CHAPTER 7
THE ESTIMATED MODEL

7.1 INTRODUCTION

This chapter presents an overview of the estimation of the full model. As discussed earlier, the main model uses the SP Green Bay choice pair data, the SP data on the number of days the angler expects to fish the preferred Green Bay site, and the RP data on the actual number of days spent fishing Green Bay to estimate simultaneously the anglers' choices from the choice pairs and the allocation of total fishing days between Green Bay and other sites. The utility from fishing Green Bay and the utility from fishing another fishing site are defined in Chapter 6. The estimated parameters of those utility functions are discussed qualitatively here, and the specific parameter estimates are reported in Appendix B.

These parameters are used to estimate the anglers' values for changes in the characteristics of Green Bay, and to construct value estimates for recreational fishing services lost due to the presence of FCAs in Green Bay. Major conclusions that can be drawn from this chapter and Appendix B are that model parameters are estimated with a high level of accuracy and make sense, and that the model does a good job in explaining angler choices and behavior. Technical results and measures of model goodness-of-fit (i.e., how well the model explains the data) are presented in detail in Appendix B. The estimates here apply to our target population of 1998 anglers active in fishing the Wisconsin waters of Green Bay and who purchased a fishing license in one of eight nearby counties.

7.2 SIGNS AND SIGNIFICANCE OF THE PARAMETER ESTIMATES

An important result from this estimation is that all of the estimated parameters have the correct signs (Table B-2 in Appendix B). The estimated parameters on the catch times and the FCA variables are negative, and the estimated parameter on the launch fee is positive (recall that the fee enters the utility function with a negative sign). These parameter signs indicate anglers are worse off as catch times increase, as FCAs increase, and as costs increase. Further, parameters on the FCA dummy variables tend to increase in absolute value as the FCA level becomes more severe. For example, the parameter for the most severe level, Level 9, is -1.15, whereas the parameter for Level 2 is -0.09. FCA parameter estimates also show that as the severity of FCAs increases, so does the damage, but not necessarily in a linear fashion.

The parameters are estimated by maximum likelihood, so they have desirable statistical properties. In addition, the parameter estimates have small confidence intervals; that is, there is confidence that the estimates of the parameters would not vary much across random samples. Using conventional statistical tests, the parameters are all highly statistically "significant," which means that they differ from zero with a high degree of confidence.

7.3   MEASURES OF MODEL FIT

Several statistical procedures were implemented to assess how well the model explains the data. Overall, the results from these procedures show that the model does a very good job in explaining angler choices and the number of days anglers spend fishing Green Bay under current conditions.

An intuitively appealing test of fit in the A-B choice-pair portion of the model is to examine the proportion of angler choices from the choice pairs that are accurately predicted by the model. The model correctly predicts 73% of the 5,038 choice occasions in the data.[1] A pseudo-R^2 for the choice pairs is 0.43. It is akin to a measure of fit for a simple linear regression model where the value ranges from zero to one and indicates the percentage of variation in the data that is explained by the model. A pseudo-R^2 of 0.43 is quite high for cross-sectional data.

The estimated model also does well in identifying alternatives that are appealing or unappealing to anglers. For example, when the predicted probability of selecting alternative A is less than 0.1, alternative A is chosen in only 5% of the pairs; anglers only rarely choose alternatives that the model indicates are unlikely to be chosen. Conversely, when the predicted probability is greater than 0.9, alternative A is chosen in almost all of the pairs, 96%. The estimated model identifies the Green Bay alternatives anglers actually do prefer as likely candidates to be chosen.

Another measure of model accuracy is a comparison of the mean number of days that anglers would expect to visit the preferred Green Bay alternatives (reported in the followup questions to the choice pairs), with the model's prediction of the mean number of days. The means are almost identical (12.0197 versus 12.0927), although there is significant variation on an individual basis (see Appendix B). The model is also sufficiently flexible to predict perfectly the mean current number Green Bay days from the RP data: 10 predicted and actual.

---

1. To determine which alternative the model predicts would be chosen from a pair, the estimated parameter values are put into Equation 1 in Chapter 6, along with the Green Bay characteristics from the two alternatives. Whichever alternative gives the highest value for estimated expected utility is the alternative the model predicts will be chosen.

7.4   CHANGES IN GREEN BAY FISHING FROM CHANGES IN FCAS

The model is not only useful in predicting choices based on the pairs and predicting days under current conditions, it can also predict how changes in FCAs or other Green Bay characteristics such as catch time will affect the proportion of fishing days spent at Green Bay versus other sites, and therefore the total number of Green Bay days, holding total fishing days constant.

The model's estimate of the probability that Green Bay will be chosen under current FCA Level 4 conditions (versus another site) is 0.40 for anglers who currently fish in Green Bay and purchased licenses in the eight counties.[2] With the elimination of FCAs in Green Bay, that percentage would increase to almost 0.46, and the number of Green Bay days would increase by 14.5%. As PCBs are gradually removed from Green Bay and FCAs become less stringent in phases, other scenarios may become relevant. For example, the probability of visiting Green Bay would increase to 0.43 if FCAs were at Level 3, and increase to 0.45 at Level 2. Results from catch-time scenarios are presented in Table B-6. An important finding is that catch time for all four species in Green Bay would have to be reduced by almost half for visitation to increase as much as it would if FCAs were completely removed.

---

2. A conservative interpretation of current FCAs in Green Bay is Level 4, as discussed in Section 5.4 (see Table 5-3 for the FCA level definitions).