CHAPTER 5
THE GREEN BAY CHOICE QUESTIONS

5.1 INTRODUCTION

Choice questions, sometimes called stated-choice questions or attribute-based choice questions, along with data on observed fishing behavior, are used to estimate anglers' willingness to pay (WTP) to reduce or remove Green Bay FCAs. A choice question presents an individual with a number of alternatives, each described in terms of the levels of their common set of characteristics, and asks the individual to state his preferred alternative.[1]

Consider presenting a current Green Bay angler with the following simple choice pair: Green Bay with a $5 launch fee and an average catch rate of one fish per hour, versus Green Bay with an $8 launch fee and an average catch rate of one fish every 30 minutes. If an angler chooses the second alternative (higher cost and catch rate), his WTP per Green Bay fishing day for the doubled catch rate is at least $3. If the angler chooses the first alternative, the WTP is less than $3. Many different choice pairs can be generated by varying the launch fee and catch rates. For example, if there are three launch fees and four catch rates, there are 12 possible alternatives and 66 possible pairs. If site characteristics include cost, catch rate, and FCA level, choice pairs can determine how an angler(s) would trade off less stringent FCAs at the site for higher cost, better catch rates for higher cost, or better catch rates for more stringent FCAs.

We ask this type of Green Bay choice question, then ask a followup question of how often the angler would fish Green Bay if it were as described in his chosen alternative. This followup question gives the angler the opportunity to indicate whether he considers the chosen Green Bay alternative better or worse than current conditions. For example, an angler could choose an alternative and then report he would fish Green Bay less, or even zero times, if the conditions were as in the chosen alternative. Section 5.6 further describes the followup question.

Choice questions are a stated preference (SP) technique for estimating preferences because the respondent is asked to state something about his preferences. In contrast, revealed preference (RP) techniques observe an individual's actual choices in the market or other arenas, and inferences are made about the individual's preferences based on those observed choices; SP data

1. Cost and quality are also defined as characteristics of a commodity or an activity like fishing. Quality characteristics are commonly referred to as attributes, but cost is not an attribute. Later when we discuss choice pairs (Section 5.4), for simplicity of presentation, we refer to characteristics of different Green Bay alternatives to include both attributes and cost.

have advantages over RP data. Morikawa et al. (1990) states, "for example, since SP data are collected in a fully controlled "experimental" environment, such data has the following advantages in contrast with RP data that are generated in natural experiments: 1) they can elicit preferences for nonexisting alternatives; 2) the choice set is prespecified; 3) multicollinearity among attributes can be avoided; and 4) range of attribute values can be extended."[2] Further, because SP data allow the researcher to control more variables and because there are more unknowns influencing the decisions in RP data, the SP data often contain less noise and measurement error (Louviere, 1996).

Revealed preference (RP) data have a potential advantage in that these data reflect actual decisions made and the consequences of those decisions. If the consequences are significant, respondents have incentives to make choices consistent with their preferences (assuming they have adequate knowledge about the choices). With choice questions in SP data, if the respondent does not feel his responses have meaningful consequences, the incentives to carefully respond consistently with one's preference are reduced, which may result in data of reduced accuracy. To address this potential issue with SP data, we designed the survey materials to communicate the importance of the respondents' answers, and we implemented the assessment with anglers who are active in fishing the waters of Green Bay. These anglers are familiar with the site and issues at the site, and can be expected to understand and care that resource managers are evaluating options for the site (see Chapter 3 for an additional discussion).

This chapter is organized as follows: Section 5.2 provides an introduction to choice questions and their use in the valuation of environmental amenities, Section 5.3 discusses the selection of the SP choice questions for our application, and Section 5.4 describes the specific Green Bay choice pairs in our application. Section 5.5 provides a general discussion of the responses to the choice pairs and how they indicate a WTP for an improvement in quality, and Section 5.6 discusses the followup question to each choice pair about how many days they would expect to spend at their preferred alternative.

While this chapter discusses SP questions and data, it is important to remember that to estimate damages we combine the SP data with data on observed fishing days under current conditions, so we use a combination of SP and RP data. This practice is widely supported.[3] SP and RP data provide different information about anglers' preferences, so combining them into an integrated model leads to better estimates of those preferences. The integrated model is presented in Chapter 7. In this chapter, Green Bay refers to the Wisconsin waters of Green Bay, unless specifically identified otherwise.

2. The same basic list of advantages can be found in Adamowicz et al. (1998).

3. See, for example, McFadden (1986), Ben-Akiva and Morikawa (1990), Morikawa et al. (1990), Cameron (1992), Louviere (1992), Hensher and Bradley (1993), Adamowicz et al. (1994, 1997), Ben-Akiva et al. (1994), Swait et al. (1994), Morikawa et al. (1991), Louviere (1996), Kling (1997), and Mathews et al. (1997).

5.2 CHOICE QUESTIONS ARE WELL ESTABLISHED FOR ESTIMATING TRADEOFFS

Choice question methods have an established basis in the professional literature and are consistent with NRDA regulations. Choice questions evolved from conjoint analysis, a method used extensively in marketing and transportation research.[4] Conjoint analysis requires respondents to rank or rate multiple alternatives where each alternative is characterized by multiple characteristics (e.g., Johnson et al., 1995; Roe et al., 1996). Choice questions require respondents to choose the most preferred alternative (a partial ranking) from multiple alternative goods (i.e., a choice set), where the alternatives within a choice set are differentiated by their characteristics.

There are many desirable aspects of choice questions, not the least of which is the nature of the choice being made. To choose the most preferred alternative from some set of alternatives is a very common decision experience, especially when one of the characteristics of the alternatives is a price. One needs only to walk the aisles of a grocery store to experience this type of decision environment. Morikawa et al. (1990) note that choice questions often contain useful information on trade-offs among characteristics. Quoting from Mathews et al. (1997), "SP models provide valuable information for restoration decisions by identifying the characteristics that matter to anglers and the relative importance of different characteristics that might be included in a fishing restoration program." Johnson et al. (1995) note that, "The process of evaluating a series of pairwise comparisons of attribute profiles encourages respondents to explore their preferences for various attribute combinations." Choice questions encourage respondents to concentrate on the trade-offs between characteristics rather than to take a position for or against an initiative or policy. Adamowicz et al. (1996) note that the repeated nature of choice questions makes it difficult to behave strategically.

Choice questions allow for the construction of goods characterized by characteristics levels that (currently) do not exist. This feature is particularly useful in marketing studies when the purpose is to estimate preferences for proposed goods.[5] For example, Beggs et al. (1981) assess the potential demand for electric cars. Similarly, researchers estimating the value of environmental goods are often valuing a good or condition that does not currently exist, e.g., Green Bay absent PCB contamination and FCAs.

