	-7.31%	-25.05%	0.09%	-17.30%	-1.48%	-13.92%	-5.25%	-6.65%
Separated season latitude	2	4	33	-26.22%	-10.04%	-10.69%	-32.72%	-50.68%	-2.57%	-7.33%	-22.34%	-1.14%	-13.96%	-2.89%	-11.10%	-5.85%	-7.00%
Separated season box	2	4	173031	-28.14%	-10.04%	-9.76%	-32.93%	-51.15%	-3.90%	2.75%	-23.75%	-0.67%	-14.93%	-1.88%	-11.62%	-8.48%	-6.56%
Separated season box	2	4	172031	-27.99%	-10.04%	-9.86%	-32.61%	-50.89%	-4.10%	2.70%	-23.39%	-0.82%	-14.64%	-2.07%	-12.83%	-9.06%	-6.64%
Separated season box	2	4	171031	-27.91%	-10.04%	-9.89%	-32.60%	-50.80%	-4.23%	2.39%	-22.79%	-0.99%	-13.81%	-2.25%	-13.23%	-9.45%	-6.75%
Separated season box	2	4	170031	-27.80%	-10.04%	-9.98%	-32.09%	-50.49%	-4.37%	2.34%	-22.31%	-1.21%	-13.32%	-2.30%	-12.39%	-9.69%	-6.84%
Separated season box	2	4	169031	-27.65%	-10.04%	-10.10%	-31.23%	-50.14%	-4.52%	2.26%	-21.82%	-1.48%	-13.05%	-2.51%	-12.14%	-10.00%	-6.87%
Separated season box	2	4	168031	-27.58%	-10.04%	-10.17%	-31.13%	-50.14%	-4.59%	2.11%	-21.59%	-1.61%	-12.96%	-2.61%	-11.26%	-10.09%	-6.92%
Separated season box	2	4	167031	-27.51%	-10.04%	-10.24%	-31.00%	-50.06%	-4.64%	1.89%	-21.36%	-1.77%	-12.80%	-2.74%	-11.67%	-10.23%	-6.94%

Leatherback turtle take reduction bin # 10 (-45% to -50%)
10 best of 3650 scenarios at this take level with minimum fishing effort disruption

Type of management action	#Mn	Ms	Lon/Lat	FED	FEL	Rev	Log	Lea	Rid	Gre	Swo	Big	Alb	Yel	Blu	Mah	Opa
Separated season box	2	4	163032	-24.71%	-10.04%	-10.58%	-16.34%	-45.49%	-6.25%	-0.81%	-15.97%	-3.54%	-9.88%	-4.12%	-3.96%	-11.85%	-7.55%
Separated season box	2	4	162032	-24.35%	-10.04%	-10.66%	-13.25%	-45.05%	-6.50%	-0.99%	-14.84%	-3.91%	-8.91%	-4.39%	-4.23%	-12.25%	-7.61%
Separated season box	2	4	168033	-24.82%	-10.04%	-10.18%	-19.73%	-47.19%	-5.49%	-1.20%	-16.92%	-2.91%	-11.91%	-4.27%	-4.27%	-11.22%	-7.54%
Separated season box	2	4	167033	-24.76%	-10.04%	-10.27%	-19.57%	-47.12%	-5.54%	-1.38%	-16.88%	-3.03%	-11.79%	-4.36%	-4.63%	-11.42%	-7.55%
Separated season box	2	4	166033	-24.69%	-10.04%	-10.33%	-19.18%	-47.03%	-5.60%	-1.56%	-16.87%	-3.11%	-11.60%	-4.41%	-4.88%	-11.52%	-7.55%
Separated season box	2	4	165033	-24.52%	-10.04%	-10.40%	-17.75%	-46.20%	-5.75%	-2.08%	-16.63%	-3.27%	-11.22%	-4.51%	-5.53%	-11.72%	-7.58%
Separated season box	2	4	164033	-24.21%	-10.04%	-10.50%	-15.27%	-45.18%	-5.99%	-2.24%	-15.54%	-3.52%	-10.14%	-4.68%	-3.96%	-11.85%	-7.66%
Separated season box	2	4	173034	-24.11%	-10.04%	-10.28%	-16.59%	-45.30%	-5.56%	-2.25%	-16.60%	-3.07%	-12.63%	-4.77%	-1.57%	-10.99%	-7.55%
Separated season box	2	4	172034	-24.00%	-10.04%	-10.26%	-16.40%	-45.09%	-5.71%	-2.33%	-16.57%	-3.13%	-12.33%	-4.81%	-2.63%	-11.20%	-7.56%
Separated season box	2	4	171034	-23.93%	-10.04%	-10.25%	-16.39%	-45.01%	-5.82%	-2.59%	-16.30%	-3.21%	-11.91%	-4.85%	-2.94%	-11.27%	-7.58%

Leatherback turtle take reduction bin # 9 (-40% to -45%)
10 best of 4035 scenarios at this take level with minimum fishing effort disruption

Type of management action	#Mn	Ms	Lon/Lat	FED	FEL	Rev	Log	Lea	Rid	Gre	Swo	Big	Alb	Yel	Blu	Mah	Opa
Separated season box	2	4	160034	-22.15%	-10.04%	-10.68%	-4.19%	-41.19%	-7.04%	-4.09%	-12.63%	-4.83%	-7.72%	-5.69%	-1.35%	-13.20%	-7.85%
Separated season box	2	4	159034	-22.10%	-10.04%	-10.71%	-3.76%	-41.07%	-7.07%	-4.15%	-12.56%	-4.89%	-7.73%	-5.74%	-1.60%	-13.30%	-7.87%
Separated season box	2	4	158034	-22.01%	-10.04%	-10.75%	-3.41%	-40.77%	-7.14%	-4.24%	-12.53%	-4.94%	-7.69%	-5.78%	-1.58%	-13.37%	-7.87%
Separated season box	2	4	157034	-21.93%	-10.04%	-10.78%	-3.05%	-40.61%	-7.17%	-4.31%	-12.50%	-4.97%	-7.66%	-5.81%	-1.57%	-13.37%	-7.88%
Separated season box	2	4	156034	-21.90%	-10.04%	-10.79%	-2.93%	-40.57%	-7.20%	-4.32%	-12.47%	-5.00%	-7.66%	-5.83%	-1.42%	-13.44%	-7.88%
Separated season box	2	4	155034	-21.90%	-10.04%	-10.79%	-2.94%	-40.56%	-7.20%	-4.33%	-12.48%	-5.01%	-7.56%	-5.85%	-1.45%	-13.46%	-7.88%
Separated season box	2	4	154034	-21.89%	-10.04%	-10.80%	-2.95%	-40.54%	-7.20%	-4.35%	-12.49%	-5.02%	-7.55%	-5.85%	-1.46%	-13.46%	-7.88%
Separated season box	2	4	153034	-21.88%	-10.04%	-10.81%	-2.95%	-40.51%	-7.21%	-4.35%	-12.49%	-5.03%	-7.49%	-5.86%	-1.41%	-13.45%	-7.89%
Separated season box	2	4	152034	-21.83%	-10.04%	-10.82%	-2.98%	-40.35%	-7.22%	-4.39%	-12.39%	-5.07%	-7.52%	-5.88%	-1.23%	-13.47%	-7.89%
Separated season box	2	4	151034	-21.81%	-10.04%	-10.84%	-2.98%	-40.29%	-7.23%	-4.41%	-12.34%	-5.11%	-7.56%	-5.92%	-0.32%	-13.57%	-7.90%

Leatherback turtle take reduction bin # 8 (-35% to -40%)
10 best of 5630 scenarios at this take level with minimum fishing effort disruption

Type of management action	#Mn	Ms	Lon/Lat	FED	FEL	Rev	Log	Lea	Rid	Gre	Swo	Big	Alb	Yel	Blu	Mah	Opa
Separated season box	2	4	146036	-20.39%	-10.04%	-10.99%	-2.28%	-35.23%	-7.62%	-5.86%	-11.46%	-5.50%	-7.64%	-6.33%	-0.22%	-13.98%	-7.97%
Separated season box	2	4	158038	-20.40%	-10.04%	-10.95%	-2.50%	-35.05%	-7.62%	-5.77%	-11.38%	-5.45%	-7.76%	-6.28%	-0.11%	-13.92%	-7.95%
Separated season box	2	4	157038	-20.38%	-10.04%	-10.95%	-2.44%	-35.03%	-7.63%	-5.79%	-11.35%	-5.46%	-7.70%	-6.29%	-0.13%	-13.92%	-7.95%
Separated season box	2	4	156038	-20.38%	-10.04%	-10.96%	-2.43%	-35.03%	-7.64%	-5.80%	-11.35%	-5.46%	-7.71%	-6.29%	-0.14%	-13.93%	-7.95%
Separated season box	2	4	155038	-20.38%	-10.04%	-10.96%	-2.43%	-35.03%	-7.64%	-5.80%	-11.35%	-5.46%	-7.70%	-6.29%	-0.14%	-13.94%	-7.95%
Separated season box	2	4	154038	-20.37%	-10.04%	-10.96%	-2.42%	-35.02%	-7.64%	-5.80%	-11.36%	-5.47%	-7.71%	-6.29%	-0.15%	-13.93%	-7.95%
Separated season box	2	4	153038	-20.37%	-10.04%	-10.96%	-2.42%	-35.02%	-7.64%	-5.80%	-11.36%	-5.47%	-7.71%	-6.29%	-0.15%	-13.93%	-7.95%
Separated season box	2	4	152038	-20.37%	-10.04%	-10.96%	-2.42%	-35.02%	-7.64%	-5.80%	-11.36%	-5.47%	-7.71%	-6.30%	-0.15%	-13.94%	-7.95%
Separated season box	2	4	151038	-20.37%	-10.04%	-10.96%	-2.42%	-35.02%	-7.64%	-5.81%	-11.37%	-5.47%	-7.71%	-6.30%	-0.16%	-13.96%	-7.95%
Separated season box	2	4	170039	-20.39%	-10.04%	-10.84%	-3.04%	-35.00%	-7.59%	-5.83%	-11.35%	-5.34%	-7.72%	-6.23%	-0.36%	-13.34%	-7.94%

Leatherback turtle take reduction bin # 7 (-30% to -35%)
10 best of 5360 scenarios at this take level with minimum fishing effort disruption

Type of management action	#Mn	Ms	Lon/Lat	FED	FEL	Rev	Log	Lea	Rid	Gre	Swo	Big	Alb	Yel	Blu	Mah	Opa
Season	2	4	0	-20.07%	-10.04%	-11.02%	-2.19%	-34.23%	-7.78%	-6.22%	-11.33%	-5.58%	-7.75%	-6.39%	-0.60%	-13.99%	-7.97%
Separated season box	2	4	146038	-20.18%	-10.04%	-11.00%	-2.24%	-34.30%	-7.70%	-6.07%	-11.33%	-5.55%	-7.67%	-6.36%	-0.36%	-13.99%	-7.97%
Separated season box	2	4	156039	-20.18%	-10.04%	-10.98%	-2.24%	-34.77%	-7.72%	-6.08%	-11.37%	-5.50%	-7.78%	-6.31%	-0.41%	-13.96%	-7.96%
Separated season box	2	4	155039	-20.18%	-10.04%	-10.98%	-2.24%	-34.77%	-7.72%	-6.08%	-11.37%	-5.50%	-7.77%	-6.32%	-0.41%	-13.96%	-7.96%
Separated season box	2	4	153039	-20.18%	-10.04%	-10.98%	-2.24%	-34.77%	-7.72%	-6.09%	-11.37%	-5.50%	-7.77%	-6.32%	-0.42%	-13.97%	-7.96%
Separated season box	2	4	150039	-20.17%	-10.04%	-10.99%	-2.23%	-34.60%	-7.72%	-6.09%	-11.37%	-5.51%	-7.75%	-6.32%	-0.42%	-13.93%	-7.96%
Separated season box	2	4	149039	-20.17%	-10.04%	-10.99%	-2.23%	-34.60%	-7.72%	-6.09%	-11.35%	-5.52%	-7.73%	-6.34%	-0.44%	-13.97%	-7.97%
Separated season box	2	4	148039	-20.15%	-10.04%	-10.99%	-2.23%	-34.36%	-7.73%	-6.10%	-11.34%	-5.53%	-7.68%	-6.35%	-0.45%	-13.95%	-7.97%
Separated season box	2	4	147039	-20.13%	-10.04%	-11.00%	-2.18%	-34.29%	-7.74%	-6.13%	-11.33%	-5.55%	-7.68%	-6.36%	-0.43%	-13.98%	-7.97%
Separated season box	2	4	146039	-20.11%	-10.04%	-11.01%	-2.19%	-34.26%	-7.76%	-6.17%	-11.33%	-5.56%	-7.69%	-6.37%	-0.47%	-13.99%	-7.97%

Leatherback turtle take reduction bin # 6 (-25% to -30%)
10 best of 5006 scenarios at this take level with minimum fishing effort disruption

