

False Killer Whale TRT – Predictive Model Work Group

Teleconference #2, May 14, 2010

Attendees: Ryan Steen, John Hall, Robin Baird, Tory O’Connell, John LaGrange, Karin Forney, Erin Oleson, Bennett Brooks, Scott McCreary, Nancy Young

Background Document

Karin Forney prepared a handout with an update on her progress on the predictive model programming (Attachment 1). This handout provided the basis for the Work Group’s discussions.

Karin is still working to incorporate some of the input parameters identified in the last call (e.g., geographic detail, sampling by trip, monitoring each year’s data for triggers such as sea turtle bycatch cap), which involve re-extracting observer data. On this call, she requested we focus on the types of simulation output that can be produced.

Sample Output

Attachment 1 contains output of simulation runs based on hypothetical situations; the conditions in both samples are not based on recommendations by the TRT, but were selected by Karin only to illustrate how the simulation works as currently programmed.

Summary and input data

The top line (starting just below the KEY in Attachment 1, p. 1) describes the conditions of the simulation run. In this first sample run, the numbers of deep and shallow sets are constrained (14,000 and 6,000, respectively). Other conditions also apply (not described here, but would appear where it currently says “Conditions XXX” or “Conditions YYY”). The model allows multiple constraints/conditions to be applied simultaneously, such as geographical location (inside/outside EEZ, latitude, quadrants, etc.), time (certain months of year, etc.), and hook type. The “punch line” of the model run (percent change in false killer whale (*Pseudorca crassidens*, or PC) bycatch) is also shown in the top line.

In the box below is a summary of the input data that go into the model, indicating sample sizes. The “base” columns are for the full dataset from the observer database we are working with. The “new” columns are for the subset of data that meet the conditions we are imposing for a particular model run (i.e., what is left once we constrain the full dataset to meet certain criteria). For both “base” and “new” datasets in the deep- and shallow-set fisheries, the following items are listed: number of sets, number of target catch items (bigeye for deep-set, swordfish for shallow-set), rates of target species catch, false killer whale (FKW) takes (total and EEZ only), and rate of false killer whale bycatch (per 1,000 sets).

Note: currently, all FKW “takes” are included; they are not coded separately for serious and non-serious injuries or mortalities.

Simulation results (histograms)

Simulations were run 1,000 times. Results of the model runs are shown in histograms. The histograms show the distribution of results from the individual simulation runs and reflect the

expected variation from random chance. The x-axes of the histograms show the total number of FKWs taken under the sampling scenario, while the height of the bars shows the frequency in the 1,000 simulation runs at which that number of FKW takes occurred. Means for the 1,000 simulation runs are indicated by a caret on the x-axis and printed as part of the x-axis label.

- Top row = results for total dataset (baseline dataset without constraints/conditions)
- Lower row = results for dataset with the constraints/conditions we selected for this simulation
- 1st column = results for deep-set fishery
- 2nd column = results for shallow-set fishery
- Third column = totals for combined deep-set and shallow-set data, which is important for take reduction and PBR goals
- Percent change in FKW takes is difference between the total (combined DS&SS) takes for the base case (top right histogram) and total for the simulation (bottom right histogram)

The handout provides results for 2 simulations, which are based on different data conditions/constraints. These conditions were chosen for illustration purposes only.

Page 1

- Conditions:
 - 14,000 deep sets where fishing is only in 2nd half of year (simulation draws only from July-December sets)
 - 6,000 shallow sets where fishing is only in 1st half of year (simulation draws only from January-June sets)
 - “Base” draws from whole year of fishing

Page 2: Same as simulation on page 1, but includes only sets within the EEZ

Discussion

- It would be good to allow this to be interactive for Team members, but the coding is complicated
 - Karin will create stand-alone input file/form where Team members can specify different combinations of input parameters to be run in simulation; will allow many different scenarios to be run before and during the meeting
- Current analysis looks at what the observer data tells us might happen if the relationship between the fishery and FKWs stays the same
 - Second tier of analysis – can incorporate changes to other parameters in the simulation, such as reducing frequency of serious injury versus non-serious injury, if there is a rational basis for doing so
- FKWs taken on sets where no depredation was observed may actually have been depredating (taking bait or hooked on first attempt at depredation on the set), so it may not make sense to have those sets separated
 - Karin will try to do a sensitivity analysis to see how results change if we separate FKW takes on non-depredated sets (no evidence of depredation) from takes on sets with depredation

Recommended changes to simulation output

- Add explanatory text about what bars mean
- Add output graphics for geographic and temporal representation of where fishing effort is taking place, to ensure simulation is realistic
- Consider performing statistical test and show p-value that indicates whether the average FKW take values between based and simulated scenarios are statistically different
- Put a tick mark on the x-axis for the take reduction goal (percent reduction)
- Run simulation that applies scenario to 5 hypothetical years, to get the 5-year average takes that are used in Stock Assessment Reports

Next Steps

- Karin will continue work on programming to include geographic detail, sampling by trip and for full years, and monitoring each year's data for trigger (e.g., cap on false killer whale takes)
- Karin will draft more explanatory text for sample output to make clearer what is being shown
- Karin will draft a form for specifying input parameters to include in simulation; distribute to Work Group by 5/21
- Work Group to consider the types of output for the simulations (e.g., graphs or tables showing geographic and/or temporal detail)
- Next Work Group teleconference to be scheduled for week of 5/24

ATTACHMENT 1

False killer whale TRT -- Predictive modeling update for work group call 14 May 2010 (prepared by Karin Forney)

Although I've made progress with the programming, a significant amount of work remains to be completed. For today's call, I wanted to show some sample output (so far) to get feedback on whether it is useful and discuss how/if it should be modified. I can also provide an update on what still needs to be incorporated: geographic detail, Sampling by trip and for full years, Monitoring of each year's data for triggers (e.g. cap on false killer whale (PC) takes, etc.