4. Cattin and Wittink (1982) and Wittink and Cattin (1989) survey the commercial use of conjoint analysis, which is widespread. For survey articles and reviews of conjoint, see Louviere (1988, 1992), Green and Srinivasan (1990), and Batsell and Louviere (1991). Transportation planners use choice questions to determine how commuters would respond to a new mode of transportation or a change in an existing mode. Hensher (1994) provides an overview of choice questions as they have been applied in transportation.

5. Louviere (1994) provides an overview of choice questions as they have been applied in marketing.

Like all elicitation techniques, the responses to choice questions may contain biases or random errors. Choosing can be difficult if the individual is almost indifferent between two alternatives. If each respondent is asked to answer a number of choice questions there can be both learning and fatigue. Respondents can become frustrated if they dislike all of the available alternatives, and they may have no incentive for sufficient introspection to determine their preferred alternative. A number of studies have investigated these issues.[6] Paraphrasing Morikawa et al. (1990, p. 4), other possible reasons for bias or noise include: 1) the respondent chooses solely on the basis of what he or she considers to be the most important attribute, 2) choices are biased toward the status quo, 3) the respondent uses the questionnaire as an opinion statement for his own benefit, 4) the respondent ignores his constraints, and 5) the respondent ignores an attribute if its level lacks credibility. While these are all matters of concern, such decision protocols can also bias or add random noise to actual choices (RP data). Nevertheless, the general consensus is that if SP choice questions are carefully designed and implemented they can elicit important and relevant information about preferences, information that often cannot be deduced solely on the basis of observed behavior.

Choice questions, rankings, and ratings are increasingly used to estimate the value of environmental goods. For example, Magat et al. (1988) and Viscusi et al. (1991) estimate the value of reducing health risks; Adamowicz et al. (1994, 1997), and Morey et al. (1999a) estimate recreational site choice models for fishing, mountain biking, and moose hunting, respectively; Adamowicz et al. (1996) estimate the value of enhancing the population of a threatened species; Layton and Brown (1998) estimate the value of mitigating forest loss resulting from global climate change; and Morey et al. (1999b) estimate WTP for monument preservation in Washington, DC. In each of these studies, a price (e.g., tax, or a measure of travel costs) is included as one of the characteristics of each alternative so that preferences for the other characteristics can be measured in terms of dollars. Other examples of choice questions to value environmental commodities include Swait et al. (1998), who compare prevention versus compensation programs for oil spills, and Mathews et al. (1997) and Ruby et al. (1998) who ask anglers to choose between two saltwater fishing sites as a function of their characteristics. Mathews et al. is an NRDA application.

Alternatively, a number of environmental studies have used ratings, in which survey respondents rate the degree to which they prefer one alternative over another. For example, Opaluch et al. (1993) and Kline and Wichelns (1996) develop a utility index for the characteristics associated with potential noxious facility sites and farm land preservation, respectively. Johnson and Desvousges (1997) estimate WTP for various electricity generation scenarios using a rating scale in which respondents indicate their strength of preference for one of two alternatives within each choice set. Other environmental examples include Rae (1983), Lareau and Rae (1998), Krupnick

6. For more details, see for example, Louviere (1988), Green and Srinivasan (1990), Agarwal and Green (1991), Gan and Luzar (1993), Bradley and Daly (1994), Mazzotta and Opaluch (1995), and Swait and Adamowicz (1996).

and Cropper (1992), Gan and Luzar (1993), and Mackenzie (1993). Adamowicz et al. (1997) provides an overview of choice and ranking experiments as they are applied to environmental valuation. It is argued that choice questions better predict actual choices than do rating questions because choice questions mimic the real choices individuals are continuously required to make, whereas individuals rank and rate much less often.[7]

Choice and rating questions characterize the alternatives in term of a small number of characteristics. For example, Opaluch et al. (1993) characterize noxious facilities in terms of seven characteristics; Adamowicz et al. (1997) use six characteristics to describe recreational hunting sites; Johnson and Desvousges (1997) use nine characteristics to describe electricity-generation scenarios; Mathews et al. (1997) use seven characteristics to describe fishing sites; Morey et al. (1999a) use six characteristics to describe mountain bike sites; and Morey et al. (1999b) use two characteristics to characterize monument preservation programs.

Choice-based damage computation methods as applied here are consistent with U.S. DOI NRDA regulations [43 C.F.R. § 11.83(c)(3)] because they measure WTP. The choice-based method used here combines elements of random utility models used in recreation assessments and contingent valuation methods for determining use values, which are identified as acceptable methods in the U.S. DOI regulations [43 C.F.R. §11.83(c)]. Choice-based methods are explicitly identified (as conjoint methods) in the NOAA NRDA regulations for use in valuing and scaling injuries and restoration (15 C.F.R. Part 990, preamble Appendix B, part G). Mathews et al. (1995) note that conjoint analysis is one of the most promising techniques for making the determination of in-kind compensation.

5.3 VALUATION AND THE USE OF CHOICE QUESTIONS

Choice questions were used to supplement the data on current fishing days because Green Bay is unique. No sites exist that are similar to Green Bay in terms of catch rates, size, and other factors, but that differ from Green Bay in terms of the level of PCB contamination and associated FCAs. Lake Michigan has similar FCAs for PCBs, but it is a much larger water body that generally requires larger boats to fish and that has varying fish species from the waters of Green Bay. The inland lakes are much smaller and do not suffer from PCB contamination; many have FCAs, but not for PCBs. If there were a number of sites similar to Green Bay but with varying catch rates and varying FCA levels, there might be less of a need for choice questions. Instead, one might be able to estimate an angler's WTP for higher Green Bay catch rates or lower Green Bay FCA using only observed trip patterns for existing sites. However, this is not the case, so choice questions are a well-substantiated antidote to a lack of variation in the characteristics of the alternatives available.

7. See, for example, Louviere and Woodward (1983), Louviere (1988), and Elrod et al. (1992).

We have Green Bay anglers focus on preferred Green Bay alternatives and characteristics of Green Bay fishing. These anglers are most familiar with the site and issues and can be expected to give informed judgments, and thus accurate valuations relevant to the specific issue of PCB advisories in the waters of Green Bay.

Finally, as discussed further in the next section, the inclusion of cost and multiple Green Bay attributes allow for a comparison between FCAs and catch rates to assess their tradeoffs as well as dollar valuation. This feature makes the study broader than just an FCA valuation study, and allows for other useful valuation anchors. For example, the valuation of changes in catch rates is prevalent in the literature (see Chapter 2).

5.4 THE GREEN BAY CHOICE PAIRS

Each Green Bay alternative was described to respondents in terms of nine characteristics: a launch fee; the average amount of time necessary to catch a fish (catch time) for each of the four species (yellow perch, trout/salmon, walleye, and smallmouth bass); and an FCA level for each of the four species.