Type of management action	#Mn	Ms	Lon/Lat	FED	FEL	Rev	Log	Lea	Rid	Gre	Swo	Big	Alb	Yel	Blu	Mah	Opa
Separated season latitude	1	4	32	-17.36%	0.00%	0.80%	-38.08%	-27.48%	6.72%	-0.14%	-14.51%	6.88%	-10.27%	6.68%	-12.13%	4.84%	0.52%
Separated season latitude	1	4	33	-16.15%	0.00%	0.57%	-32.68%	-25.48%	6.14%	-0.46%	-11.79%	5.65%	-6.92%	5.29%	-9.29%	4.23%	0.17%
Separated season box	1	4	170031	-17.78%	0.00%	1.31%	-32.04%	-25.81%	4.43%	9.27%	-11.90%	5.56%	-6.36%	5.85%	-10.57%	0.23%	0.34%
Separated season box	1	4	169031	-17.63%	0.00%	1.19%	-31.18%	-25.47%	4.29%	9.21%	-11.39%	5.30%	-6.08%	5.64%	-10.32%	-0.09%	0.31%
Separated season box	1	4	168031	-17.57%	0.00%	1.12%	-31.09%	-25.47%	4.22%	9.05%	-11.16%	5.16%	-5.99%	5.54%	-9.44%	-0.18%	0.26%
Separated season box	1	4	167031	-17.49%	0.00%	1.06%	-30.96%	-25.39%	4.16%	8.84%	-10.92%	5.01%	-5.83%	5.42%	-9.85%	-0.31%	0.24%
Separated season box	1	4	166031	-17.38%	0.00%	1.00%	-30.46%	-25.24%	4.05%	8.70%	-10.57%	4.84%	-5.60%	5.37%	-9.73%	-0.44%	0.22%
Merged season latitude	9	4	27	-16.39%	0.00%	0.12%	-37.71%	-26.03%	11.62%	-13.65%	-25.98%	4.00%	-9.17%	9.95%	-11.88%	3.19%	5.96%
Merged season latitude	10	4	28	-16.31%	0.00%	-0.91%	-54.66%	-27.17%	10.46%	-9.41%	-28.10%	5.74%	-11.13%	9.30%	-17.97%	8.93%	5.04%
Merged season latitude	11	9	29	-17.68%	0.00%	-0.46%	-52.25%	-25.38%	8.99%	4.19%	-31.35%	8.00%	-11.96%	6.56%	-24.35%	12.11%	3.33%

Leatherback turtle take reduction bin # 5 (-20% to -25%)
10 best of 5955 scenarios at this take level with minimum fishing effort disruption

Type of management action	#Mn	Ms	Lon/Lat	FED	FEL	Rev	Log	Lea	Rid	Gre	Swo	Big	Alb	Yel	Blu	Mah	Opa
Latitude	0	0	31	-9.50%	0.00%	0.57%	-42.67%	-20.08%	6.71%	0.57%	-17.31%	6.43%	-9.86%	5.86%	-17.28%	9.09%	1.86%
Merged season latitude	5	9	26	-10.29%	0.00%	0.32%	-42.99%	-20.24%	13.94%	-4.04%	-17.91%	4.47%	-14.34%	3.32%	-19.54%	7.63%	2.81%
Merged season latitude	7	7	29	-10.46%	0.00%	0.11%	-49.38%	-20.68%	8.37%	-5.16%	-20.16%	6.30%	-10.79%	8.25%	-17.21%	7.32%	3.06%
Merged season latitude	8	6	29	-10.79%	0.00%	0.10%	-49.39%	-21.06%	8.49%	-6.37%	-20.29%	6.26%	-10.71%	8.42%	-17.30%	6.69%	3.07%
Merged season latitude	8	6	30	-9.49%	0.00%	0.29%	-44.88%	-20.21%	7.46%	-1.36%	-18.86%	6.14%	-10.71%	6.97%	-13.71%	8.20%	2.37%
Merged season latitude	9	4	29	-10.27%	0.00%	1.26%	-32.09%	-20.53%	8.29%	-5.32%	-18.31%	5.24%	-10.18%	6.46%	-10.62%	5.91%	3.47%
Merged season latitude	9	5	30	-9.64%	0.00%	0.34%	-44.88%	-20.62%	7.54%	-1.26%	-18.94%	6.21%	-10.82%	6.96%	-13.89%	8.02%	2.37%
Merged season latitude	10	4	30	-10.02%	0.00%	0.27%	-44.86%	-21.23%	7.60%	-1.08%	-19.82%	6.26%	-10.82%	6.67%	-14.33%	8.48%	2.65%
Merged season latitude	11	4	31	-9.26%	0.00%	0.59%	-42.54%	-20.01%	6.68%	0.27%	-16.92%	6.38%	-10.09%	5.80%	-16.68%	8.73%	1.83%
Merged season latitude	11	9	31	-8.62%	0.00%	0.88%	-35.26%	-20.03%	5.84%	2.26%	-15.67%	6.16%	-10.30%	4.86%	-16.63%	8.77%	1.42%

Leatherback turtle take reduction bin # 4 (-15% to -20%)
10 best of 9396 scenarios at this take level with minimum fishing effort disruption

Type of management action	#Mn	Ms	Lon/Lat	FED	FEL	Rev	Log	Lea	Rid	Gre	Swo	Big	Alb	Yel	Blu	Mah	Opa
Merged season latitude	3	11	31	-5.00%	0.00%	1.04%	-24.31%	-15.27%	2.55%	3.56%	-9.53%	4.58%	-8.53%	3.00%	-11.29%	5.75%	0.89%
Merged season latitude	4	9	31	-4.89%	0.00%	1.58%	-20.19%	-15.06%	5.05%	-1.24%	-10.43%	4.61%	-10.64%	2.99%	-9.82%	6.36%	1.08%
Merged season latitude	4	10	32	-5.21%	0.00%	0.78%	-23.83%	-15.76%	3.09%	2.32%	-9.61%	4.61%	-10.00%	3.22%	-10.68%	6.85%	0.82%
Merged season latitude	5	9	33	-5.09%	0.00%	0.53%	-21.57%	-15.02%	4.25%	0.14%	-9.00%	3.74%	-6.66%	2.52%	-9.63%	7.19%	0.57%
Merged season latitude	6	9	33	-5.15%	0.00%	0.53%	-21.55%	-15.06%	4.26%	0.19%	-9.01%	3.77%	-6.66%	2.58%	-9.71%	7.24%	0.57%
Merged season latitude	7	9	33	-5.21%	0.00%	0.54%	-21.54%	-15.09%	4.27%	0.27%	-9.00%	3.77%	-6.65%	2.59%	-9.75%	7.33%	0.57%
Merged season latitude	8	9	33	-5.21%	0.00%	0.54%	-21.54%	-15.12%	4.27%	0.27%	-8.99%	3.77%	-6.65%	2.60%	-9.75%	7.33%	0.57%
Merged season latitude	9	9	33	-5.22%	0.00%	0.54%	-21.54%	-15.12%	4.27%	0.28%	-8.99%	3.77%	-6.65%	2.60%	-9.87%	7.33%	0.57%
Merged season latitude	9	11	32	-5.27%	0.00%	0.91%	-22.71%	-15.78%	2.56%	2.14%	-8.31%	4.30%	-7.62%	3.30%	-10.19%	4.28%	0.81%
Merged season latitude	10	10	33	-5.08%	0.00%	0.44%	-21.69%	-15.33%	3.20%	1.15%	-8.00%	3.61%	-6.38%	2.66%	-9.06%	5.72%	0.62%

Leatherback turtle take reduction bin # 3 (-10% to -15%)
10 best of 14312 scenarios at this take level with minimum fishing effort disruption

Type of management action	#Mn	Ms	Lon/Lat	FED	FEL	Rev	Log	Lea	Rid	Gre	Swo	Big	Alb	Yel	Blu	Mah	Opa
Merged season latitude	2	11	33	-2.94%	0.00%	0.78%	-12.07%	-10.95%	1.78%	0.41%	-4.76%	2.52%	-4.22%	1.38%	-5.78%	3.11%	0.53%
Merged season box	2	11	165031	-2.91%	0.00%	0.78%	-9.77%	-10.09%	1.56%	1.95%	-4.57%	1.99%	-3.89%	1.34%	-4.59%	1.66%	0.30%
Merged season box	2	11	168032	-2.94%	0.00%	0.87%	-10.45%	-10.93%	1.63%	2.06%	-4.88%	2.31%	-4.23%	1.53%	-3.82%	1.78%	0.40%
Merged season box	2	11	167032	-2.92%	0.00%	0.77%	-10.24%	-10.87%	1.61%	2.08%	-4.82%	2.20%	-4.00%	1.44%	-4.03%	1.67%	0.40%
Merged season box	2	11	166032	-2.90%	0.00%	0.73%	-10.07%	-10.80%	1.57%	2.06%	-4.81%	2.12%	-3.86%	1.37%	-4.11%	1.63%	0.40%
Merged season box	2	11	173033	-2.87%	0.00%	0.80%	-10.99%	-10.37%	1.55%	1.61%	-4.48%	2.29%	-3.82%	1.35%	-2.45%	2.32%	0.47%
Merged season box	2	11	172033	-2.84%	0.00%	0.76%	-10.70%	-10.27%	1.50%	1.81%	-4.43%	2.23%	-3.84%	1.32%	-3.22%	2.13%	0.45%
Merged season box	2	11	171033	-2.84%	0.00%	0.75%	-10.57%	-10.23%	1.48%	1.84%	-4.31%	2.20%	-3.44%	1.30%	-3.17%	1.97%	0.40%
Merged season box	2	11	170033	-2.81%	0.00%	0.71%	-10.29%	-10.11%	1.44%	1.90%	-4.30%	2.09%	-3.04%	1.28%	-3.07%	1.86%	0.36%
Merged season latitude	9	11	34	-2.95%	0.00%	0.32%	-11.44%	-10.55%	1.46%	0.88%	-4.38%	2.02%	-3.48%	1.27%	-4.34%	2.52%	0.35%

Leatherback turtle take reduction bin # 2 (-5% to -10%)
10 best of 18589 scenarios at this take level with minimum fishing effort disruption

Type of management action	#Mn	Ms	Lon/Lat	FED	FEL	Rev	Log	Lea	Rid	Gre	Swo	Big	Alb	Yel	Blu	Mah	Opa
Merged season box	1	12	153027	-1.15%	0.00%	0.11%	-0.21%	-5.26%	0.40%	1.06%	-1.19%	0.29%	-0.12%	0.29%	-2.94%	0.19%	0.07%
Merged season box	1	12	153030	-1.14%	0.00%	0.10%	-0.21%	-5.24%	0.39%	1.05%	-1.19%	0.29%	-0.13%	0.29%	-2.90%	0.23%	0.07%
Merged season box	1	12	153031	-1.14%	0.00%	0.10%	-0.22%	-5.24%	0.39%	1.05%	-1.19%	0.29%	-0.13%	0.28%	-2.90%	0.23%	0.07%
Merged season box	1	12	155032	-1.15%	0.00%	0.11%	-0.25%	-5.28%	0.40%	1.05%	-1.19%	0.29%	-0.18%	0.29%	-2.96%	0.21%	0.07%
Merged season box	1	12	154032	-1.15%	0.00%	0.10%	-0.26%	-5.25%	0.40%	1.04%	-1.19%	0.29%	-0.15%	0.29%	-2.96%	0.20%	0.07%
Merged season box	1	12	153032	-1.13%	0.00%	0.10%	-0.24%	-5.19%	0.39%	1.03%	-1.19%	0.28%	-0.14%	0.28%	-2.90%	0.23%	0.07%
Merged season box	1	12	161033	-1.13%	0.00%	0.20%	-0.49%	-5.06%	0.39%	0.97%	-1.19%	0.40%	-0.58%	0.35%	-2.53%	0.24%	0.07%
Merged season box	1	12	160033	-1.12%	0.00%	0.18%	-0.48%	-5.03%	0.39%	0.96%	-1.14%	0.34%	-0.59%	0.32%	-2.57%	0.22%	0.08%
Merged season box	1	12	159033	-1.12%	0.00%	0.16%	-0.44%	-5.01%	0.38%	0.96%	-1.13%	0.33%	-0.60%	0.31%	-2.57%	0.22%	0.07%
Merged season box	1	12	158033	-1.12%	0.00%	0.15%	-0.44%	-5.00%	0.38%	0.96%	-1.14%	0.32%	-0.55%	0.30%	-2.48%	0.21%	0.07%

Appendix 2. Listing of twenty-five best scenarios for fishing effort disruption bin approximating Emergency closure optimized for leatherback turtle take reduction. Notations: #Mn = the number of months for a seasonal closure, Ms = the starting month of a seasonal closure, Lon/Lat = position of spatial closure, FED = fishing effort disruption, FEL = fishing effort lost, Rev = fish catch revenue change, Log = loggerhead turtle take change, Lea = leatherback turtle take change, Rid = olive ridley turtle take change, Gre = green turtle take change, Swo = swordfish catch change, Big = bigeye tuna catch change, Alb = albacore catch change, Yel = yellowfin tuna catch change, Blu = bluefin tuna catch change, Mah = mahi-mahi catch change, Opa = opah catch change. Other fish species included in the revenue calculations are not presented to save space. Results are not presented in any ordered sequence.