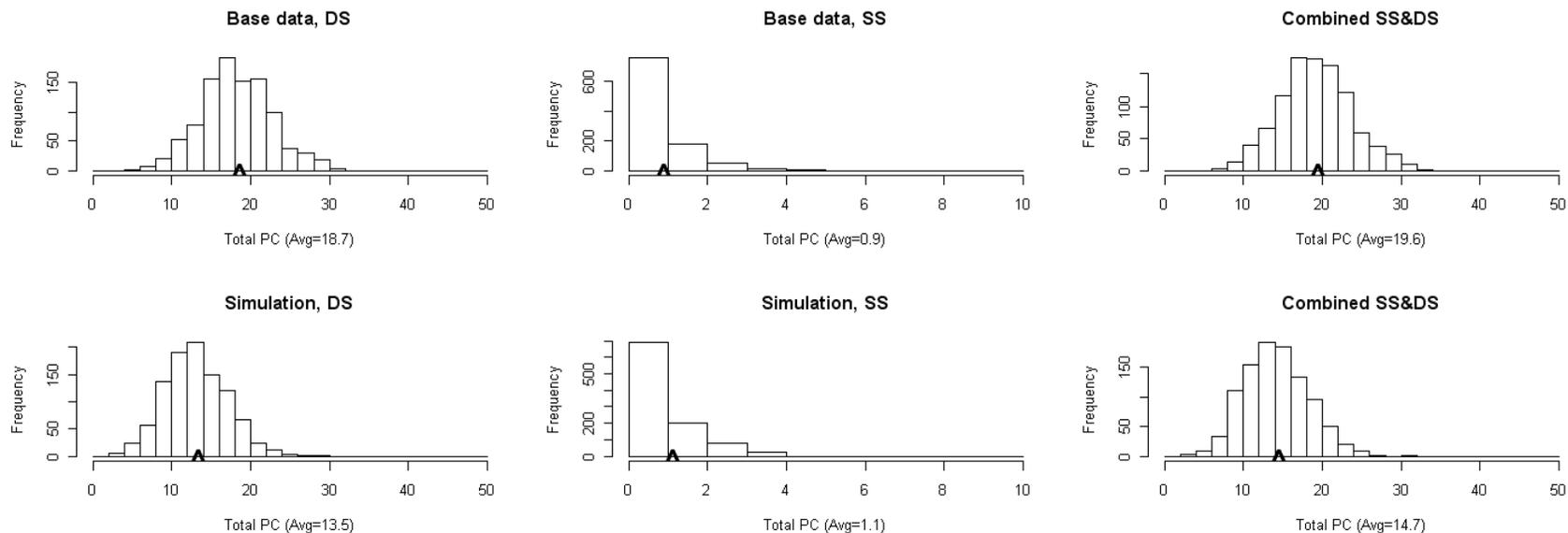
Sample output:

KEY: **DS** = Deep-set fishery, **SS** = Shallow-set fishery, **PC** = false killer whale takes, TgtCatch = Bigeye for DS, Swordfish for SS, **Base** = current observer data, **New** = simulated data subset simulation. The code allows this for EEZ takes only as well.

Sample Simulation 2: DS: 14000 (Conditions XXX), SS: 6000 (Conditions YYY) (-25.2% change in PC takes)

	Data:	BaseDS	NewDS	BaseSS	NewSS	Data:	BaseDS	NewDS	BaseSS	NewSS
NumSets:		20724	12362	6228	5319	Num PC:	28	12	1	1
#TgtCatch:		176936	110533	81306	71638	EEZPC:	13	6	1	1
TgtCtchperSet:		8.538	8.941	13.055	13.468	PCper1000Sets:	1.351	0.971	0.161	0.188

SIMULATION RESULTS: Total PC



ATTACHMENT 1

Sample Simulation 2: DS: 14000 (Conditions XXX), SS: 6000 (Conditions YYY) (-17.7% change in PC takes)

	Data:	BaseDS	NewDS	BaseSS	NewSS	Data:	BaseDS	NewDS	BaseSS	NewSS
NumSets:		20724	12362	6228	5319	Num PC:	28	12	1	1
#TgtCatch:		176936	110533	81306	71638	EEZPC:	13	6	1	1
TgtCtchperSet:		8.538	8.941	13.055	13.468	PCper1000Sets:	1.351	0.971	0.161	0.188

SIMULATION RESULTS: EEZ PC