We include catch times (the reciprocal of catch rates) and costs in our characteristics set because a large body of recreational fishing literature has shown consistently that these are important characteristics of site choice. Further, catch times are included to support any subsequent computation of damages from reduced catch times and to compute benefits from increased catch rates if such a program is part of a restoration package. We include FCAs as a key feature of the damages caused by the PCB contamination and because recent literature demonstrates the importance of FCAs to recreational fishing (see Chapter 2). Our focus groups, pretests, and final survey all confirm the importance of these characteristics. The selection of levels for each of these characteristics is described below (see “Choice Set Characteristics”).

Supporting recreational facilities, such as more boat launches, picnic tables, and walking trails, are not included as characteristics in the choice questions because anglers in the focus groups and pretests indicate little concern about existing conditions and changes in these site characteristics compared to catch rates and FCAs.[8] We concluded that addressing recreational facilities would

8. For example, in focus groups anglers were asked: “What was the most important factor in your decisions when you first decided to fish Green Bay? What two or three factors contribute most to your enjoyment of fishing trips to Green Bay? What two or three factors detract most from your enjoyment of fishing trips on the waters of Green Bay? If you could change anything about fishing on the waters of Green Bay, what would you change?” Only one angler mentioned launch facilities and no anglers mentioned other facilities. Pretest anglers also rated enhanced facilities for fishing in the waters of Green Bay and as in the final survey (see Tables 3-11, 3-15, and 4-9) recreational facilities always were rated much lower than catch times and FCAs.

not improve the damage assessment, but would complicate survey design and the cognitive burden for respondents.

Figure 5-1 is an example choice pair presented to every angler preceding the choice questions. Note that in this choice pair, Green Bay Alternative B has a less stringent advisory for trout/salmon, walleye, and smallmouth bass, and the catch rate is better for perch and walleye (i.e., the time it takes to catch these species is less). However Alternative B has a launch fee of $3, whereas Alternative A is free. Appendix E contains Version 1 of the survey, including the example pair and eight other pairs. Other versions are identical except that the specific combinations of characteristics in the choice questions presented vary by version (see Section 5.5 and Tables E-1 through E-10).

Note that the Green Bay choice pairs do not ask the individuals where they would fish if they had the choice between different sites, but whether they would prefer to fish Green Bay under conditions A or B; that is, the choice-pair questions ask anglers to choose which Green Bay they would prefer, not how often they would go.[9] Given this, the answers to the choice pairs measure values for changes in site characteristics for existing days at the site, but cannot be used to determine how often an angler would fish Green Bay under different conditions and the related values for changes in site visits. However, when the choice-pair data are combined with the data on how often anglers fish Green Bay under current conditions and the anglers' answers to questions on how often they would fish Green Bay under different conditions, one can better estimate both how anglers would trade off Green Bay characteristics and how often they would fish Green Bay under different conditions, which is what is done in this report.[10] The choice-pair data tell us how an angler would trade off different Green Bay characteristics on a Green Bay fishing day. Therefore, the choice pairs can be used to estimate how much anglers would prefer a Green Bay fishing day with no FCAs to fishing Green Bay under current conditions.

9. In contrast, one could develop choice pairs where there are two or more sites available and ask which site the individual would visit. Examples include Magat et al. (1988), Viscusi et al. (1991), Adamowicz et al. (1994, 1997), Mathews et al. (1997), Ruby et al. (1998), and Morey et al. (1999a). Choice studies such as this one that ask the individual to choose over different "states" include Johnson et al. (1995), Adamowicz et al. (1996), Roe et al. (1996), Johnson and Desvousges (1997), Morey et al. (1997, 1999b), Stevens et al. (1997), Layton and Brown (1998), and Swait et al. (1998).

10. Many studies use only choice questions to estimate preferences. In these cases, one must be sure that the choice questions provide everything one needs to know about preferences, including how behavior would change if site characteristics change. In this assessment, the choice questions are only one component of the data. Chapter 7 presents the integrated model. In Chapter 9, we consider models based solely on the data from the choice pairs.

Figure 5-1
Example Choice Question

If you were going to fish the waters of Green Bay, would you prefer to fish the waters of Green Bay under Alternative A or Alternative B? *Check one box in the last row*

	Alternative A ▼	Alternative B ▼
Yellow Perch		
Average catch rate for a typical angler.....	40 minutes per perch	30 minutes per perch
Fish consumption advisory.....	No more than one meal per week	No more than one meal per week
Trout and Salmon		
Average catch rate for a typical angler.....	2 hours per trout/salmon	2 hours per trout/salmon
Fish consumption advisory.....	Do not eat	No more than one meal per month
Walleye		
Average catch rate for a typical angler.....	8 hours per walleye	4 hours per walleye
Fish consumption advisory.....	Do not eat	No more than one meal per month
Smallmouth bass		
Average catch rate for a typical angler.....	2 hours per bass	2 hours per bass
Fish consumption advisory.....	No more than one meal per month	Unlimited consumption
Your share of the daily launch fee.....	Free	$3
Check the box for the alternative you prefer.....	❑	❑

5.4.1 Choice Set Characteristics

Catch Times

The catch characteristic for each species is defined as the amount of time it would take, on average, to catch a fish, expressed in either minutes or hours (e.g., a perch every 30 minutes, a bass every two hours). Increasing the catch time indicates worsening conditions (e.g., with a trout/salmon catch time of two hours one would expect to catch twice as many fish in a given period than one would expect with catch time of four hours).[11] We will refer to a bettering or worsening of the catch rate as a decrease or increase in the catch time, respectively. For each Green Bay alternative, the perch catch time took one of five levels: every 10, 20, 30, 40, or 60 minutes. For the other species, catch time took one of six levels: a fish every hour, every two hours, four hours, six hours, eight hours, or every twelve hours. In Green Bay, perch take less time to catch than other sport fish. These ranges were chosen on the basis of historical WDNR catch data and feedback from anglers during pretesting, and were chosen to include catch characteristics that are both better and worse than Green Bay conditions in recent years prior to the 1998 survey.

Catch data (catch and fishing time) for the Green Bay fishery in Wisconsin were collected by the WDNR. Table 5-1 reports the total hours spent targeting a species divided by the total catch for that species to obtain the average time to catch each species.[12] The long-run averages (1986-1998) are 31 minutes per perch, 7.8 hours per trout/salmon, 6.9 hours per walleye and 5.0 hours per bass. Average catch time has increased dramatically in recent years.

It is important to note that the WDNR creel survey does not collect catch data for moored boat days or charter boat days, which constituted about 15% of total fishing effort in the waters of Green Bay according to the WDNR estimates of fishing hours. Comparing the data for boat trips from a ramp to nonboat trips (pier, shore, and stream fishing modes) reveals that generally it takes less time to catch a fish from a boat than from nonboat modes. Therefore, as a result of the omission of moored and charter boat mode days, the catch times in Table 5-1 may overstate actual catch times.