Fishing effort disruption bin # 3 (-10% to -15%)
25 best of 8173 scenarios at this level optimized for leatherback

Type of management action	#Mn	Ms	Lon/Lat	FED	FEL	Rev	Log	Lea	Rid	Gre	Swo	Big	Alb	Yel	Blu	Mah	Opa
Latitude	0	0	30	-13.54%	0.00%	-0.26%	-49.88%	-22.23%	8.15%	2.82%	-24.38%	7.22%	-9.99%	7.44%	-20.73%	14.20%	2.85%
Separated season latitude	1	4	34	-14.77%	0.00%	0.21%	-26.41%	-22.18%	5.08%	-0.96%	-10.19%	4.78%	-6.19%	4.35%	-5.71%	3.23%	-0.12%
Separated season box	1	4	170033	-14.93%	0.00%	1.27%	-20.67%	-22.46%	3.44%	5.75%	-6.81%	4.22%	-5.15%	4.12%	-3.67%	-0.83%	-0.31%
Separated season box	1	4	169033	-14.80%	0.00%	1.15%	-19.85%	-22.18%	3.32%	5.71%	-6.53%	4.02%	-4.90%	3.99%	-3.38%	-1.07%	-0.34%
Separated season box	1	4	168033	-14.74%	0.00%	1.08%	-19.70%	-22.17%	3.25%	5.59%	-6.37%	3.88%	-4.88%	3.92%	-2.47%	-1.18%	-0.37%
Merged season latitude	7	7	26	-13.54%	0.00%	-0.89%	-54.36%	-22.22%	16.00%	-11.67%	-23.96%	2.93%	-10.36%	11.71%	-21.51%	1.64%	5.33%
Merged season latitude	9	4	28	-13.60%	0.00%	0.51%	-35.22%	-23.67%	9.71%	-8.45%	-22.62%	4.34%	-9.47%	7.71%	-10.70%	6.22%	4.84%
Merged season latitude	9	5	27	-14.75%	0.00%	-0.08%	-52.63%	-23.93%	11.51%	-12.23%	-23.58%	4.60%	-9.40%	11.54%	-18.44%	-0.05%	5.23%
Merged season latitude	9	5	28	-12.64%	0.00%	-0.02%	-51.39%	-23.05%	9.90%	-8.99%	-21.64%	4.99%	-9.71%	9.81%	-17.39%	3.08%	4.23%
Merged season latitude	9	6	28	-14.93%	0.00%	-1.48%	-64.37%	-22.39%	10.57%	-8.80%	-27.76%	5.71%	-9.51%	10.86%	-22.21%	8.45%	4.16%
Merged season latitude	10	4	29	-12.91%	0.00%	-0.04%	-50.05%	-23.95%	8.97%	-4.85%	-23.67%	6.72%	-11.63%	7.88%	-17.90%	8.49%	3.66%
Merged season latitude	10	5	29	-13.91%	0.00%	-0.14%	-57.96%	-22.83%	9.34%	-4.51%	-25.40%	7.43%	-11.04%	9.03%	-21.06%	8.72%	3.15%
Merged season latitude	11	9	30	-12.55%	0.00%	0.12%	-42.43%	-22.18%	7.22%	4.91%	-22.47%	7.16%	-10.64%	5.98%	-20.20%	13.33%	2.20%
Merged season box	10	4	166026	-14.49%	0.00%	0.35%	-29.25%	-22.60%	5.38%	14.45%	-9.59%	2.49%	-5.80%	3.78%	-7.55%	-8.28%	2.10%
Merged season box	10	4	171027	-14.89%	0.00%	0.28%	-35.30%	-23.89%	5.83%	15.17%	-16.39%	4.38%	-7.01%	6.23%	-9.41%	-2.82%	3.47%
Merged season box	10	4	170027	-14.39%	0.00%	0.26%	-34.44%	-23.45%	5.58%	14.77%	-15.57%	4.45%	-6.61%	5.89%	-8.51%	-3.67%	3.19%
Merged season box	10	4	169027	-13.88%	0.00%	0.34%	-32.68%	-22.68%	5.30%	14.25%	-13.98%	4.23%	-6.42%	5.33%	-8.42%	-4.42%	3.02%
Merged season box	10	4	168027	-13.36%	0.00%	0.57%	-31.79%	-22.58%	5.08%	13.69%	-13.16%	4.30%	-6.26%	4.84%	-7.20%	-4.63%	2.87%
Merged season box	10	4	167027	-12.93%	0.00%	0.67%	-30.86%	-22.30%	4.93%	13.05%	-11.11%	3.92%	-6.30%	4.25%	-7.64%	-4.88%	2.67%
Merged season box	10	4	173028	-13.60%	0.00%	0.45%	-35.59%	-22.76%	5.53%	12.85%	-18.03%	5.29%	-7.93%	6.46%	-6.96%	4.94%	3.21%
Merged season box	10	4	172028	-13.04%	0.00%	0.38%	-35.30%	-22.60%	5.23%	13.16%	-16.59%	5.09%	-7.59%	5.83%	-8.63%	2.93%	3.16%
Merged season box	10	4	171028	-12.68%	0.00%	0.37%	-34.86%	-22.49%	5.05%	13.07%	-15.50%	4.87%	-6.99%	5.25%	-9.11%	1.77%	2.89%
Merged season box	11	3	167028	-14.91%	0.00%	0.93%	-32.70%	-22.21%	5.54%	24.00%	-12.27%	5.10%	-6.18%	3.74%	-11.02%	-0.16%	2.42%
Merged season box	11	4	169028	-14.64%	0.00%	-0.21%	-43.90%	-22.42%	5.24%	16.28%	-18.55%	5.63%	-6.00%	5.03%	-12.76%	2.77%	2.52%
Merged season box	11	4	168028	-14.24%	0.00%	0.04%	-42.67%	-22.35%	5.06%	16.02%	-16.51%	5.67%	-5.93%	4.57%	-11.58%	2.14%	2.38%

Appendix 3. Listings of three best scenarios optimized for 1) loggerhead turtle take reduction, 2) olive ridley turtle take reduction, 3) green turtle take reduction, and 4) aggregate turtle take reduction per bin of leatherback turtle take reduction. Notations: #Mn = the number of months for a seasonal closure, Ms = the starting month of a seasonal closure, Lon/Lat = position of spatial closure, FED = fishing effort disruption, FEL = fishing effort lost, Rev = fish catch revenue change, Log = loggerhead turtle take change, Lea = leatherback turtle take change, Rid = olive ridley turtle take change, Gre = green turtle take change, Swo = swordfish catch change, Big = bigeye tuna catch change, Alb = albacore catch change, Yel = yellowfin tuna catch change, Blu = bluefin tuna catch change, Mah = mahi-mahi catch change, Opa = opah catch change. Other fish species included in the revenue calculations are not presented to save space. Results are not presented in any ordered sequence.

Leatherback turtle take reduction bin # 20 (-95% to %-100%)
3 best of 2327 scenarios at this take level with maximum loggerhead turtle take reduction

Type of management action	#Mn	Ms	Lon/Lat	FED	FEL	Rev	Log	Lea	Rid	Gre	Swo	Big	Alb	Yel	Blu	Mah	Opa
Separated season latitude	10	11	21	-95.60%	-78.86%	-88.03%	-100.00%	-97.53%	-4.48%	-88.83%	-99.24%	-86.89%	-92.16%	-82.84%	-57.45%	-89.40%	-80.39%
Separated season latitude	11	10	21	-97.85%	-86.31%	-93.03%	-100.00%	-99.13%	19.68%	-91.94%	-99.67%	-95.10%	-95.17%	-87.20%	-57.38%	-95.87%	-89.81%
Separated season latitude	11	11	21	-97.74%	-84.25%	-90.44%	-100.00%	-97.53%	-76.46%	-92.61%	-99.43%	-89.27%	-95.26%	-92.25%	-59.38%	-91.77%	-86.20%

Leatherback turtle take reduction bin # 20 (-95% to %-100%)
3 best of 2327 scenarios at this take level with maximum olive ridley turtle take reduction

Type of management action	#Mn	Ms	Lon/Lat	FED	FEL	Rev	Log	Lea	Rid	Gre	Swo	Big	Alb	Yel	Blu	Mah	Opa
Separated season longitude	11	1	173	-99.98%	-82.54%	-87.11%	-98.52%	-95.22%	-99.42%	-97.06%	-96.24%	-96.54%	-96.34%	-99.45%	-60.00%	-96.69%	-100.00%
Separated season longitude	11	1	171	-99.98%	-82.54%	-79.74%	-98.63%	-95.44%	-99.37%	-97.03%	-96.49%	-96.66%	-96.64%	-99.44%	-60.00%	-96.63%	-99.98%
Separated season longitude	11	1	170	-99.98%	-82.54%	-81.17%	-98.63%	-95.44%	-99.37%	-97.03%	-95.25%	-93.44%	-95.92%	-99.08%	-60.00%	-98.87%	-99.98%

Leatherback turtle take reduction bin # 20 (-95% to %-100%)
3 best of 2327 scenarios at this take level with maximum green turtle take reduction

Type of management action	#Mn	Ms	Lon/Lat	FED	FEL	Rev	Log	Lea	Rid	Gre	Swo	Big	Alb	Yel	Blu	Mah	Opa
Separated season longitude	11	1	173	-99.98%	-82.54%	-87.11%	-98.52%	-95.22%	-99.42%	-97.06%	-96.24%	-96.54%	-96.34%	-99.45%	-60.00%	-96.69%	-100.00%
Separated season longitude	11	1	172	-99.98%	-82.54%	-88.68%	-98.63%	-95.44%	-99.37%	-97.03%	-96.43%	-96.64%	-96.55%	-99.46%	-60.00%	-96.64%	-99.98%
Separated season longitude	11	1	170	-99.98%	-82.54%	-81.17%	-98.63%	-95.44%	-99.37%	-97.03%	-95.25%	-93.44%	-95.92%	-99.08%	-60.00%	-98.87%	-99.98%

Leatherback turtle take reduction bin # 20 (-95% to %-100%)
3 best of 2327 scenarios at this take level with maximum aggregate turtle take reduction

Type of management action	#Mn	Ms	Lon/Lat	FED	FEL	Rev	Log	Lea	Rid	Gre	Swo	Big	Alb	Yel	Blu	Mah	Opa
Separated season longitude	11	1	172	-99.98%	-82.54%	-88.68%	-98.63%	-95.44%	-99.37%	-97.03%	-96.43%	-96.64%	-96.55%	-99.46%	-60.00%	-96.64%	-99.98%
Separated season longitude	11	1	171	-99.98%	-82.54%	-79.74%	-98.63%	-95.44%	-99.37%	-97.03%	-96.49%	-96.66%	-96.64%	-99.44%	-60.00%	-96.63%	-99.98%
Separated season longitude	11	1	170	-99.98%	-82.54%	-81.17%	-98.63%	-95.44%	-99.37%	-97.03%	-95.25%	-93.44%	-95.92%	-99.08%	-60.00%	-98.87%	-99.98%

Leatherback turtle take reduction bin # 19 (-90% to -95%)
3 best of 3249 scenarios at this take level with maximum loggerhead turtle take reduction

Type of management action	#Mn	Ms	Lon/Lat	FED	FEL	Rev	Log	Lea	Rid	Gre	Swo	Big	Alb	Yel	Blu	Mah	Opa
Separated season latitude	9	12	21	-92.00%	-70.17%	-83.35%	-99.98%	-93.65%	7.93%	-83.58%	-98.90%	-75.02%	-89.62%	-76.12%	-56.13%	-79.41%	-72.09%
Separated season latitude	10	12	21	-94.14%	-75.60%	-85.77%	-99.98%	-93.69%	-65.36%	-87.37%	-99.08%	-77.43%	-92.72%	-85.65%	-58.06%	-81.82%	-77.90%
Separated season latitude	11	12	21	-96.40%	-83.02%	-90.40%	-99.98%	-94.12%	-77.33%	-90.58%	-99.51%	-84.30%	-96.11%	-90.97%	-58.33%	-87.29%	-87.56%

Leatherback turtle take reduction bin # 19 (-90% to -95%)
3 best of 3249 scenarios at this take level with maximum olive ridley turtle take reduction

Type of management action	#Mn	Ms	Lon/Lat	FED	FEL	Rev	Log	Lea	Rid	Gre	Swo	Big	Alb	Yel	Blu	Mah	Opa
Separated season longitude	10	1	173	-99.92%	-73.90%	-87.54%	-93.91%	-93.01%	-99.05%	-91.55%	-94.77%	-96.24%	-92.30%	-99.35%	-49.71%	-96.53%	-100.00%
Separated season longitude	11	12	173	-99.93%	-83.02%	-95.72%	-93.05%	-94.91%	-99.24%	-91.20%	-98.31%	-99.65%	-94.96%	-99.85%	-48.58%	-99.81%	-100.00%
Separated season longitude	11	12	172	-99.91%	-83.02%	-78.27%	-92.60%	-94.94%	-99.28%	-91.16%	-97.94%	-99.58%	-94.71%	-99.85%	-51.23%	-99.85%	-99.98%

Leatherback turtle take reduction bin # 19 (-90% to -95%)
3 best of 3249 scenarios at this take level with maximum green turtle take reduction

Type of management action	#Mn	Ms	Lon/Lat	FED	FEL	Rev	Log	Lea	Rid	Gre	Swo	Big	Alb	Yel	Blu	Mah	Opa
Separated season longitude	10	1	173	-99.92%	-73.90%	-87.54%	-93.91%	-93.01%	-99.05%	-91.55%	-94.77%	-96.24%	-92.30%	-99.35%	-49.71%	-96.53%	-100.00%
Separated season longitude	10	1	172	-99.89%	-73.90%	-75.48%	-93.65%	-93.19%	-99.04%	-91.51%	-94.66%	-96.29%	-92.39%	-99.37%	-52.24%	-96.51%	-99.97%
Separated season longitude	11	12	173	-99.93%	-83.02%	-95.72%	-93.05%	-94.91%	-99.24%	-91.20%	-98.31%	-99.65%	-94.96%	-99.85%	-48.58%	-99.81%	-100.00%

Leatherback turtle take reduction bin # 19 (-90% to -95%)
3 best of 3249 scenarios at this take level with maximum aggregate turtle take reduction

Type of management action	#Mn	Ms	Lon/Lat	FED	FEL	Rev	Log	Lea	Rid	Gre	Swo	Big	Alb	Yel	Blu	Mah	Opa
Separated season longitude	10	1	173	-99.92%	-73.90%	-87.54%	-93.91%	-93.01%	-99.05%	-91.55%	-94.77%	-96.24%	-92.30%	-99.35%	-49.71%	-96.53%	-100.00%
Separated season longitude	10	1	172	-99.89%	-73.90%	-75.48%	-93.65%	-93.19%	-99.04%	-91.51%	-94.66%	-96.29%	-92.39%	-99.37%	-52.24%	-96.51%	-99.97%
Separated season longitude	11	12	173	-99.93%	-83.02%	-95.72%	-93.05%	-94.91%	-99.24%	-91.20%	-98.31%	-99.65%	-94.96%	-99.85%	-48.58%	-99.81%	-100.00%

Leatherback turtle take reduction bin # 18 (-85% to -90%)
3 best of 2369 scenarios at this take level with maximum loggerhead turtle take reduction

Type of management action	#Mn	Ms	Lon/Lat	FED	FEL	Rev	Log	Lea	Rid	Gre	Swo	Big	Alb	Yel	Blu	Mah	Opa
Separated season latitude	11	7	21	-96.17%	-83.24%	-85.97%	-100.00%	-85.69%	-77.05%	-79.68%	-96.91%	-93.23%	-81.72%	-79.73%	-57.37%	-98.59%	-88.11%
Separated season latitude	11	7	22	-95.90%	-83.24%	-86.32%	-100.00%	-85.56%	-77.98%	-79.59%	-96.77%	-93.21%	-80.36%	-80.46%	-57.39%	-98.35%	-86.57%
Separated season latitude	11	7	23	-95.72%	-83.24%	-86.44%	-100.00%	-85.46%	-78.38%	-80.01%	-96.02%	-93.10%	-78.59%	-81.99%	-57.32%	-97.88%	-85.22%