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11. An alternative way to define catch success is how many fish one can expect, on average, to catch in a given amount of time (e.g., two perch per hour or eight perch per day). In focus group discussions, we found that this definition was occasionally confused with the "bag limit" by anglers accustomed to catching the limit. The bag limit is a legal limit on the number of fish an angler is allowed to keep per day. Alternatively, when we expressed catch rates in terms of the amount of time it would take, on average, to catch each fish, no confusion with bag limits was detected. Defining catch rates in terms of days rather than hours or minutes would have also introduced ambiguity because the number of hours in a "day" of fishing varies across anglers.

12. Total hours targeting a species is computed as total angler hours multiplied by the percent of angler hours targeting the species.

Table 5-1
Average Time to Catch a Fish in Green Bay
(hours per fish)

	1998	Average 1986-1998	Average 1996-1998
Yellow perch	0.75	0.52	0.74
Trout/salmon	19.4	7.8	12.1
Walleye	7.4	6.9	7.6
Smallmouth bass	15.0	5.0	8.9

Source: WDNR creel data. Does not include catch statistics for moored boats or charter boats. As a result, the reported catch times may overstate actual catch times.

Mail survey respondents were asked what they felt were the current average catch times (for all anglers, not just themselves) on the Green Bay waters. The means of the responses are shown in Table 5-2, which indicate that anglers have perceptions about average catch times that are consistent with the WDNR data for perch, but are substantially shorter than the WDNR data for other species. This might be because the respondents overestimate what other anglers catch, are optimistic, are better anglers than most, or because their perceptions correspond to long-run averages. It may also be because catch varies by location or other factors, including measurement error in the creel data due to the omission of boats moored and charter boat fishing days.

Table 5-2
Perceived Average Time to Catch a Fish in Green Bay
(hours per fish — mail survey Question 36)

	N	Mean (SE)	Median	Mode	% Missing
Yellow perch	626	0.9 (0.06)	0.5	0.5	3.3%
Trout/salmon	629	2.7 (0.10)	2	2	2.8%
Walleye	625	2.1 (0.08)	1	1	3.4%
Smallmouth bass	617	1.3 (0.07)	0.67	0.5	4.6%

Fish Consumption Advisories

Consider now the FCA characteristics by species. Generally, for reductions in PCB levels, the FCAs for all species will decrease or remain the same (depending on the change in PCB levels). Generally, it is not the case that with changes in PCB levels, FCAs would become more stringent for some species and less stringent for other species.

The reality of how FCAs will change with changes in PCBs is reflected in the design of the FCA characteristics. We define nine FCA levels covering the FCA for each of our four species of interest (Table 5-3). Level 1 indicates PCB levels are sufficiently low such that all species may be eaten in unlimited quantities; there is no health risk from consumption. Level 9 is the most restrictive: trout/salmon, walleye, and bass should not be eaten, and a perch meal should be consumed once a month at most. In general, the stringency of FCAs for particular species increases or stays the same moving from lower to higher levels, with two exceptions: going from Level 5 to Level 4, the walleye FCA becomes less stringent while the perch FCA becomes more stringent, and going from Level 6 to Level 5, the trout/salmon FCA becomes less stringent while the walleye FCA becomes more stringent. These two exceptions allow for examination of whether respondents are sensitive to the variations within the mix of FCAs across levels; the results show that anglers are.

Note that in the presentation of the pairs (see the example in Figure 5-1), the FCAs in each of the alternatives are reported by species, but because they are based on nine aggregate levels they do not vary in unrealistic ways by species across the alternatives. This design and presentation of the FCA characteristics account for the fact that the FCAs are correlated across species through their underlying cause, PCB contamination, but take into account the fact that FCAs vary by species, and that different anglers might be interested in different species.

The actual FCAs for the waters of Green Bay vary by species, fish size, and location. Table 5-4 shows the 1998 WDNR advisories for the Fox River from its mouth at Green Bay up to DePere Dam, and for the Wisconsin waters of Green Bay (which include all other tributaries up to their first dam) for the species addressed in the survey (see Table 2-10 for a summary of FCAs for all species). Note that the nine FCA levels in Table 5-3 vary by species but not by size. The least restrictive advisories in 1998, by species, are once a week for perch, and once a month for trout/ salmon, bass, and walleye. This corresponds to Level 4 in Table 5-3, which is a conservative representation of the current FCA conditions in the Wisconsin waters of Green Bay for each of the four species.

Note that in the WDNR advisory for Green Bay, there is a distinction between once a month and once every two months; this restriction was not used in the choice pairs. Eliminating this category reduces the complexity of the levels and choice tasks. Assuming the current FCA advisory is once a month, if it is once every two months, will also lead to lower damage estimates. In the focus

Table 5-3
Green Bay FCA Levels for an Average Size Fish
(mail survey — see Appendix E)

	Species	Fish Meals Advised
FCA Level 1	Yellow perch Trout/salmon Walleye Smallmouth bass	"Unlimited" "Unlimited" "Unlimited" "Unlimited"
FCA Level 2	Yellow perch Trout/salmon Walleye Smallmouth bass	"Unlimited" "Eat no more than 1 meal a week" "Eat no more than 1 meal a week" "Unlimited"
FCA Level 3	Yellow perch Trout/salmon Walleye Smallmouth bass	"Unlimited" "Eat no more than 1 meal a month" "Eat no more than 1 meal a month" "Eat no more than 1 meal a week"
FCA Level 4	Yellow perch Trout/salmon Walleye Smallmouth bass	"Eat no more than 1 meal a week" "Eat no more than 1 meal a month" "Eat no more than 1 meal a month" "Eat no more than 1 meal a month"
FCA Level 5	Yellow perch Trout/salmon Walleye Smallmouth bass	"Unlimited" "Eat no more than 1 meal a month" "Do not eat" "Eat no more than 1 meal a month"
FCA Level 6	Yellow perch Trout/salmon Walleye Smallmouth bass	"Unlimited" "Do not eat" "Eat no more than 1 meal a month" "Eat no more than 1 meal a month"
FCA Level 7	Yellow perch Trout/salmon Walleye Smallmouth bass	"Unlimited" "Do not eat" "Do not eat" "Eat no more than 1 meal a month"
FCA Level 8	Yellow perch Trout/salmon Walleye Smallmouth bass	"Eat no more than 1 meal a week" "Do not eat" "Do not eat" "Eat no more than 1 meal a month"
FCA Level 9	Yellow perch Trout/salmon Walleye Smallmouth bass	"Eat no more than 1 meal a month" "Do not eat" "Do not eat" "Do not eat"

Table 5-4
1998 Wisconsin FCAs for Green Bay and Fox River for Selected Species

		Unlimited	Once a Week	Once a Month	Once Every 2 Months	Do Not Eat
Yellow perch	Fox River			all sizes		
	Green Bay		all sizes			
Rainbow trout	Green Bay			all sizes		
Chinook salmon	Green Bay			< 30"	> 30"	
Brown trout	Green Bay			< 17"	17-28"	> 28"
Walleye	Fox River			< 16"	16-22"	> 22"
	Green Bay			< 17"	17-26"	> 26"
Smallmouth bass	Fox River				all sizes	
	Green Bay			all sizes		

Source: WDNR creel data.

groups, respondents were largely indifferent between once every two months and once a month. Perceived FCAs and actual FCAs are generally consistent, as discussed in Chapter 4.

Note that the difference between Level 4 and Level 3 is the elimination of the FCA for yellow perch (in both the Lower Fox River and the Bay of Green Bay). The difference between Level 3 and Level 2 is a reduction in severity in each of the trout/salmon, walleye, and smallmouth bass FCAs, with the smallmouth bass FCA going to unlimited. The difference between Level 2 and Level 1 is the reduction of trout/salmon and walleye FCAs from once a week to unlimited.

Daily Fee

One of the characteristics used to describe each Green Bay alternative is the "share of the daily launch fee." For angling trips that did not involve a boat, respondents were told twice they should "think of the daily boat launch fee as a fee you would have to pay to fish the waters of Green Bay," so the cost variable in the choice question has a meaning to all respondents. This presentation strategy was tested in the pretests and found to be accepted in a manner consistent with the design of the choice questions. For each Green Bay alternative, the launch fee took one of nine levels: free, $2, $3, $5, $7, $9, $10, $12, or $15, which includes fees that are lower than and higher than the current average fee. Inclusion of this "cost" characteristic gives the respondent the opportunity to indicate his WTP for better conditions on Green Bay; without it monetary estimates of damages would not be possible.

Green Bay has many boat access points, some run by private marinas or private land owners, some city run, some county run, and some state run. In the summer of 1997, we collected launch fee data for 37 launches. Fifty-one percent of these sites charged $3.00 to launch a boat; the average was $2.84, and the range was $0.00 to $7.00. In the mail survey (Q38), anglers were asked, "Approximately what do you think is the average daily boat launch fee for the waters of Green Bay?" The mean of the angler estimates is $4.41, the median is $4.00, and the mode is $3.00. The anglers' perceptions of costs were very consistent with the data collected on actual boat fees, again reflecting anglers' familiarity with fishing in the waters of Green Bay. The cost range in the choice questions is broader than actually observed to allow for higher costs tradeoffs with less stringent FCAs and higher catch rates. The cost range was determined from the focus groups and pretests, and spans the partial range of cost differentials anglers indicated were acceptable for changes in FCAs and catch rates (i.e., some anglers would pay more than $15 for improvements at the site, and thus our range results in conservative value estimates).

5.4.2 Selection of Choice Sets

Given the number of characteristics and the levels they can take, there are 1,620 possible Green Bay alternatives and an extremely large number of possible pairs. Eighty of these pairs were chosen so that there would be sufficient independent variation in the levels of the six different characteristics. Independent variation is required to identify the separate influence of each of the characteristics.

The experimental design for the choice study was accomplished using the conjoint design software of Bretton Clark (1990). This software uses a set of characteristics and the levels of these characteristics as inputs to produce a set of "products," which in our case is a set of Green Bay alternatives. Each Green Bay alternative in the final set of 80 pairs represents a specific combination of the levels for the FCA, and catch and cost characteristics. The set produced by the conjoint design software represents the smallest possible set of alternatives sufficient to estimate a main effects model; it contains 160 Green Bay alternatives. In other words, the design program produces the smallest possible set of alternatives with sufficient variation in any one characteristic, independent of all the others, to allow estimation of the effect of changes in that characteristic on the probability of selection. The 160 members of the set were randomly divided into 80 pairs, which in turn were randomly allocated among 10 versions of the survey instrument. The simple correlations between the characteristics in the 160 alternatives are reported in Table 5-5. None of the correlations is significantly different from zero, indicating independent variation among the characteristics which aids the estimation of separate values for each characteristic. The specific choice pairs for each survey version are included with the survey materials in Appendix E.

Table 5-5
Pearson Correlation Coefficients between Green Bay Characteristics across the Choice Pairs

	Yellow Perch Catch	Trout/Salmon Catch	Walleye Catch	Smallmouth Bass Catch	FCA	Fee
Yellow perch catch	1.0000	-0.0335	0.0122	0.0062	-0.0104	0.0302
Trout/salmon catch	-0.0335	1.0000	-0.0472	0.0160	0.0228	0.0033
Walleye catch	0.0122	-0.0472	1.0000	-0.0089	-0.0245	0.0541
Smallmouth bass catch	0.0062	0.0160	-0.0089	1.0000	-0.0542	0.0392
FCA	-0.0104	0.0228	-0.0245	-0.0542	1.0000	0.0281
Fee	0.0302	0.0033	0.0541	0.0392	0.0281	1.0000

5.5 EVALUATION OF CHOICES ACROSS ALTERNATIVES

In this section anglers' choices of the preferred alternatives from the choice pairs are summarized and evaluated. Overall, their choices are very consistent with the characteristics they rate as important in other survey questions and with their reported preferences such as species target preference.

Only 138 (2.7%) of the choice pairs were left unanswered. This is consistent with our finding from the focus groups and pretests that most anglers found the survey interesting and the choice tasks reasonable. Remember that we surveyed only current Green Bay anglers.

In 40.5% of sample pairs, anglers chose the more costly alternative, which indicates that Green Bay anglers are willing to pay for better Green Bay conditions. An estimate of this WTP is determined by inputting all of the choice data into a statistical model, along with the data on actual number of Green Bay days under current conditions. The model is outlined in Chapter 6, and the WTP estimates for eliminating Green Bay FCAs are reported in Chapter 8.

In pairs where the only varying characteristic is a higher cost for a less stringent FCA level, one could estimate from that pair how many anglers have a WTP for the specified FCA reduction at least as large as the cost difference. However, there are few such pairs, as most comparisons involve changes in three or more characteristics. To estimate the specific magnitude of WTP for changes in characteristic levels, one must use the data in its entirety.

For most anglers, their chosen alternatives indicate consistent preferences across the choices, i.e., the criteria on which they base the pairwise choices appear to stem from stable preferences. The pairwise choices are also consistent with anglers' answers to other questions in the survey. In

practice we do not expect every choice for all anglers to be perfectly consistent, which the method and statistical evaluation are designed to accommodate through the random element in angler choices. In reviewing each angler's response for consistency, only a few anglers in our sample made choices that may indicate that their choices were based on something other than their preferences, such as always choosing the first or second alternative in each of the eight choices. For example, only eight anglers (1.2%) always chose the first or second alternative, and it is possible those alternatives were always their preferred ones.