Leatherback turtle take reduction bin # 18 (-85% to -90%)
3 best of 2369 scenarios at this take level with maximum olive ridley turtle take reduction

Type of management action	#Mn	Ms	Lon/Lat	FED	FEL	Rev	Log	Lea	Rid	Gre	Swo	Big	Alb	Yel	Blu	Mah	Opa
Separated season longitude	10	1	170	-99.86%	-73.90%	-77.67%	-66.43%	-85.77%	-98.73%	-85.15%	-91.35%	-91.41%	-74.58%	-98.57%	-47.56%	-98.37%	-99.58%
Separated season longitude	11	10	173	-99.88%	-86.31%	-89.82%	-71.78%	-88.15%	-99.03%	-72.58%	-97.35%	-99.93%	-99.78%	-99.97%	-58.23%	-99.69%	-99.96%
Separated season longitude	11	12	169	-99.85%	-83.02%	-87.81%	-62.72%	-86.45%	-98.73%	-83.40%	-93.98%	-95.52%	-77.08%	-99.19%	-48.96%	-99.07%	-99.58%

Leatherback turtle take reduction bin # 18 (-85% to -90%)
3 best of 2369 scenarios at this take level with maximum green turtle take reduction

Type of management action	#Mn	Ms	Lon/Lat	FED	FEL	Rev	Log	Lea	Rid	Gre	Swo	Big	Alb	Yel	Blu	Mah	Opa
Separated season latitude	11	8	21	-95.87%	-84.16%	-88.93%	-99.77%	-88.62%	-71.33%	-89.15%	-98.58%	-95.38%	-88.69%	-76.14%	-58.85%	-98.24%	-90.71%
Separated season latitude	11	8	22	-95.53%	-84.16%	-89.49%	-99.72%	-88.55%	-71.75%	-88.99%	-98.55%	-95.31%	-87.27%	-76.07%	-58.83%	-98.12%	-88.56%
Separated season latitude	11	8	24	-95.00%	-84.16%	-89.70%	-99.14%	-88.10%	-73.00%	-88.97%	-97.75%	-95.28%	-81.06%	-75.69%	-58.63%	-96.82%	-85.88%

Leatherback turtle take reduction bin # 18 (-85% to -90%)
3 best of 2369 scenarios at this take level with maximum aggregate turtle take reduction

Type of management action	#Mn	Ms	Lon/Lat	FED	FEL	Rev	Log	Lea	Rid	Gre	Swo	Big	Alb	Yel	Blu	Mah	Opa
Separated season longitude	11	1	169	-99.97%	-82.54%	-81.17%	-98.46%	-87.00%	-89.91%	-88.53%	-74.08%	-83.63%	-89.21%	-98.97%	-60.00%	-95.55%	-99.98%
Separated season box	11	12	164032	-92.54%	-83.02%	-88.77%	-85.96%	-85.83%	-80.87%	-84.68%	-91.97%	-75.85%	-79.88%	-88.48%	-46.60%	-79.73%	-83.67%
Separated season box	11	12	164033	-92.52%	-83.02%	-88.80%	-85.73%	-85.76%	-80.92%	-84.68%	-91.83%	-75.82%	-79.42%	-88.44%	-46.45%	-79.67%	-83.66%

Leatherback turtle take reduction bin # 17 (-80% to -85%)
3 best of 4485 scenarios at this take level with maximum loggerhead turtle take reduction

Type of management action	#Mn	Ms	Lon/Lat	FED	FEL	Rev	Log	Lea	Rid	Gre	Swo	Big	Alb	Yel	Blu	Mah	Opa
Separated season latitude	11	7	25	-94.08%	-83.24%	-85.99%	-100.00%	-84.63%	-79.43%	-81.66%	-91.84%	-93.58%	-78.70%	-85.57%	-56.44%	-96.67%	-84.97%
Separated season latitude	11	7	26	-93.30%	-83.24%	-85.62%	-100.00%	-83.82%	-79.97%	-81.87%	-90.42%	-93.23%	-78.60%	-85.56%	-57.02%	-96.60%	-84.97%
Separated season latitude	11	7	27	-92.66%	-83.24%	-85.23%	-100.00%	-83.77%	-79.98%	-77.64%	-89.32%	-92.82%	-78.68%	-85.98%	-56.86%	-96.21%	-84.95%

Leatherback turtle take reduction bin # 17 (-80% to -85%)
3 best of 4485 scenarios at this take level with maximum olive ridley turtle take reduction

Type of management action	#Mn	Ms	Lon/Lat	FED	FEL	Rev	Log	Lea	Rid	Gre	Swo	Big	Alb	Yel	Blu	Mah	Opa
Separated season longitude	10	1	171	-99.88%	-73.90%	-76.57%	-60.45%	-84.19%	-98.78%	-84.28%	-92.40%	-95.78%	-74.93%	-99.13%	-42.78%	-96.46%	-99.97%
Separated season longitude	11	12	171	-99.90%	-83.02%	-88.96%	-45.25%	-82.10%	-98.91%	-80.85%	-95.54%	-99.02%	-76.89%	-99.62%	-41.23%	-99.79%	-99.98%
Separated season longitude	11	12	170	-99.88%	-83.02%	-88.95%	-53.80%	-84.37%	-98.83%	-82.07%	-95.65%	-97.85%	-77.11%	-99.40%	-46.16%	-99.44%	-99.59%

Leatherback turtle take reduction bin # 17 (-80% to -85%)
3 best of 4485 scenarios at this take level with maximum green turtle take reduction

Type of management action	#Mn	Ms	Lon/Lat	FED	FEL	Rev	Log	Lea	Rid	Gre	Swo	Big	Alb	Yel	Blu	Mah	Opa
Separated season latitude	11	12	36	-92.01%	-83.02%	-88.88%	-79.11%	-83.66%	-81.78%	-86.39%	-89.72%	-76.66%	-78.70%	-88.71%	-50.22%	-80.50%	-83.72%
Separated season box	11	12	147036	-91.48%	-83.02%	-88.98%	-73.38%	-80.87%	-82.14%	-86.33%	-87.87%	-77.23%	-76.38%	-89.07%	-47.44%	-81.29%	-83.86%
Separated season box	11	12	146036	-91.48%	-83.02%	-88.99%	-73.41%	-80.85%	-82.14%	-86.35%	-87.84%	-77.24%	-76.37%	-89.07%	-47.48%	-81.29%	-83.86%

Leatherback turtle take reduction bin # 17 (-80% to -85%)
3 best of 4485 scenarios at this take level with maximum aggregate turtle take reduction

Type of management action	#Mn	Ms	Lon/Lat	FED	FEL	Rev	Log	Lea	Rid	Gre	Swo	Big	Alb	Yel	Blu	Mah	Opa
Separated season box	11	12	163030	-92.34%	-83.02%	-88.74%	-81.76%	-84.53%	-81.14%	-85.02%	-91.43%	-76.31%	-79.93%	-88.74%	-47.42%	-80.12%	-83.83%
Separated season box	11	12	163031	-92.33%	-83.02%	-88.76%	-81.64%	-84.52%	-81.17%	-85.03%	-91.18%	-76.24%	-79.18%	-88.64%	-46.73%	-79.93%	-83.79%
Separated season box	11	12	163032	-92.30%	-83.02%	-88.78%	-81.47%	-84.55%	-81.20%	-85.01%	-90.91%	-76.26%	-78.87%	-88.65%	-46.19%	-79.93%	-83.76%

Leatherback turtle take reduction bin # 16 (-75% to -80%)
3 best of 3965 scenarios at this take level with maximum loggerhead turtle take reduction

Type of management action	#Mn	Ms	Lon/Lat	FED	FEL	Rev	Log	Lea	Rid	Gre	Swo	Big	Alb	Yel	Blu	Mah	Opa
Separated season latitude	6	12	21	-80.98%	-48.02%	-65.37%	-99.86%	-77.15%	2.01%	-61.12%	-94.46%	-63.40%	-64.28%	-29.97%	-51.49%	-75.70%	-54.10%
Separated season latitude	11	5	21	-96.29%	-81.83%	-81.97%	-99.97%	-76.07%	-75.39%	-86.06%	-97.41%	-90.02%	-90.49%	-91.00%	-57.16%	-91.81%	-89.67%
Separated season latitude	11	5	22	-95.52%	-81.83%	-81.89%	-99.80%	-76.04%	-76.65%	-86.27%	-97.41%	-89.40%	-89.20%	-90.86%	-57.40%	-91.00%	-86.36%

Leatherback turtle take reduction bin # 16 (-75% to -80%)
3 best of 3965 scenarios at this take level with maximum olive ridley turtle take reduction

Type of management action	#Mn	Ms	Lon/Lat	FED	FEL	Rev	Log	Lea	Rid	Gre	Swo	Big	Alb	Yel	Blu	Mah	Opa
Separated season longitude	7	5	173	-99.10%	-44.96%	-50.23%	-52.66%	-79.99%	-92.14%	7.59%	-68.62%	-93.04%	-88.76%	-94.56%	-50.23%	-94.35%	-99.98%
Separated season longitude	8	3	171	-99.19%	-55.75%	-49.51%	6.71%	-79.06%	-95.02%	-45.37%	-86.18%	-92.42%	-63.75%	-95.13%	-35.76%	-95.00%	-99.74%
Separated season longitude	9	2	170	-99.42%	-64.50%	-64.14%	-6.44%	-79.89%	-92.21%	-43.92%	-84.63%	-88.32%	-65.59%	-95.40%	-40.69%	-97.77%	-99.58%

Leatherback turtle take reduction bin # 16 (-75% to -80%)
3 best of 3965 scenarios at this take level with maximum green turtle take reduction

Type of management action	#Mn	Ms	Lon/Lat	FED	FEL	Rev	Log	Lea	Rid	Gre	Swo	Big	Alb	Yel	Blu	Mah	Opa
Separated season latitude	11	5	24	-95.17%	-81.83%	-82.07%	-99.01%	-75.47%	-81.22%	-87.06%	-96.59%	-87.81%	-87.90%	-90.07%	-57.22%	-87.11%	-84.32%
Separated season box	11	12	166039	-91.33%	-83.02%	-88.98%	-73.50%	-78.66%	-82.26%	-86.76%	-87.71%	-77.32%	-76.52%	-89.12%	-47.75%	-81.49%	-83.86%
Separated season box	11	12	152039	-91.33%	-83.02%	-88.99%	-73.50%	-78.66%	-82.26%	-86.76%	-87.68%	-77.32%	-76.46%	-89.12%	-47.71%	-81.49%	-83.86%

Leatherback turtle take reduction bin # 16 (-75% to -80%)
3 best of 3965 scenarios at this take level with maximum aggregate turtle take reduction

Type of management action	#Mn	Ms	Lon/Lat	FED	FEL	Rev	Log	Lea	Rid	Gre	Swo	Big	Alb	Yel	Blu	Mah	Opa
Separated season box	11	1	162021	-93.83%	-82.54%	-76.70%	-85.80%	-79.60%	-83.63%	-81.80%	-82.33%	-71.89%	-83.11%	-77.36%	-46.03%	-85.01%	-82.44%
Separated season box	11	1	162022	-93.56%	-82.54%	-77.25%	-85.99%	-79.64%	-83.79%	-82.08%	-83.84%	-71.21%	-80.36%	-78.56%	-46.43%	-84.85%	-79.29%
Separated season box	11	1	162023	-93.33%	-82.54%	-77.62%	-86.35%	-79.80%	-83.89%	-82.40%	-84.66%	-70.53%	-77.19%	-79.55%	-46.42%	-81.62%	-77.33%

Leatherback turtle take reduction bin # 15 (-70% to -75%)
3 best of 4145 scenarios at this take level with maximum loggerhead turtle take reduction

Type of management action	#Mn	Ms	Lon/Lat	FED	FEL	Rev	Log	Lea	Rid	Gre	Swo	Big	Alb	Yel	Blu	Mah	Opa
Separated season latitude	11	6	21	-95.84%	-81.74%	-83.04%	-100.00%	-74.12%	-73.64%	-83.02%	-96.84%	-90.25%	-86.88%	-86.75%	-56.37%	-96.92%	-90.80%
Separated season latitude	11	6	22	-95.52%	-81.74%	-83.31%	-100.00%	-73.88%	-74.12%	-82.92%	-96.75%	-90.11%	-85.56%	-86.48%	-56.44%	-95.92%	-88.73%
Separated season latitude	11	6	24	-94.44%	-81.74%	-82.19%	-100.00%	-71.97%	-77.53%	-84.15%	-93.66%	-89.85%	-83.93%	-87.47%	-55.98%	-94.79%	-84.62%

Leatherback turtle take reduction bin # 15 (-70% to -75%)
3 best of 4145 scenarios at this take level with maximum olive ridley turtle take reduction

Type of management action	#Mn	Ms	Lon/Lat	FED	FEL	Rev	Log	Lea	Rid	Gre	Swo	Big	Alb	Yel	Blu	Mah	Opa
Separated season longitude	11	5	169	-99.03%	-81.83%	-75.58%	-83.01%	-74.35%	-88.94%	-53.96%	-84.06%	-97.29%	-93.43%	-95.04%	-58.06%	-93.27%	-96.93%
Separated season longitude	11	5	167	-98.47%	-81.83%	-75.18%	-80.86%	-73.35%	-88.49%	-61.35%	-80.61%	-94.79%	-83.43%	-94.01%	-58.23%	-90.30%	-90.02%
Separated season longitude	11	5	166	-98.19%	-81.83%	-76.04%	-81.20%	-73.60%	-87.91%	-63.15%	-81.65%	-94.53%	-84.17%	-94.13%	-57.08%	-89.69%	-90.44%

Leatherback turtle take reduction bin # 15 (-70% to -75%)
3 best of 4145 scenarios at this take level with maximum green turtle take reduction