After the angler answered the eight choice pairs, Question 35 inquired about the importance of each of the Green Bay characteristics in making pairwise choices. The average importance level of each characteristic is reported in Table 5-6, where 1 is "not at all important" and 5 is "very important." FCAs for perch and walleye and perch catch rates are the three characteristics considered to be the most important in choosing among the pairs. Most respondents indicated that perch FCA levels and catch rates were quite important in making their choice decisions, as were walleye FCAs and catch rates. This is to be expected as perch is a frequently targeted and frequently caught species on Green Bay, and fishing activity in Green Bay for walleye has been rapidly growing.

Table 5-6
Importance of Green Bay Characteristics to Choice Pair Decisions
(mail survey Question 35 1 = "not at all important" and 5 = "very important")

Characteristic	N	Mean (SE)	Median	Mode	% Missing
Yellow perch catch rate	638	3.6 (0.05)	4	5	1.4%
Yellow perch FCA level	639	3.7 (0.05)	4	5	1.2%
Trout/salmon catch rate	638	2.8 (0.05)	3	3	1.4%
Trout/salmon FCA level	640	3.1 (0.06)	3	3	1.1%
Walleye catch rate	639	3.5 (0.05)	4	3	1.2%
Walleye FCA level	634	3.7 (0.05)	4	5	2.0%
Smallmouth bass catch rate	633	3.1 (0.05)	3	3	2.2%
Smallmouth bass FCA level	633	3.0 (0.06)	3	1	2.2%
Fee	636	3.1 (0.05)	3	3	1.7%

Table 5-7 shows how the respondents who exclusively target one specific species rated the importance of the different Green Bay characteristics in their choice decisions.[13] For example, 125 anglers, or 23% of the same "often" or "almost always" target perch but not other species. Most anglers (348 or 54%) are not exclusive anglers, which is consistent with a large share (41%) of anglers "often" or "almost always" targeting "whatever is biting" (Figure 4-2). The exclusive anglers indicate that they typically target a particular species rate catch time and the FCA for that species as more important than catch times and FCAs for other species. This shows consistency between angler preferences and their intentions for selecting alternatives in the choice questions. These intentions are reflected in the actual choices made (see Chapter 8).

Table 5-7
Mean Importance of Green Bay Characteristics to Choice Pair Decisions by Target[a]
(mail survey Questions 35 and 4)

Characteristic	Targets Yellow Perch	Targets Trout/Salmon	Targets Walleye	Targets Smallmouth Bass	No Target or Multiple Targets
Number of observations	125	63	52	59	348
Yellow perch catch rate	**4.3 (0.09)**	2.6 (0.18)	3.1 (0.17)	3.0 (0.17)	3.7 (0.07)
Yellow perch FCA level	**4.3 (0.09)**	3.2 (0.21)	3.5 (0.20)	3.4 (0.20)	3.7 (0.07)
Trout/salmon catch rate	2.4 (0.10)	**4.2 (0.14)**	2.3 (0.16)	2.3 (0.15)	2.8 (0.07)
Trout/salmon FCA level	2.9 (0.12)	**4.2 (0.14)**	2.8 (0.21)	2.8 (0.21)	3.1 (0.08)
Walleye catch rate	3.1 (0.10)	2.9 (0.16)	**4.4 (0.12)**	3.1 (0.15)	3.7 (0.06)
Walleye FCA level	3.5 (0.12)	3.6 (0.18)	**4.1 (0.17)**	3.4 (0.19)	3.8 (0.07)
Smallmouth bass catch rate	2.6 (0.11)	2.4 (0.15)	2.5 (0.17)	**4.2 (0.13)**	3.4 (0.07)
Smallmouth bass FCA level	2.8 (0.13)	2.9 (0.21)	2.6 (0.22)	**3.2 (0.21)**	3.1 (0.08)
Fee	3.3 (0.12)	3.2 (0.19)	3.0 (0.20)	3.1 (0.16)	3.0 (0.07)

a. Each target group targets the respective species "often" or "almost always" and does not target any other species "often" or "almost always." Standard errors appear in parentheses. Bold text highlights answers by anglers targeting the identified species.

How important the different characteristics are to the choice pair decisions does not vary greatly by characteristics of the angler other than target species preference, but some small differences can be detected. Women rate the FCAs more important and catch time less important than do

13. In this section we define target angler as one who "often" or "almost always" targets a species, but does not "often" or "almost always" target any other species. We use this definition to identify anglers who are focused on one individual species.

men. A typical result in the risk literature is that women are more risk averse than men (see, for example, Slovic, 1987). This is not surprising since consumption of PCB-contaminated fish by pregnant women can affect a child's development. Anglers with higher education levels generally have lower mean importance ratings, as do anglers with higher income levels. Anglers who fished 15 or more days on the open waters of Green Bay in 1998 have the same or slightly higher importance ratings for all characteristics than those who fished less than 5 days, as reported in Table 5-8.

Table 5-8
Mean Importance of Green Bay Characteristics to Choice Pair Decisions by Avidity in 1998[a]
(mail survey Question 35 1 = "not at all important" and 5 = "very important")

Characteristic	Low Avidity (<5 Green Bay days per year) N = 289	High Avidity (15 Green Bay days per year) N = 135
Yellow perch catch rate	3.5 (0.08)	3.8 (0.12)
Yellow perch FCA level	3.7 (0.08)	3.7 (0.12)
Trout/salmon catch rate	2.7 (0.08)	2.9 (0.12)
Trout/salmon FCA level	3.0 (0.09)	3.2 (0.13)
Walleye catch rate	3.4 (0.07)	3.7 (0.10)
Walleye FCA level	3.7 (0.08)	3.8 (0.11)
Smallmouth bass catch rate	3.0 (0.08)	3.3 (0.12)
Smallmouth bass FCA level	2.9 (0.09)	3.0 (0.14)
Fee	3.0 (0.08)	3.3 (0.12)

a. Standard errors appear in parentheses.

While importance increases with avidity, it does not increase as much as for whether the angler targets a particular species; this result suggests that values per day may not vary much by angler avidity, which is confirmed by model results in Chapter 9 and Appendix D. Note also that differences in mean importance ratings of FCAs across avidity groups are generally less than for other characteristics, implying similar values across the groups.

In general, anglers' intentions in Question 35 are consistent with their actual pairwise choices; anglers who report catch as very important tend to choose alternatives with higher catch rates than those who rate catch as unimportant, and anglers who report FCAs as important tend to choose alternatives with less stringent FCA levels. Table 5-9 reports the means and modes of the

Table 5-9
Mean Characteristics Levels for the Preferred Alternatives by Whether the Characteristics Were Important to Choice[a] (mail survey Question 35)

Characteristic		All Respondents	Characteristic Important (rating = 4, 5)	Characteristic Not Important (rating = 1, 2)
Yellow perch catch time (minutes per fish)	mean (SE) mode	29 (0.25) 10	27 (0.34) 10	31 (0.54) 30
Trout/salmon catch time (hours per fish)	mean (SE) mode	5.2 (0.05) 1	4.9 (0.09) 1	5.4 (0.08) 1
Walleye catch time (hours per fish)	mean (SE) mode	5.2 (0.05) 1	5.0 (0.07) 1	5.6 (0.13) 8
Smallmouth bass catch time (hours per fish)	mean (SE) mode	5.3 (0.05) 1	5.0 (0.08) 2	5.6 (0.10) 12
Yellow perch FCA level (meals per month)	mean (SE) mode	24 (0.15) 30	25 (0.18) 30	23 (0.37) 30
Trout/salmon FCA level (meals per month)	mean (SE) mode	6.6 (0.16) 1	6.9 (0.24) 1	5.8 (0.24) 0
Walleye FCA level (meals per month)	mean (SE) mode	6.6 (0.16) 1	6.8 (0.21) 1	5.7 (0.36) 0
Smallmouth bass FCA level (meals per month)	mean (SE) mode	11.0 (0.19) 1	11.7 (0.30) 1	10.4 (0.29) 1
Fee (dollars)	mean (SE) mode	6.2 (0.06) 2	5.8 (0.10) 2	6.6 (0.11) 2

a. Increasing catch time means it takes longer to catch a fish. Increasing meals per month reflects a less restrictive FCA.

characteristics of the chosen alternatives for all anglers, for those anglers who rated the characteristics as important (rated 4 or 5), and for those anglers that rated the characteristics as unimportant (rated 1 or 2). For example, in the Green Bay alternatives chosen by anglers who reported salmon catch as important, the average trout/salmon catch time is 4.9 hours, whereas for those anglers who reported salmon catch as not important, the average is 5.4 hours. Expected results are also obtained for species' FCA characteristics. The average recommended maximum number of meals for the preferred Green Bay alternatives (based on the average of the FCA characteristics for these choices) is reported in Table 5-9 by species. The maximum is assumed to

be 30 (roughly a meal a day), so 30 meals correspond to no FCA, and zero meals correspond to the most restrictive "do not eat" level. Anglers who place more importance on the FCA for a species are more inclined to choose alternatives with less stringent FCAs for that species, allowing more meals per month. For all four species, the average number of meals allowed is higher for anglers placing importance on the FCA characteristic. For example, in Table 5-9, in the alternatives chosen by anglers who reported walleye FCA levels as important, the average of the recommend maximum meals is 6.8 per month, whereas for those who reported walleye FCA levels as unimportant, the average maximum meals per month is less than 5.7.

Table 5-10 shows the same findings when anglers are separated by target species. This table reports the mean characteristics levels for catch rates of the chosen alternatives for anglers who target a specific species (see Footnote 12). In this table we do not report the average FCA levels as FCAs generally change in a consistent manner for all species, so there is little opportunity for an angler to choose alternatives with FCA levels that are low for a target species but high for other species.

Table 5-10
Mean Characteristics Levels for the Preferred Alternatives by Target Species[a]
(mail survey Question 4)

Characteristic	Targets Yellow Perch	Targets Trout/Salmon	Targets Walleye	Targets Smallmouth Bass	No Target or Multiple Targets
Yellow perch catch time (minutes per fish)	**27 (0.56)**	32 (0.84)	29 (0.87)	30 (0.84)	29 (0.35)
Trout/salmon catch time (hours per fish)	5.3 (0.12)	**4.6 (0.15)**	5.5 (0.18)	5.3 (0.17)	5.3 (0.07)
Walleye catch time (hours per fish)	5.6 (0.12)	5.4 (0.16)	**4.5 (0.17)**	5.3 (0.18)	5.1 (0.07)
Smallmouth bass catch time (hours per fish)	5.4 (0.12)	5.3 (0.17)	5.6 (0.19)	**4.5 (0.16)**	5.3 (0.07)

a. Each target group targets the respective species "often" or "almost always" and does not target any other species "often" or "almost always." Standard errors appear in parentheses. Bold text highlights answers by anglers targeting the identified species.

5.6 THE EXPECTED DAYS FOLLOWUP QUESTION TO EACH CHOICE PAIR

After each choice pair, the following followup question about the expected number of days the angler would visit the preferred site was asked:

> How often would you fish the waters of Green Bay if it had the conditions described by the alternative you just chose (A or B)? Your answer could depend on a number of factors:
>
> - How many days you typically fish in a year and how many of those days are spent fishing the waters of Green Bay.
> - How much you enjoy fishing the waters of Green Bay compared to other places you might fish.
> - How far you live from Green Bay compared to other places you might fish.
> - The cost of fishing the waters of Green Bay compared to other places you might fish.
> - Whether you think the conditions for the waters of Green Bay in the alternative you just chose are better, worse, or about the same as current conditions.
> - The more you fish the waters of Green Bay the less time you will have for fishing elsewhere.
>
> Excluding ice fishing, how many days, on average, would you fish the waters of Green Bay in a typical year if the conditions on the waters of Green Bay were those described in the alternative you chose *? Fill in the blank.*
>
> _____ days fishing the waters of Green Bay in a typical year.

The answers to these expected days followup questions, along with the number of days the angler fished Green Bay in 1998, will be used to estimate how the number of fishing days in Green Bay would change if there were a change in its characteristics. One would expect that, for some anglers, an improvement in conditions would lead to an increase in fishing days and that the long-run response to an improvement would be greater than the short-run response, because it takes time for anglers to break habits and initiate change. The answers to the expected days questions likely reflect what anglers would do in the short-run, and therefore are likely to underestimate the long-run response to an improvement.

The expected days question for each pair gives the angler the ability to express possible displeasure with the chosen alternative by reporting that he would reduce or stop fishing Green Bay entirely if it had the conditions of the chosen alternative, for example, if the respondent feels the chosen alternative is inferior to Green Bay under current conditions. That is, the respondent has the ability to "just say no."[14] Alternatively, if the respondent feels the chosen alternative is superior to Green Bay under current conditions, he has the option of saying he will fish more. The angler also can report that he would continue to fish Green Bay his current number of days.

When presented with a pair where both alternatives are unappealing, and with no way to express displeasure with these options, some individuals either may not respond out of protest or may not respond due to an inability to identify the preferred alternative. To avoid such possibilities some authors have advocated a third "opt-out" alternative, such as "would not fish" or "would fish elsewhere."[15] Our expected days question plays the role of such a third alternative, while avoiding one of its disadvantages: giving the respondent an easy way to avoid difficult choices. Choosing will be difficult when the angler is almost indifferent between the two sets of Green Bay characteristics. However, if the individual makes these choices he reveals the rate at which he is willing to trade off site characteristics. There is no fundamental reason individuals cannot choose between alternatives they dislike, or between options both better than the status quo, and such choices provide valuable information about preferences.