Type of management action	#Mn	Ms	Lon/Lat	FED	FEL	Rev	Log	Lea	Rid	Gre	Swo	Big	Alb	Yel	Blu	Mah	Opa
Separated season box	11	1	150035	-91.13%	-82.54%	-78.12%	-90.36%	-71.26%	-84.84%	-86.20%	-79.90%	-68.03%	-72.33%	-78.62%	-41.91%	-81.57%	-77.62%
Separated season box	11	1	149035	-91.10%	-82.54%	-78.14%	-90.38%	-71.08%	-84.85%	-86.22%	-79.87%	-68.05%	-72.26%	-78.63%	-41.60%	-81.61%	-77.62%
Separated season box	11	1	148035	-91.02%	-82.54%	-78.12%	-90.49%	-70.29%	-84.88%	-86.34%	-79.53%	-68.12%	-72.06%	-78.66%	-41.52%	-81.68%	-77.61%

Leatherback turtle take reduction bin # 15 (-70% to -75%)
3 best of 4145 scenarios at this take level with maximum aggregate turtle take reduction

Type of management action	#Mn	Ms	Lon/Lat	FED	FEL	Rev	Log	Lea	Rid	Gre	Swo	Big	Alb	Yel	Blu	Mah	Opa
Separated season box	11	1	146025	-91.40%	-82.54%	-78.25%	-90.49%	-74.35%	-84.55%	-85.66%	-80.27%	-68.20%	-72.15%	-78.60%	-40.97%	-81.69%	-77.57%
Separated season box	11	1	147033	-91.43%	-82.54%	-78.16%	-90.75%	-74.82%	-84.52%	-85.56%	-80.21%	-68.10%	-72.09%	-78.57%	-40.78%	-81.63%	-77.56%
Separated season box	11	1	148034	-91.38%	-82.54%	-78.07%	-90.43%	-74.65%	-84.63%	-85.63%	-80.20%	-68.02%	-72.06%	-78.54%	-40.91%	-81.59%	-77.57%

Leatherback turtle take reduction bin # 14 (-65% to -70%)
3 best of 4977 scenarios at this take level with maximum loggerhead turtle take reduction

Type of management action	#Mn	Ms	Lon/Lat	FED	FEL	Rev	Log	Lea	Rid	Gre	Swo	Big	Alb	Yel	Blu	Mah	Opa
Separated season box	11	6	158022	-92.47%	-81.74%	-81.34%	-100.00%	-67.10%	-81.45%	-75.79%	-85.94%	-89.68%	-84.87%	-85.32%	-56.41%	-88.74%	-87.54%
Separated season box	11	6	166027	-90.61%	-81.74%	-81.03%	-100.00%	-66.83%	-81.23%	-80.37%	-86.23%	-89.01%	-84.39%	-86.02%	-56.47%	-89.42%	-85.24%
Separated season box	11	6	173029	-90.24%	-81.74%	-81.13%	-100.00%	-65.88%	-81.49%	-81.03%	-86.37%	-89.03%	-84.29%	-85.64%	-56.49%	-89.21%	-85.20%

Leatherback turtle take reduction bin # 14 (-65% to -70%)
3 best of 4977 scenarios at this take level with maximum olive ridley turtle take reduction

Type of management action	#Mn	Ms	Lon/Lat	FED	FEL	Rev	Log	Lea	Rid	Gre	Swo	Big	Alb	Yel	Blu	Mah	Opa
Separated season longitude	6	5	171	-98.31%	-36.49%	-26.14%	18.36%	-66.88%	-88.06%	21.37%	-57.72%	-89.19%	-60.07%	-90.72%	-31.35%	-91.26%	-96.73%
Separated season box	11	5	166030	-90.35%	-81.83%	-79.18%	-85.43%	-65.00%	-86.03%	-81.64%	-80.24%	-89.09%	-85.01%	-87.89%	-55.84%	-78.93%	-85.14%
Separated season box	11	5	164030	-90.35%	-81.83%	-79.20%	-85.43%	-65.00%	-86.03%	-81.64%	-80.00%	-89.06%	-84.93%	-87.81%	-55.84%	-78.78%	-85.14%

Leatherback turtle take reduction bin # 14 (-65% to -70%)
3 best of 4977 scenarios at this take level with maximum green turtle take reduction

Type of management action	#Mn	Ms	Lon/Lat	FED	FEL	Rev	Log	Lea	Rid	Gre	Swo	Big	Alb	Yel	Blu	Mah	Opa
Separated season box	11	1	148039	-90.79%	-82.54%	-78.25%	-90.31%	-68.33%	-84.96%	-86.66%	-78.84%	-68.30%	-72.21%	-78.80%	-40.11%	-81.80%	-77.63%
Separated season box	11	1	147039	-90.79%	-82.54%	-78.25%	-90.31%	-68.33%	-84.96%	-86.66%	-78.78%	-68.30%	-72.20%	-78.81%	-40.09%	-81.80%	-77.63%
Separated season box	11	1	146039	-90.79%	-82.54%	-78.25%	-90.31%	-68.33%	-84.96%	-86.66%	-78.77%	-68.30%	-72.20%	-78.80%	-40.08%	-81.80%	-77.63%

Leatherback turtle take reduction bin # 14 (-65% to -70%)
3 best of 4977 scenarios at this take level with maximum aggregate turtle take reduction

Type of management action	#Mn	Ms	Lon/Lat	FED	FEL	Rev	Log	Lea	Rid	Gre	Swo	Big	Alb	Yel	Blu	Mah	Opa
Separated season box	11	1	147035	-90.96%	-82.54%	-78.14%	-90.55%	-69.90%	-84.89%	-86.42%	-79.18%	-68.20%	-72.15%	-78.72%	-40.58%	-81.73%	-77.62%
Separated season box	11	1	146035	-90.94%	-82.54%	-78.15%	-90.48%	-69.60%	-84.91%	-86.46%	-79.09%	-68.23%	-72.22%	-78.74%	-39.58%	-81.78%	-77.62%
Separated season box	11	1	152036	-90.89%	-82.54%	-78.20%	-90.53%	-69.57%	-84.90%	-86.54%	-79.09%	-68.25%	-72.22%	-78.76%	-41.40%	-81.75%	-77.62%

Leatherback turtle take reduction bin # 13 (-60% to -65%)
3 best of 3720 scenarios at this take level with maximum loggerhead turtle take reduction

Type of management action	#Mn	Ms	Lon/Lat	FED	FEL	Rev	Log	Lea	Rid	Gre	Swo	Big	Alb	Yel	Blu	Mah	Opa
Separated season box	11	6	148029	-89.94%	-81.74%	-81.31%	-100.00%	-64.42%	-81.83%	-81.67%	-83.69%	-88.51%	-83.28%	-84.61%	-56.17%	-86.26%	-85.07%
Separated season box	11	6	170035	-89.92%	-81.74%	-81.32%	-100.00%	-64.20%	-81.86%	-81.75%	-83.65%	-88.53%	-83.30%	-84.61%	-56.20%	-86.22%	-85.07%
Separated season box	11	6	169038	-89.92%	-81.74%	-81.32%	-100.00%	-64.20%	-81.86%	-81.75%	-83.31%	-88.45%	-83.26%	-84.51%	-56.18%	-86.00%	-85.06%

Leatherback turtle take reduction bin # 13 (-60% to -65%)
3 best of 3720 scenarios at this take level with maximum olive ridley turtle take reduction

Type of management action	#Mn	Ms	Lon/Lat	FED	FEL	Rev	Log	Lea	Rid	Gre	Swo	Big	Alb	Yel	Blu	Mah	Opa
Separated season longitude	11	6	172	-99.36%	-81.74%	-83.16%	-99.98%	-62.38%	-88.91%	-53.70%	-88.89%	-98.01%	-97.26%	-91.12%	-60.00%	-94.68%	-98.63%
Separated season longitude	11	6	171	-99.29%	-81.74%	-83.18%	-99.98%	-62.25%	-89.00%	-55.74%	-88.99%	-98.08%	-97.27%	-90.96%	-60.00%	-94.00%	-95.99%
Separated season longitude	11	6	170	-99.20%	-81.74%	-82.96%	-99.99%	-64.15%	-90.32%	-56.84%	-89.34%	-98.01%	-97.04%	-92.46%	-60.00%	-93.97%	-95.92%

Leatherback turtle take reduction bin # 13 (-60% to -65%)
3 best of 3720 scenarios at this take level with maximum green turtle take reduction

Type of management action	#Mn	Ms	Lon/Lat	FED	FEL	Rev	Log	Lea	Rid	Gre	Swo	Big	Alb	Yel	Blu	Mah	Opa
Separated season box	11	5	165034	-90.01%	-81.83%	-79.12%	-85.51%	-64.06%	-86.10%	-82.14%	-78.11%	-88.88%	-84.73%	-87.03%	-55.36%	-77.59%	-85.19%
Separated season box	11	5	146036	-90.01%	-81.83%	-79.12%	-85.51%	-64.06%	-86.10%	-82.14%	-77.48%	-88.82%	-84.63%	-86.87%	-55.31%	-77.10%	-85.18%
Separated season box	11	5	154039	-90.01%	-81.83%	-79.12%	-85.51%	-64.06%	-86.10%	-82.14%	-77.46%	-88.82%	-84.63%	-86.87%	-55.31%	-77.08%	-85.18%

Leatherback turtle take reduction bin # 13 (-60% to -65%)
3 best of 3720 scenarios at this take level with maximum aggregate turtle take reduction

Type of management action	#Mn	Ms	Lon/Lat	FED	FEL	Rev	Log	Lea	Rid	Gre	Swo	Big	Alb	Yel	Blu	Mah	Opa
Separated season latitude	11	5	30	-90.39%	-81.83%	-79.24%	-85.49%	-64.99%	-86.02%	-81.90%	-82.15%	-89.13%	-85.28%	-88.17%	-56.16%	-79.21%	-84.91%
Separated season box	11	5	150029	-90.28%	-81.83%	-79.20%	-85.67%	-64.95%	-86.05%	-81.66%	-78.38%	-88.94%	-84.66%	-87.13%	-55.39%	-77.56%	-85.15%
Separated season box	11	5	173030	-90.36%	-81.83%	-79.21%	-85.43%	-64.99%	-86.03%	-81.65%	-81.25%	-89.10%	-85.19%	-88.06%	-56.15%	-79.09%	-84.98%

Leatherback turtle take reduction bin # 12 (-55% to -60%)
3 best of 3870 scenarios at this take level with maximum loggerhead turtle take reduction

Type of management action	#Mn	Ms	Lon/Lat	FED	FEL	Rev	Log	Lea	Rid	Gre	Swo	Big	Alb	Yel	Blu	Mah	Opa
Separated season latitude	10	7	31	-81.66%	-73.34%	-74.01%	-99.99%	-59.82%	-71.27%	-66.22%	-76.23%	-85.17%	-71.49%	-77.34%	-54.66%	-84.78%	-77.55%
Separated season latitude	10	7	32	-81.57%	-73.34%	-74.05%	-99.99%	-59.51%	-71.33%	-66.26%	-75.76%	-85.08%	-71.38%	-77.18%	-54.64%	-84.27%	-77.52%
Separated season latitude	10	7	33	-81.54%	-73.34%	-74.07%	-99.99%	-59.45%	-71.35%	-65.47%	-75.44%	-85.02%	-71.33%	-77.08%	-54.63%	-84.04%	-77.51%

Leatherback turtle take reduction bin # 12 (-55% to -60%)
3 best of 3870 scenarios at this take level with maximum olive ridley turtle take reduction

Type of management action	#Mn	Ms	Lon/Lat	FED	FEL	Rev	Log	Lea	Rid	Gre	Swo	Big	Alb	Yel	Blu	Mah	Opa
Separated season longitude	10	6	173	-99.30%	-71.94%	-69.32%	-88.02%	-58.85%	-89.64%	-18.82%	-78.37%	-97.24%	-96.82%	-89.88%	-60.00%	-93.58%	-98.63%
Separated season longitude	10	6	172	-98.95%	-71.94%	-69.85%	-89.40%	-58.70%	-89.53%	-36.19%	-75.96%	-96.29%	-95.59%	-89.44%	-57.99%	-93.18%	-96.63%
Separated season longitude	10	6	170	-98.45%	-71.94%	-73.14%	-87.71%	-59.45%	-90.47%	-43.26%	-75.99%	-96.05%	-95.54%	-89.24%	-57.92%	-89.61%	-94.92%

Leatherback turtle take reduction bin # 12 (-55% to -60%)
3 best of 3870 scenarios at this take level with maximum green turtle take reduction

Type of management action	#Mn	Ms	Lon/Lat	FED	FEL	Rev	Log	Lea	Rid	Gre	Swo	Big	Alb	Yel	Blu	Mah	Opa
Separated season latitude	10	6	24	-89.60%	-71.94%	-72.37%	-99.22%	-59.45%	-68.40%	-77.92%	-90.71%	-81.68%	-77.82%	-81.64%	-54.72%	-83.85%	-75.45%
Separated season latitude	10	6	25	-88.25%	-71.94%	-71.78%	-98.92%	-58.70%	-71.25%	-77.13%	-85.42%	-81.61%	-77.93%	-81.10%	-54.64%	-75.06%	-76.23%
Separated season latitude	10	6	26	-86.91%	-71.94%	-71.58%	-98.25%	-56.27%	-72.27%	-77.28%	-84.27%	-81.82%	-77.99%	-80.73%	-54.80%	-72.05%	-76.32%

Leatherback turtle take reduction bin # 12 (-55% to -60%)
3 best of 3870 scenarios at this take level with maximum aggregate turtle take reduction

Type of management action	#Mn	Ms	Lon/Lat	FED	FEL	Rev	Log	Lea	Rid	Gre	Swo	Big	Alb	Yel	Blu	Mah	Opa
Season	8	1	0	-69.73%	-61.02%	-65.62%	-70.77%	-59.33%	-55.67%	-68.69%	-68.01%	-46.24%	-50.04%	-65.14%	-32.43%	-50.01%	-45.81%
Separated season latitude	10	6	24	-89.60%	-71.94%	-72.37%	-99.22%	-59.45%	-68.40%	-77.92%	-90.71%	-81.68%	-77.82%	-81.64%	-54.72%	-83.85%	-75.45%
Separated season latitude	10	6	25	-88.25%	-71.94%	-71.78%	-98.92%	-58.70%	-71.25%	-77.13%	-85.42%	-81.61%	-77.93%	-81.10%	-54.64%	-75.06%	-76.23%