In 69.9% of the answered expected days questions, anglers report a number of Green Bay fishing days greater than their current 1998 numbers. If 1998 is assumed to be a typical year and a base for comparison, these responses indicate that anglers feel the preferred alternative in the pair is better than the status quo. In 8.0% of the answered questions, anglers report their current number of Green Bay fishing days. In 22.1%, anglers report an expected number of Green Bay fishing days less than their current numbers, indicating anglers feel the alternatives in the pair are inferior to current conditions. Eighty-five of the anglers (13%) provide an answer of days at trips to Green Bay in response to at least one of their Green Bay alternative choices; that is, they say they would not fish if the conditions were as described in that pair. Zero fishing days was reported for

14. If the angler does not like the alternatives, he also has the option of not choosing from that pair (this happened in less than 3% of the pairs). In addition, 172 (3.3%) of the expected days followup questions were unanswered. Ten anglers (1.5%) left all eight of these followup questions blank, and 53 respondents (8.2%) left one or more of them blank. Blanks on the followup questions were assumed to contain no information about the individual's preferences; they were *not* interpreted as responses of zero days.

15. With questions involving a choice of moose hunting site, Adamowicz et al. (1997) included as a third alternative, "Neither site A nor site B. I will NOT go moose hunting." Along with two water-based recreational sites Adamowicz et al. (1994) included as a third alternative, "Any other nonwater related recreational activity or stay at home." With choice pairs over mountain bike sites, Morey et al. (1999a) included no "opt-out" alternative other than the option of not answering a choice pair. Through focus groups and the survey, they found respondents able and willing to answer most of the pairs. Ruby et al. (1998) investigated the inclusion and form of "opt-out" alternatives, and found that the form of the "opt-out" can matter.

just over 4% of the followup questions. Summary statistics from the expected days questions are compared to reported 1998 Green Bay days in Table 5-11.

Table 5-11
Comparison of Expected Days to Visit Preferred Green Bay Alternative to Reported Days

	Expected Days to Visit Preferred Alternative	Reported 1998 Days
Mean Green Bay fishing days (standard error)	17.81 (0.33)	9.95 (0.55)
Median Green Bay fishing days	10	5
Mode for Green Bay fishing days	10	2
Minimum Green Bay fishing days	0	1
Maximum Green Bay fishing days	300	120

That anglers prefer the chosen Green Bay alternatives, on average, to current Green Bay conditions is not surprising (since the angler gets to choose the preferred site), and is consistent with the study goal of estimating anglers' WTP for an improvement, rather than a deterioration at the site. This preference also indicates a WTP for better conditions because the average launch fee in the chosen alternatives is higher than the current average, indicating anglers prefer the chosen alternative to the status quo, even though it costs more. At the same time, for 22% of the followup questions, respondents reported fewer Green Bay fishing days, which is consistent with the random procedure generating some choice pairs where both choices could be perceived as inferior to current conditions (see discussion of Table 5-12 below).

The characteristics levels in the chosen alternatives are consistent with the chosen alternative being, on average, preferred to current conditions. Over the chosen Green Bay alternatives, the average of the FCAs is Level 4, which is the least stringent representation of current FCA levels. The FCA level chosen most frequently is "unlimited consumption" for perch, as shown in Table 5-9. Over the chosen alternatives, the averages of the catch rates are better than those that WDNR reported for Green Bay in 1998, but worse than anglers' perceptions of the catch rates. In contrast, the modes are better than both the 1998 WDNR catch rates and the averages of the anglers' perceptions. Remember that not all anglers are concerned with all catch rates: a perch angler may be willing to choose an alternative with the worst walleye catch rate to get the best perch catch rate or perch FCA level.

In Table 5-12, the means of the characteristics for the preferred alternatives show that expected days tend to be higher when site quality is better. For example, when anglers report expected days that are greater than the current level, the perch catch time is 28 minutes; when anglers report fewer expected days than current, the perch catch time is 31 minutes. For all nine characteristics, the mean for higher-than-current expected days is better than or the same as the mean for lower-than-current expected days.

Table 5-12
Mean Characteristics Levels for the Preferred Alternatives by Whether Respondent Expects to Spend Fewer, the Same as, or More than Current Days[a]

Characteristic	Fewer than Current	Same as Current	More than Current
N of choice occasions	1,107	399	3,498
Yellow perch catch time (minutes per fish)	31 (0.56)	29 (0.90)	28 (0.35)
Trout/salmon catch time (hours per fish)	5.2 (0.11)	5.5 (0.18)	5.2 (0.06)
Walleye catch time (hours per fish)	5.3 (0.11)	5.2 (0.19)	5.1 (0.06)
Smallmouth bass catch time (hours per fish)	5.3 (0.11)	5.3 (0.19)	5.2 (0.06)
Yellow perch FCA level (meals per month)	23 (0.34)	23 (0.57)	24 (0.18)
Trout/salmon FCA level (meals per month)	5.7 (0.32)	5.6 (0.53)	6.4 (0.19)
Walleye FCA level (meals per month)	5.7 (0.32)	5.6 (0.53)	6.5 (0.19)
Smallmouth bass FCA level (meals per month)	9.6 (0.4)	9.7 (0.65)	11.2 (0.23)
Fee (dollars)	7.02 (0.14)	6.47 (0.22)	5.90 (0.08)

a. Standard errors appear in parentheses.

There were 222 respondents (34%) who did not vary their expected days responses throughout the eight pair questions. This is consistent with many of the comments in the focus groups about time constraints, entrenched fishing patterns, and dependencies on fishing partners. It is also

consistent with the responses to Question 11 of the mail survey, where 68% of the anglers indicated they had not reduced the number of days spent fishing Green Bay in response to FCAs.

That an angler does not change his or her number of fishing days in response to the change in environmental characteristics does not indicate that he or she would not benefit from an improvement in FCAs or catch rates. If conditions are improved, constraints can keep the angler from increasing fishing days, but each day fished will be enjoyed more. If conditions worsen, the angler still might prefer fishing Green Bay to doing something else, he just prefers it less. When the quality of a product is improved or its price is decreased, many consumers do not buy more of it, but they do get greater benefits from the amount they purchase. Also, if a product's quality decreases or price increases, many consumers will not purchase less in the short run; e.g., one does not immediately reduce gas consumption when its price has risen, even though the price hike makes the individual worse off.

Sixty-six percent of the anglers did vary their answers to the expected days questions over the eight pairs, indicating that for the majority of anglers, the number of days they fish Green Bay will vary as a function of changes in the characteristics of Green Bay, even in the short run. For such anglers, if Green Bay conditions are improved, they are likely to fish Green Bay more days and value each of those days more than they currently value Green Bay fishing days.