Leatherback turtle take reduction bin # 11 (-50% to -55%)
3 best of 3393 scenarios at this take level with maximum loggerhead turtle take reduction

Type of management action	#Mn	Ms	Lon/Lat	FED	FEL	Rev	Log	Lea	Rid	Gre	Swo	Big	Alb	Yel	Blu	Mah	Opa
Separated season latitude	5	11	21	-76.71%	-36.98%	-49.95%	-99.85%	-51.52%	18.50%	-51.38%	-89.55%	-60.50%	-53.10%	-20.37%	-48.76%	-75.84%	-49.86%
Separated season latitude	6	10	21	-78.97%	-44.63%	-55.21%	-99.85%	-53.36%	44.17%	-54.56%	-89.98%	-68.80%	-56.28%	-25.06%	-48.74%	-82.21%	-59.41%
Separated season latitude	7	9	21	-81.11%	-50.24%	-58.03%	-99.84%	-54.35%	-24.77%	-58.01%	-90.18%	-72.17%	-58.86%	-33.04%	-50.01%	-85.23%	-65.71%

Leatherback turtle take reduction bin # 11 (-50% to -55%)
3 best of 3393 scenarios at this take level with maximum olive ridley turtle take reduction

Type of management action	#Mn	Ms	Lon/Lat	FED	FEL	Rev	Log	Lea	Rid	Gre	Swo	Big	Alb	Yel	Blu	Mah	Opa
Separated season longitude	5	6	173	-98.50%	-26.96%	-41.90%	-51.89%	-53.66%	-83.90%	40.64%	-56.76%	-90.94%	-82.10%	-85.60%	-40.00%	-89.02%	-98.61%
Separated season longitude	6	6	171	-97.70%	-35.31%	-21.54%	-22.20%	-53.05%	-81.01%	37.04%	-51.94%	-88.24%	-79.08%	-82.10%	-48.83%	-85.68%	-92.76%
Separated season longitude	7	6	171	-97.72%	-44.22%	-32.69%	-17.35%	-54.22%	-80.98%	40.17%	-55.14%	-91.40%	-81.41%	-82.55%	-48.24%	-89.07%	-92.80%

Leatherback turtle take reduction bin # 11 (-50% to -55%)
3 best of 3393 scenarios at this take level with maximum green turtle take reduction

Type of management action	#Mn	Ms	Lon/Lat	FED	FEL	Rev	Log	Lea	Rid	Gre	Swo	Big	Alb	Yel	Blu	Mah	Opa
Separated season latitude	9	7	24	-84.61%	-63.55%	-65.97%	-99.22%	-54.42%	-57.52%	-68.88%	-85.23%	-78.32%	-64.44%	-69.93%	-53.60%	-81.64%	-67.29%
Separated season latitude	10	6	27	-85.63%	-71.94%	-70.79%	-95.53%	-54.04%	-73.46%	-75.30%	-82.55%	-82.12%	-78.13%	-80.24%	-54.59%	-70.26%	-76.50%
Separated season latitude	10	6	28	-84.27%	-71.94%	-70.29%	-92.91%	-51.51%	-74.32%	-72.45%	-80.44%	-82.41%	-78.22%	-80.17%	-54.50%	-69.71%	-76.68%

Leatherback turtle take reduction bin # 11 (-50% to -55%)
3 best of 3393 scenarios at this take level with maximum aggregate turtle take reduction

Type of management action	#Mn	Ms	Lon/Lat	FED	FEL	Rev	Log	Lea	Rid	Gre	Swo	Big	Alb	Yel	Blu	Mah	Opa
Separated season latitude	10	6	27	-85.63%	-71.94%	-70.79%	-95.53%	-54.04%	-73.46%	-75.30%	-82.55%	-82.12%	-78.13%	-80.24%	-54.59%	-70.26%	-76.50%
Separated season box	10	6	166025	-85.69%	-71.94%	-69.48%	-88.01%	-53.63%	-74.36%	-61.34%	-74.07%	-82.60%	-77.42%	-80.65%	-53.25%	-80.39%	-77.66%
Separated season box	10	6	163025	-85.05%	-71.94%	-69.49%	-87.58%	-52.97%	-74.52%	-62.56%	-73.02%	-82.72%	-76.96%	-79.89%	-53.29%	-79.16%	-77.69%

Leatherback turtle take reduction bin # 10 (-45% to -50%)
3 best of 3650 scenarios at this take level with maximum loggerhead turtle take reduction

Type of management action	#Mn	Ms	Lon/Lat	FED	FEL	Rev	Log	Lea	Rid	Gre	Swo	Big	Alb	Yel	Blu	Mah	Opa
Separated season latitude	2	1	21	-65.63%	-9.20%	-12.36%	-99.70%	-46.30%	45.61%	-34.42%	-83.60%	-19.99%	-42.34%	12.76%	-36.75%	-38.79%	-23.00%
Separated season latitude	4	12	21	-73.11%	-28.17%	-45.11%	-99.83%	-47.49%	29.80%	-46.02%	-89.17%	-48.47%	-50.50%	-13.47%	-47.37%	-65.59%	-41.46%
Separated season latitude	4	12	22	-68.04%	-28.17%	-43.43%	-99.63%	-47.13%	26.41%	-45.92%	-88.97%	-46.16%	-44.89%	-16.39%	-48.26%	-61.96%	-31.01%

Leatherback turtle take reduction bin # 10 (-45% to -50%)
3 best of 3650 scenarios at this take level with maximum olive ridley turtle take reduction

Type of management action	#Mn	Ms	Lon/Lat	FED	FEL	Rev	Log	Lea	Rid	Gre	Swo	Big	Alb	Yel	Blu	Mah	Opa
Separated season box	10	6	149029	-80.21%	-71.94%	-69.37%	-88.65%	-45.15%	-75.52%	-71.58%	-69.38%	-82.76%	-75.49%	-78.14%	-53.45%	-71.41%	-77.46%
Separated season box	10	6	151030	-80.13%	-71.94%	-69.37%	-88.49%	-45.04%	-75.53%	-71.72%	-69.64%	-82.78%	-75.45%	-78.24%	-53.61%	-71.49%	-77.48%
Separated season box	10	6	150030	-80.10%	-71.94%	-69.37%	-88.51%	-45.00%	-75.54%	-71.77%	-69.52%	-82.78%	-75.46%	-78.20%	-53.63%	-71.50%	-77.47%

Leatherback turtle take reduction bin # 10 (-45% to -50%)
3 best of 3650 scenarios at this take level with maximum green turtle take reduction

Type of management action	#Mn	Ms	Lon/Lat	FED	FEL	Rev	Log	Lea	Rid	Gre	Swo	Big	Alb	Yel	Blu	Mah	Opa
Separated season latitude	10	6	30	-80.45%	-71.94%	-69.39%	-88.50%	-45.51%	-75.42%	-71.70%	-73.03%	-83.05%	-76.16%	-79.26%	-54.36%	-73.20%	-77.27%
Separated season box	10	6	151030	-80.13%	-71.94%	-69.37%	-88.49%	-45.04%	-75.53%	-71.72%	-69.64%	-82.78%	-75.45%	-78.24%	-53.61%	-71.49%	-77.48%
Separated season box	10	6	150030	-80.10%	-71.94%	-69.37%	-88.51%	-45.00%	-75.54%	-71.77%	-69.52%	-82.78%	-75.46%	-78.20%	-53.63%	-71.50%	-77.47%

Leatherback turtle take reduction bin # 10 (-45% to -50%)
3 best of 3650 scenarios at this take level with maximum aggregate turtle take reduction

Type of management action	#Mn	Ms	Lon/Lat	FED	FEL	Rev	Log	Lea	Rid	Gre	Swo	Big	Alb	Yel	Blu	Mah	Opa
Separated season box	10	6	156025	-82.80%	-71.94%	-69.50%	-88.04%	-49.78%	-75.15%	-67.04%	-71.17%	-82.94%	-75.96%	-78.64%	-53.66%	-73.86%	-77.56%
Separated season box	10	6	157026	-82.68%	-71.94%	-69.43%	-88.13%	-49.99%	-74.89%	-66.92%	-71.33%	-82.66%	-76.05%	-78.60%	-53.67%	-73.41%	-77.40%
Separated season box	10	6	157027	-82.43%	-71.94%	-69.43%	-88.34%	-49.81%	-74.95%	-67.37%	-71.25%	-82.57%	-76.07%	-78.51%	-53.74%	-72.96%	-77.38%

Leatherback turtle take reduction bin # 9 (-40% to -45%)
3 best of 4035 scenarios at this take level with maximum loggerhead turtle take reduction

Type of management action	#Mn	Ms	Lon/Lat	FED	FEL	Rev	Log	Lea	Rid	Gre	Swo	Big	Alb	Yel	Blu	Mah	Opa
Separated season latitude	2	1	22	-58.27%	-9.20%	-18.67%	-99.43%	-44.95%	44.38%	-32.59%	-83.60%	-17.04%	-33.46%	8.48%	-40.60%	-36.61%	-8.67%
Separated season latitude	3	1	21	-69.57%	-18.90%	-32.65%	-99.81%	-41.66%	38.53%	-39.26%	-86.43%	-29.49%	-45.09%	3.87%	-37.75%	-49.93%	-28.59%
Separated season latitude	3	1	22	-62.65%	-18.90%	-27.49%	-99.57%	-40.20%	37.68%	-37.26%	-86.61%	-26.70%	-35.95%	-0.51%	-41.46%	-47.81%	-15.04%

Leatherback turtle take reduction bin # 9 (-40% to -45%)
3 best of 4035 scenarios at this take level with maximum olive ridley turtle take reduction

Type of management action	#Mn	Ms	Lon/Lat	FED	FEL	Rev	Log	Lea	Rid	Gre	Swo	Big	Alb	Yel	Blu	Mah	Opa
Separated season longitude	5	6	171	-97.60%	-26.96%	-18.18%	13.74%	-42.64%	-80.55%	48.55%	-47.73%	-87.33%	-57.32%	-81.80%	-31.49%	-85.46%	-92.74%
Separated season longitude	5	6	170	-97.19%	-26.96%	-17.64%	35.00%	-42.60%	-77.69%	53.52%	-39.91%	-76.98%	-51.47%	-79.20%	-36.85%	-83.97%	-90.14%
Separated season longitude	11	8	169	-98.55%	-84.16%	-86.48%	-81.75%	-42.89%	-78.53%	-61.19%	-88.48%	-97.13%	-92.96%	-97.65%	-59.58%	-96.38%	-95.95%

Leatherback turtle take reduction bin # 9 (-40% to -45%)
3 best of 4035 scenarios at this take level with maximum green turtle take reduction

Type of management action	#Mn	Ms	Lon/Lat	FED	FEL	Rev	Log	Lea	Rid	Gre	Swo	Big	Alb	Yel	Blu	Mah	Opa
Season	10	6	0	-79.93%	-71.94%	-69.36%	-88.52%	-44.20%	-75.60%	-72.05%	-68.64%	-82.65%	-75.45%	-77.96%	-53.47%	-70.99%	-77.46%
Separated season box	10	6	173036	-79.93%	-71.94%	-69.36%	-88.52%	-44.20%	-75.60%	-72.05%	-69.14%	-82.72%	-75.55%	-78.10%	-53.49%	-71.33%	-77.48%
Separated season box	10	6	153037	-79.93%	-71.94%	-69.36%	-88.52%	-44.20%	-75.60%	-72.05%	-68.71%	-82.66%	-75.46%	-77.98%	-53.47%	-71.04%	-77.47%

Leatherback turtle take reduction bin # 9 (-40% to -45%)
3 best of 4035 scenarios at this take level with maximum aggregate turtle take reduction

Type of management action	#Mn	Ms	Lon/Lat	FED	FEL	Rev	Log	Lea	Rid	Gre	Swo	Big	Alb	Yel	Blu	Mah	Opa
Separated season longitude	10	6	148	-80.14%	-71.94%	-69.36%	-88.59%	-44.81%	-75.53%	-71.70%	-69.27%	-82.76%	-75.48%	-78.10%	-53.48%	-71.43%	-77.47%
Separated season box	10	6	148022	-80.14%	-71.94%	-69.36%	-88.59%	-44.81%	-75.53%	-71.70%	-69.26%	-82.76%	-75.48%	-78.10%	-53.48%	-71.43%	-77.46%
Separated season box	10	6	149030	-80.08%	-71.94%	-69.37%	-88.51%	-44.90%	-75.55%	-71.80%	-69.37%	-82.77%	-75.46%	-78.11%	-53.49%	-71.43%	-77.47%

Leatherback turtle take reduction bin # 8 (-35% to -40%)
3 best of 5630 scenarios at this take level with maximum loggerhead turtle take reduction

Type of management action	#Mn	Ms	Lon/Lat	FED	FEL	Rev	Log	Lea	Rid	Gre	Swo	Big	Alb	Yel	Blu	Mah	Opa
Separated season latitude	2	2	21	-66.13%	-9.40%	-23.18%	-99.35%	-39.04%	46.63%	-34.64%	-86.10%	-16.58%	-43.48%	17.95%	-31.38%	-42.92%	-22.90%
Separated season latitude	3	1	23	-59.05%	-18.90%	-27.28%	-99.26%	-39.59%	37.34%	-34.77%	-84.01%	-23.55%	-25.81%	-8.56%	-42.34%	-40.64%	-4.93%
Merged season latitude	11	6	21	-52.92%	0.00%	-5.04%	-99.09%	-38.30%	49.23%	-27.27%	-75.95%	-3.71%	-39.99%	29.07%	-29.00%	-21.89%	-13.25%

Leatherback turtle take reduction bin # 8 (-35% to -40%)
3 best of 5630 scenarios at this take level with maximum olive ridley turtle take reduction

Type of management action	#Mn	Ms	Lon/Lat	FED	FEL	Rev	Log	Lea	Rid	Gre	Swo	Big	Alb	Yel	Blu	Mah	Opa
Separated season longitude	4	7	171	-96.32%	-18.95%	-11.08%	11.86%	-37.91%	-69.69%	93.35%	-36.26%	-85.85%	-56.00%	-79.68%	-31.29%	-82.70%	-92.34%
Separated season longitude	8	10	171	-96.61%	-64.42%	-66.99%	-60.47%	-37.73%	-68.20%	7.16%	-69.07%	-94.45%	-94.58%	-95.41%	-56.04%	-89.60%	-95.77%
Separated season longitude	10	9	170	-97.96%	-78.40%	-82.59%	-55.05%	-37.60%	-75.66%	-50.73%	-83.18%	-95.75%	-95.75%	-98.08%	-57.95%	-92.49%	-97.15%

Leatherback turtle take reduction bin # 8 (-35% to -40%)
3 best of 5630 scenarios at this take level with maximum green turtle take reduction

Type of management action	#Mn	Ms	Lon/Lat	FED	FEL	Rev	Log	Lea	Rid	Gre	Swo	Big	Alb	Yel	Blu	Mah	Opa
Separated season latitude	9	7	31	-71.71%	-63.55%	-62.09%	-88.64%	-39.87%	-65.05%	-56.69%	-62.47%	-79.32%	-63.90%	-70.98%	-52.14%	-70.18%	-69.94%
Separated season latitude	9	7	32	-71.59%	-63.55%	-62.12%	-88.62%	-39.48%	-65.10%	-56.76%	-61.82%	-79.25%	-63.75%	-70.78%	-52.00%	-69.72%	-69.93%
Separated season latitude	9	7	33	-71.56%	-63.55%	-62.14%	-88.62%	-39.42%	-65.12%	-55.98%	-61.41%	-79.19%	-63.68%	-70.67%	-51.97%	-69.43%	-69.91%

Leatherback turtle take reduction bin # 8 (-35% to -40%)
3 best of 5630 scenarios at this take level with maximum aggregate turtle take reduction

Type of management action	#Mn	Ms	Lon/Lat	FED	FEL	Rev	Log	Lea	Rid	Gre	Swo	Big	Alb	Yel	Blu	Mah	Opa
Separated season latitude	7	7	34	-52.74%	-45.17%	-39.38%	-52.79%	-39.82%	-54.06%	-39.34%	-38.94%	-59.51%	-52.32%	-49.71%	-34.68%	-53.89%	-57.85%
Separated season latitude	7	7	35	-52.73%	-45.17%	-39.38%	-52.78%	-39.81%	-54.07%	-39.34%	-38.62%	-59.42%	-52.26%	-49.58%	-34.58%	-53.75%	-57.84%
Separated season latitude	7	7	36	-52.71%	-45.17%	-39.37%	-52.78%	-39.71%	-54.09%	-39.30%	-38.34%	-59.35%	-52.19%	-49.48%	-34.48%	-53.63%	-57.83%

Leatherback turtle take reduction bin # 7 (-30% to -35%)
3 best of 5360 scenarios at this take level with maximum loggerhead turtle take reduction

Type of management action	#Mn	Ms	Lon/Lat	FED	FEL	Rev	Log	Lea	Rid	Gre	Swo	Big	Alb	Yel	Blu	Mah	Opa
Separated season latitude	2	2	24	-48.69%	-9.40%	-19.97%	-95.23%	-34.14%	35.33%	-35.03%	-73.78%	-7.85%	-20.28%	1.60%	-34.53%	-22.54%	2.07%
Separated season latitude	3	1	26	-47.67%	-18.90%	-24.81%	-96.33%	-32.24%	8.41%	-38.09%	-60.71%	-20.93%	-22.99%	-15.18%	-41.50%	-17.67%	-5.94%
Merged season latitude	9	8	21	-45.03%	0.00%	-4.35%	-94.91%	-34.00%	44.94%	-19.06%	-64.62%	-3.94%	-41.51%	10.50%	-28.12%	-15.64%	-14.15%

Leatherback turtle take reduction bin # 7 (-30% to -35%)
3 best of 5360 scenarios at this take level with maximum olive ridley turtle take reduction

Type of management action	#Mn	Ms	Lon/Lat	FED	FEL	Rev	Log	Lea	Rid	Gre	Swo	Big	Alb	Yel	Blu	Mah	Opa
Separated season longitude	6	12	172	-96.64%	-48.02%	-52.26%	-51.38%	-30.18%	-63.87%	29.10%	-68.35%	-94.30%	-91.87%	-96.71%	-46.11%	-89.08%	-97.35%
Separated season longitude	8	10	172	-96.82%	-64.42%	-72.95%	-57.73%	-34.10%	-71.04%	7.88%	-72.03%	-95.23%	-97.08%	-97.30%	-55.10%	-89.46%	-97.37%
Separated season longitude	9	10	170	-97.73%	-72.94%	-74.72%	-60.50%	-31.46%	-75.20%	-43.17%	-80.50%	-94.22%	-95.34%	-97.51%	-56.93%	-88.35%	-95.55%

Leatherback turtle take reduction bin # 7 (-30% to -35%)
3 best of 5360 scenarios at this take level with maximum green turtle take reduction

Type of management action	#Mn	Ms	Lon/Lat	FED	FEL	Rev	Log	Lea	Rid	Gre	Swo	Big	Alb	Yel	Blu	Mah	Opa
Separated season latitude	8	8	30	-65.51%	-56.06%	-57.37%	-86.37%	-34.19%	-51.84%	-48.20%	-60.46%	-75.63%	-57.11%	-59.27%	-51.09%	-66.51%	-64.03%
Separated season latitude	8	8	31	-64.75%	-56.06%	-57.29%	-86.13%	-33.10%	-52.14%	-47.75%	-58.01%	-75.46%	-56.99%	-59.07%	-50.80%	-65.58%	-64.31%
Separated season latitude	8	8	32	-64.55%	-56.06%	-57.28%	-85.98%	-32.64%	-52.24%	-47.63%	-57.20%	-75.36%	-56.89%	-59.05%	-50.67%	-64.94%	-64.33%

Leatherback turtle take reduction bin # 7 (-30% to -35%)
3 best of 5360 scenarios at this take level with maximum aggregate turtle take reduction

Type of management action	#Mn	Ms	Lon/Lat	FED	FEL	Rev	Log	Lea	Rid	Gre	Swo	Big	Alb	Yel	Blu	Mah	Opa
Separated season latitude	6	6	31	-47.16%	-35.31%	-22.66%	-46.19%	-32.96%	-47.08%	-34.48%	-34.35%	-25.90%	-43.75%	-28.95%	-26.19%	-35.14%	-41.93%
Separated season box	6	6	173031	-47.06%	-35.31%	-22.75%	-46.36%	-32.69%	-47.21%	-34.32%	-33.48%	-25.82%	-42.16%	-28.87%	-25.95%	-35.18%	-41.95%
Separated season box	6	6	170031	-47.05%	-35.31%	-22.99%	-46.36%	-32.68%	-47.23%	-34.32%	-32.80%	-25.95%	-41.85%	-28.94%	-26.11%	-35.68%	-41.96%

Leatherback turtle take reduction bin # 6 (-25% to -30%)
3 best of 5006 scenarios at this take level with maximum loggerhead turtle take reduction

Type of management action	#Mn	Ms	Lon/Lat	FED	FEL	Rev	Log	Lea	Rid	Gre	Swo	Big	Alb	Yel	Blu	Mah	Opa
Separated season latitude	2	2	26	-41.05%	-9.40%	-16.16%	-91.14%	-29.73%	14.11%	-31.51%	-58.32%	-7.19%	-19.50%	-1.58%	-34.50%	-8.77%	0.49%
Separated season latitude	3	1	27	-44.73%	-18.90%	-22.48%	-92.76%	-29.04%	1.65%	-32.50%	-57.22%	-19.24%	-23.38%	-16.77%	-38.00%	-14.05%	-6.51%
Merged season latitude	9	7	21	-42.04%	0.00%	-2.83%	-90.33%	-29.30%	40.94%	-21.46%	-57.87%	-5.92%	-40.05%	20.38%	-27.93%	-12.57%	-13.81%

Leatherback turtle take reduction bin # 6 (-25% to -30%)
3 best of 5006 scenarios at this take level with maximum olive ridley turtle take reduction

Type of management action	#Mn	Ms	Lon/Lat	FED	FEL	Rev	Log	Lea	Rid	Gre	Swo	Big	Alb	Yel	Blu	Mah	Opa
Separated season longitude	8	9	170	-95.78%	-60.02%	-62.85%	-59.98%	-25.50%	-64.46%	8.46%	-62.16%	-92.06%	-89.83%	-88.09%	-57.62%	-83.95%	-91.81%
Separated season longitude	8	11	170	-97.59%	-65.39%	-70.91%	-57.04%	-29.57%	-67.99%	-21.10%	-78.33%	-93.15%	-93.60%	-96.71%	-54.26%	-85.33%	-93.97%
Separated season longitude	10	9	171	-98.08%	-78.40%	-83.61%	-52.78%	-28.90%	-77.86%	-53.18%	-82.92%	-96.03%	-96.09%	-97.74%	-57.54%	-92.61%	-96.44%

Leatherback turtle take reduction bin # 6 (-25% to -30%)
3 best of 5006 scenarios at this take level with maximum green turtle take reduction

Type of management action	#Mn	Ms	Lon/Lat	FED	FEL	Rev	Log	Lea	Rid	Gre	Swo	Big	Alb	Yel	Blu	Mah	Opa
Separated season latitude	6	6	34	-43.68%	-35.31%	-23.45%	-31.40%	-25.41%	-48.59%	-39.17%	-27.33%	-28.21%	-39.87%	-30.91%	-15.06%	-38.50%	-42.33%
Separated season box	6	6	173034	-43.68%	-35.31%	-23.43%	-31.41%	-25.43%	-48.59%	-39.12%	-26.95%	-28.11%	-39.42%	-30.85%	-14.95%	-38.39%	-42.32%
Separated season longitude	10	9	171	-98.08%	-78.40%	-83.61%	-52.78%	-28.90%	-77.86%	-53.18%	-82.92%	-96.03%	-96.09%	-97.74%	-57.54%	-92.61%	-96.44%

Leatherback turtle take reduction bin # 6 (-25% to -30%)
3 best of 5006 scenarios at this take level with maximum aggregate turtle take reduction

Type of management action	#Mn	Ms	Lon/Lat	FED	FEL	Rev	Log	Lea	Rid	Gre	Swo	Big	Alb	Yel	Blu	Mah	Opa
Separated season box	6	6	159031	-46.31%	-35.31%	-23.82%	-38.71%	-29.99%	-48.18%	-34.22%	-27.44%	-27.56%	-39.65%	-29.79%	-18.45%	-36.24%	-42.18%
Separated season box	6	6	164032	-45.40%	-35.31%	-23.30%	-38.67%	-29.87%	-48.09%	-35.76%	-28.78%	-27.27%	-40.32%	-29.62%	-19.93%	-37.18%	-42.16%
Separated season longitude	10	9	171	-98.08%	-78.40%	-83.61%	-52.78%	-28.90%	-77.86%	-53.18%	-82.92%	-96.03%	-96.09%	-97.74%	-57.54%	-92.61%	-96.44%

Leatherback turtle take reduction bin # 5 (-20% to -25%)
3 best of 5955 scenarios at this take level with maximum loggerhead turtle take reduction

Type of management action	#Mn	Ms	Lon/Lat	FED	FEL	Rev	Log	Lea	Rid	Gre	Swo	Big	Alb	Yel	Blu	Mah	Opa
Separated season latitude	3	1	29	-38.62%	-18.90%	-21.13%	-85.22%	-22.01%	-1.94%	-22.57%	-48.67%	-17.66%	-24.13%	-19.98%	-36.70%	-10.87%	-8.98%
Separated season longitude	9	8	169	-96.16%	-65.83%	-65.76%	-86.27%	-23.70%	-61.72%	-3.74%	-66.04%	-90.52%	-76.22%	-84.16%	-59.22%	-85.73%	-81.41%
Separated season longitude	10	8	170	-97.26%	-75.73%	-77.15%	-86.25%	-24.69%	-71.45%	-21.75%	-77.13%	-95.27%	-95.97%	-96.53%	-59.23%	-93.33%	-97.06%

Leatherback turtle take reduction bin # 5 (-20% to -25%)
3 best of 5955 scenarios at this take level with maximum olive ridley turtle take reduction

Type of management action	#Mn	Ms	Lon/Lat	FED	FEL	Rev	Log	Lea	Rid	Gre	Swo	Big	Alb	Yel	Blu	Mah	Opa
Separated season longitude	9	10	171	-97.89%	-72.94%	-75.35%	-56.13%	-21.54%	-76.95%	-42.61%	-80.35%	-95.91%	-95.97%	-97.55%	-56.46%	-92.42%	-96.39%
Separated season longitude	10	8	170	-97.26%	-75.73%	-77.15%	-86.25%	-24.69%	-71.45%	-21.75%	-77.13%	-95.27%	-95.97%	-96.53%	-59.23%	-93.33%	-97.06%
Separated season longitude	10	9	172	-98.19%	-78.40%	-84.47%	-51.13%	-23.03%	-78.40%	-51.54%	-83.57%	-96.24%	-98.59%	-98.79%	-56.80%	-92.58%	-98.02%

Leatherback turtle take reduction bin # 5 (-20% to -25%)
3 best of 5955 scenarios at this take level with maximum green turtle take reduction

Type of management action	#Mn	Ms	Lon/Lat	FED	FEL	Rev	Log	Lea	Rid	Gre	Swo	Big	Alb	Yel	Blu	Mah	Opa
Separated season box	6	6	149035	-42.74%	-35.31%	-23.72%	-28.84%	-20.04%	-49.06%	-39.78%	-24.77%	-28.47%	-38.21%	-31.18%	-12.54%	-38.34%	-42.37%
Separated season longitude	9	10	171	-97.89%	-72.94%	-75.35%	-56.13%	-21.54%	-76.95%	-42.61%	-80.35%	-95.91%	-95.97%	-97.55%	-56.46%	-92.42%	-96.39%
Separated season longitude	10	9	172	-98.19%	-78.40%	-84.47%	-51.13%	-23.03%	-78.40%	-51.54%	-83.57%	-96.24%	-98.59%	-98.79%	-56.80%	-92.58%	-98.02%

Leatherback turtle take reduction bin # 5 (-20% to -25%)
3 best of 5955 scenarios at this take level with maximum aggregate turtle take reduction

Type of management action	#Mn	Ms	Lon/Lat	FED	FEL	Rev	Log	Lea	Rid	Gre	Swo	Big	Alb	Yel	Blu	Mah	Opa
Separated season box	5	6	169033	-37.44%	-26.96%	-20.08%	-31.06%	-24.89%	-37.24%	-29.92%	-25.01%	-14.66%	-30.39%	-24.61%	-12.31%	-25.44%	-32.51%
Separated season box	5	6	168033	-37.41%	-26.96%	-20.11%	-30.77%	-24.88%	-37.30%	-29.96%	-24.84%	-14.76%	-30.56%	-24.63%	-11.62%	-25.51%	-32.53%
Separated season box	5	6	167033	-37.40%	-26.96%	-20.18%	-30.43%	-24.80%	-37.33%	-29.93%	-24.74%	-14.88%	-30.28%	-24.71%	-11.89%	-25.63%	-32.54%

Leatherback turtle take reduction bin # 4 (-15% to -20%)
3 best of 9396 scenarios at this take level with maximum loggerhead turtle take reduction

Type of management action	#Mn	Ms	Lon/Lat	FED	FEL	Rev	Log	Lea	Rid	Gre	Swo	Big	Alb	Yel	Blu	Mah	Opa
Separated season latitude	3	1	30	-36.05%	-18.90%	-21.12%	-83.59%	-19.03%	-3.19%	-22.55%	-43.90%	-17.27%	-23.60%	-20.45%	-36.81%	-10.18%	-10.01%
Separated season latitude	3	1	31	-34.80%	-18.90%	-21.35%	-82.61%	-17.40%	-4.11%	-21.62%	-40.16%	-16.46%	-22.97%	-20.51%	-36.21%	-8.10%	-10.79%
Separated season longitude	10	8	171	-97.44%	-75.73%	-80.28%	-86.97%	-16.02%	-71.76%	-16.70%	-77.16%	-95.98%	-97.35%	-97.02%	-59.19%	-93.62%	-97.70%

Leatherback turtle take reduction bin # 4 (-15% to -20%)
3 best of 9396 scenarios at this take level with maximum olive ridley turtle take reduction

Type of management action	#Mn	Ms	Lon/Lat	FED	FEL	Rev	Log	Lea	Rid	Gre	Swo	Big	Alb	Yel	Blu	Mah	Opa
Separated season longitude	9	9	173	-97.38%	-69.94%	-78.89%	-62.30%	-17.86%	-84.39%	-29.81%	-74.24%	-95.62%	-98.45%	-97.35%	-56.08%	-91.12%	-98.79%
Separated season longitude	9	10	172	-98.05%	-72.94%	-81.20%	-53.22%	-15.30%	-79.65%	-43.09%	-81.46%	-96.11%	-98.46%	-98.78%	-55.59%	-92.43%	-97.99%
Separated season longitude	10	8	171	-97.44%	-75.73%	-80.28%	-86.97%	-16.02%	-71.76%	-16.70%	-77.16%	-95.98%	-97.35%	-97.02%	-59.19%	-93.62%	-97.70%

Leatherback turtle take reduction bin # 4 (-15% to -20%)
3 best of 9396 scenarios at this take level with maximum green turtle take reduction

Type of management action	#Mn	Ms	Lon/Lat	FED	FEL	Rev	Log	Lea	Rid	Gre	Swo	Big	Alb	Yel	Blu	Mah	Opa
Separated season box	6	6	168038	-42.39%	-35.31%	-23.79%	-28.52%	-18.56%	-49.13%	-40.08%	-24.34%	-28.69%	-38.34%	-31.37%	-11.74%	-38.53%	-42.38%
Separated season box	6	6	162039	-42.39%	-35.31%	-23.78%	-28.52%	-18.56%	-49.13%	-40.08%	-24.15%	-28.65%	-38.22%	-31.34%	-11.68%	-38.45%	-42.38%
Separated season longitude	9	10	172	-98.05%	-72.94%	-81.20%	-53.22%	-15.30%	-79.65%	-43.09%	-81.46%	-96.11%	-98.46%	-98.78%	-55.59%	-92.43%	-97.99%

Leatherback turtle take reduction bin # 4 (-15% to -20%)
3 best of 9396 scenarios at this take level with maximum aggregate turtle take reduction

Type of management action	#Mn	Ms	Lon/Lat	FED	FEL	Rev	Log	Lea	Rid	Gre	Swo	Big	Alb	Yel	Blu	Mah	Opa
Separated season box	4	6	164034	-29.27%	-19.78%	-15.35%	-20.91%	-19.20%	-27.90%	-26.40%	-19.49%	-8.62%	-22.10%	-22.27%	-5.22%	-14.64%	-19.77%
Separated season box	6	6	148035	-42.66%	-35.31%	-23.70%	-28.90%	-19.53%	-49.08%	-39.84%	-24.59%	-28.51%	-38.11%	-31.20%	-12.49%	-38.37%	-42.36%
Separated season box	6	6	147035	-42.59%	-35.31%	-23.72%	-28.92%	-19.28%	-49.09%	-39.89%	-24.38%	-28.55%	-38.14%	-31.23%	-11.99%	-38.39%	-42.37%

Leatherback turtle take reduction bin # 3 (-10% to -15%)
3 best of 14312 scenarios at this take level with maximum loggerhead turtle take reduction

Type of management action	#Mn	Ms	Lon/Lat	FED	FEL	Rev	Log	Lea	Rid	Gre	Swo	Big	Alb	Yel	Blu	Mah	Opa
Separated season latitude	3	1	33	-33.56%	-18.90%	-22.77%	-78.76%	-13.66%	-6.03%	-20.07%	-35.27%	-17.26%	-17.02%	-21.84%	-33.07%	-5.52%	-11.48%
Separated season longitude	10	8	172	-97.57%	-75.73%	-80.24%	-86.53%	-10.21%	-71.39%	-14.65%	-79.76%	-96.83%	-97.35%	-97.76%	-59.09%	-93.52%	-97.52%
Separated season longitude	11	8	170	-98.63%	-84.16%	-87.97%	-82.02%	-14.13%	-79.84%	-63.52%	-88.61%	-97.13%	-98.99%	-99.15%	-59.67%	-96.37%	-98.52%

Leatherback turtle take reduction bin # 3 (-10% to -15%)
3 best of 14312 scenarios at this take level with maximum olive ridley turtle take reduction

Type of management action	#Mn	Ms	Lon/Lat	FED	FEL	Rev	Log	Lea	Rid	Gre	Swo	Big	Alb	Yel	Blu	Mah	Opa
Separated season longitude	6	1	172	-97.84%	-47.37%	-57.84%	-47.89%	-11.39%	-72.37%	-23.07%	-74.48%	-91.89%	-90.96%	-97.71%	-47.77%	-88.72%	-97.97%
Separated season longitude	7	12	172	-97.86%	-56.62%	-60.86%	-46.57%	-12.17%	-72.59%	-22.60%	-77.77%	-95.17%	-93.16%	-98.18%	-46.48%	-92.06%	-97.98%
Separated season longitude	11	8	170	-98.63%	-84.16%	-87.97%	-82.02%	-14.13%	-79.84%	-63.52%	-88.61%	-97.13%	-98.99%	-99.15%	-59.67%	-96.37%	-98.52%

Leatherback turtle take reduction bin # 3 (-10% to -15%)
3 best of 14312 scenarios at this take level with maximum green turtle take reduction

Type of management action	#Mn	Ms	Lon/Lat	FED	FEL	Rev	Log	Lea	Rid	Gre	Swo	Big	Alb	Yel	Blu	Mah	Opa
Separated season box	5	6	147039	-33.70%	-26.96%	-20.74%	-13.77%	-11.04%	-39.36%	-33.67%	-18.85%	-17.20%	-26.16%	-26.38%	-7.73%	-27.86%	-32.92%
Separated season box	5	6	146039	-33.70%	-26.96%	-20.74%	-13.77%	-11.04%	-39.36%	-33.67%	-18.84%	-17.20%	-26.16%	-26.37%	-7.72%	-27.85%	-32.92%
Separated season longitude	11	8	170	-98.63%	-84.16%	-87.97%	-82.02%	-14.13%	-79.84%	-63.52%	-88.61%	-97.13%	-98.99%	-99.15%	-59.67%	-96.37%	-98.52%

Leatherback turtle take reduction bin # 3 (-10% to -15%)
3 best of 14312 scenarios at this take level with maximum aggregate turtle take reduction

Type of management action	#Mn	Ms	Lon/Lat	FED	FEL	Rev	Log	Lea	Rid	Gre	Swo	Big	Alb	Yel	Blu	Mah	Opa
Separated season box	3	6	172035	-23.90%	-14.21%	-10.49%	-18.71%	-14.92%	-19.11%	-19.85%	-16.44%	-5.00%	-20.16%	-17.11%	-4.91%	-4.56%	-11.59%
Separated season box	3	6	171035	-23.84%	-14.21%	-10.50%	-18.77%	-14.79%	-19.27%	-20.26%	-16.24%	-5.03%	-19.94%	-17.11%	-5.12%	-4.72%	-11.59%
Separated season longitude	11	8	170	-98.63%	-84.16%	-87.97%	-82.02%	-14.13%	-79.84%	-63.52%	-88.61%	-97.13%	-98.99%	-99.15%	-59.67%	-96.37%	-98.52%

Leatherback turtle take reduction bin # 2 (-5% to -10%)
3 best of 18589 scenarios at this take level with maximum loggerhead turtle take reduction

Type of management action	#Mn	Ms	Lon/Lat	FED	FEL	Rev	Log	Lea	Rid	Gre	Swo	Big	Alb	Yel	Blu	Mah	Opa
Separated season box	3	1	173034	-32.08%	-18.90%	-22.65%	-64.15%	-8.26%	-9.03%	-14.21%	-29.15%	-19.22%	-14.98%	-23.49%	-24.31%	-10.33%	-12.01%
Separated season box	3	1	172034	-31.97%	-18.90%	-22.64%	-63.96%	-8.05%	-9.18%	-14.28%	-29.12%	-19.28%	-14.74%	-23.53%	-25.37%	-10.53%	-12.02%
Separated season box	3	1	171034	-31.90%	-18.90%	-22.63%	-63.95%	-7.97%	-9.29%	-14.55%	-28.84%	-19.37%	-14.25%	-23.57%	-25.68%	-10.61%	-12.04%

Leatherback turtle take reduction bin # 2 (-5% to -10%)
3 best of 18589 scenarios at this take level with maximum olive ridley turtle take reduction

Type of management action	#Mn	Ms	Lon/Lat	FED	FEL	Rev	Log	Lea	Rid	Gre	Swo	Big	Alb	Yel	Blu	Mah	Opa
Separated season longitude	6	12	173	-97.11%	-48.02%	-71.26%	-52.93%	-6.51%	-77.08%	3.20%	-68.72%	-94.69%	-93.47%	-96.75%	-43.06%	-90.53%	-98.76%
Separated season longitude	7	11	173	-97.18%	-56.83%	-71.79%	-52.52%	-8.55%	-74.19%	9.34%	-70.13%	-95.01%	-97.95%	-96.89%	-52.81%	-90.70%	-98.76%
Separated season longitude	8	10	173	-97.25%	-64.42%	-75.11%	-56.98%	-9.88%	-84.72%	-18.25%	-72.19%	-95.57%	-98.28%	-97.33%	-54.87%	-90.92%	-98.76%

Leatherback turtle take reduction bin # 2 (-5% to -10%)
3 best of 18589 scenarios at this take level with maximum green turtle take reduction

Type of management action	#Mn	Ms	Lon/Lat	FED	FEL	Rev	Log	Lea	Rid	Gre	Swo	Big	Alb	Yel	Blu	Mah	Opa
Season	3	6	0	-21.32%	-14.21%	-11.10%	-9.98%	-8.60%	-20.72%	-23.10%	-12.83%	-6.54%	-16.64%	-17.98%	-4.18%	-6.82%	-11.78%
Separated season box	3	6	147039	-21.37%	-14.21%	-11.09%	-9.96%	-8.67%	-20.67%	-22.96%	-12.84%	-6.52%	-16.56%	-17.96%	-4.00%	-6.76%	-11.78%
Separated season box	3	6	146039	-21.35%	-14.21%	-11.09%	-9.97%	-8.63%	-20.70%	-23.05%	-12.85%	-6.52%	-16.57%	-17.97%	-4.04%	-6.76%	-11.78%

Leatherback turtle take reduction bin # 2 (-5% to -10%)
3 best of 18589 scenarios at this take level with maximum aggregate turtle take reduction

Type of management action	#Mn	Ms	Lon/Lat	FED	FEL	Rev	Log	Lea	Rid	Gre	Swo	Big	Alb	Yel	Blu	Mah	Opa
Separated season latitude	3	7	36	-19.58%	-11.96%	-9.20%	-20.39%	-9.97%	-18.15%	-13.97%	-11.80%	-5.89%	-12.32%	-15.07%	-7.87%	-11.99%	-12.92%
Separated season latitude	4	8	35	-27.14%	-19.89%	-12.20%	-25.62%	-8.88%	-26.54%	-15.33%	-13.09%	-21.36%	-21.60%	-12.57%	-11.79%	-31.03%	-29.33%
Separated season box	4	8	148034	-27.37%	-19.89%	-12.16%	-24.28%	-9.93%	-26.56%	-14.59%	-11.31%	-21.12%	-20.03%	-12.27%	-9.85%	-30.22%	-29.26%