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Delta Protection Commission
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November 9, 1998

Dear Margit,

I am writing this letter to respond to the various concerns about our report (The Economic Impact of Recreational Boating and Fishing in the Delta) that have surfaced recently – in particular, the questions raised by Roger Mann (e-mail from Chuck Vogelsang on 10/7/98) and Tom Wegge (e-mail from Roger Mann on 10/6/98). First, I will discuss the one change that we made to our report as a result of the concerns raised. Then, I will respond to the other issues they raised (Replies 1 to 6 below). “Survey Report” below refers to the Sacramento-San Joaquin Delta Recreation Survey, which was the source of our data (actually, we got almost all of our data directly from Dave Cox).

This discussion may be in greater detail than you would care to follow. I tried to make the explanations as complete as possible so that you may share this with the reviewers if you like.

Change: A New Estimate of Angler Participation.

Roger suggested that we had over-stated angler participation by counting the number of anglers who had used the Delta as groups of anglers rather than as individual anglers. The implicit assumption behind the number of groups we used in the report was that the licensed anglers always travel with non-licensed people (anglers or otherwise). Clearly, many licensed anglers travel with other licensed anglers, so the method we used leads to double-counting angler participation. Roger suggests that the proper way to estimate participation from the fishing survey is to simply look at the number of anglers who fished in the Delta. In this view, our estimates for fishing participation and expenditure are 2.91 times higher than they should be.

If we had no additional information, we would agree with Roger. However, this suggestion assumes that anglers travel *only* with other anglers. The true participation rate lies somewhere between what Roger suggests and what we previously estimated.

Fortunately, the information from the boating survey provides us an opportunity to estimate the extent of double-counting that arises in the number of fishing groups we previously

used. Total annual participation days for fishing from a boat is estimated as 6.2 million days in Table 5 (p. 16) from the boating survey. This compares with 11.8 million days calculated in Table 108 (p. 78) for the same activity in the fishing survey. If we assume that at least one licensed angler was present every time the boat owners fished from the boat, the 6.2 million provides a lower-bound estimate for the total number of activity days fishing from boats reported by registered anglers. It is a lower bound since anglers could also have participated in this activity from unregistered rowboats and canoes or from rented boats. Using this lower bound, we estimate that the extent of double-counting implied by the fishing data is 1.9 ($=11.8/6.2$). That is, we need to divide the previous number of fishing groups by 1.9 to get at the “true” number of fishing groups. All expenditure and economic impact estimates for fishing are reduced by this same proportion. Essentially, these new estimates suggest that, on average, about 1 in 3 people in the anglers’ groups going to the Delta are not licensed anglers (in fact, they may not even be anglers). In light of the similarities between average group size participating in this activity (2.8 people for boaters vs. 2.9 people for anglers), and average number of activity days per year associated with this activity (14.5 days for boaters vs. 14.3 days for anglers), this approach seems to be valid.

Reply 1: How Do We Calculate Total Expenditures?

Roger suggests that we used the average expenditures incorrectly since the explanation in the text of the Survey Report states: “If (respondents) stayed outside the Delta, the average amount spent by the group dropped to \$12.67” (page 63). . However, Dave Cox had sent us the calculations for these average expenditures, and the calculations are in fact based on all respondents, not just for those who stayed inside (or outside) the Delta. The text in the Survey Report should therefore have read: “On average, groups spent \$24.07 for lodging inside the Delta, and \$12.67 for lodging outside the Delta”. The expenditure values used in our report is consistent with this interpretation.

Reply 2: Are Our “Number of People per Trip” Consistent With Those in the Survey Report?

Contrary to Tom's claim (his point 1), the estimated "Average Number of People per Trip" in Table 3 in our report are actually consistent with those given in the Survey Report. Our numbers of 2.97 for boaters and 2.91 for anglers, compare with a range of 2.8-4.3 people per group for boaters (Table 5, p. 16), and 2.9 people per group for anglers (Table 108, p. 78) in the Survey Report.

Reply 3: Do We Overstate Average Participation Days Per Year?

Tom (his point 2) points out an apparent inconsistency between the numbers reported for the “Average number of participation days” in Table 4 (p.15) of the Survey Report, and the implied numbers for the same thing in Table 3 of our report. While the Survey Report shows boater participation in a range of 10 to 14.5 days per year for various activities, our report’s Table 3 assumes 26.1 activity days for boaters. When we asked Dave Cox, he explained that the two numbers come from responses to different questions in the survey. The numbers he gave us represent the average total activity days for boaters in the Delta, and are given in Table 8 (p.18)

of the Survey Report. These are responses to question #15 of the Boater Survey (see p. 147 of the Survey Report). The numbers from Table 4 of the Survey Report represent the average number of activity days *for a particular activity*, and come from responses to question #14 of the Boater Survey.

Reply 4: Are Our “Days per Trip” Estimates Too Large?

Both Roger and Tom (another point 2) suggest that our “days per trip” numbers appear too large. These same numbers can be calculated from the raw data contained in Table 83 (p.66) and Table 172 (p.122) of the Survey Report. There are at least two possible sources of confusion when comparing these numbers with estimates of length of stay from other sources. The first is the distinction between mean and mode. Over half of the boaters and anglers visit for only one day, but the smaller percent that stay longer raise the average to the values we indicated.

The second possible source of confusion is to note that, in fact, there is no reason to expect average participation rates from the surveys to be consistent with average participation rates for everyone participating in those same activities in the Delta. The average length of stay for boaters estimated in the Survey Report come from *registered* boat owners. By definition, it includes only those people who own motorized vessels. If people who own only smaller boats such as rowboats, canoes and kayaks, or those who *rent* boats, are more likely to stay for shorter periods, then we would expect the length of stay from our sample to be greater than that for the Delta boating population as a whole. It is important to keep in mind that the surveys, and by extension our economic analysis, *only address participation by registered boat owners and licensed anglers*. While the title of our report may appear to suggest otherwise, we are *not* measuring total fishing and boating impacts in the Delta. We now revised the discussion in our report (second to last paragraph, P. 14) to make it clear that *total* participation rates in fishing and boating in the Delta are greater than what we estimated, since at least some participants in these activities would not have been covered in the survey.

Note: Total group and person activity days in Table 3 were calculated from “activity days per year” (responses to question #15 in the boater survey), rather than from “days per trip”. We therefore now drop “days per trip” and “trips per year” from Table 3, and put in “days per year”.

Reply 5: Are the Respondents a Representative Sample of Registered Boat Owners in California?

Tom (his point 3) questions the validity of the number of boat owners estimated in the survey to have visited the Delta, since over half of the registered boat owners live in Southern California. In fact, the survey results showed that 53% of the respondents did not visit the Delta because it was too far from their home, and 43% did not do so because they were unaware of the recreational opportunities there. These facts, and the survey’s finding that only 23.5% of the respondents visited the Delta, seem to me to be consistent with the basic observation that most registered boat owners live in Southern California. According to the Survey Report’s introduction, the questionnaires were sent to a random sample of registered boaters in California. While I do not have a good sense of what percent of registered boat owners to expect to visit the Delta, in my opinion the reviewers do not provide a convincing basis for asserting that the survey respondents are not representative of the boat-owning population in California.

Reply 6: Why Can't We Derive "Total Recreational Use" from the Survey Data?

Tom (his point 5) suggests that we use the information provided in the Survey Report to separate out the boating versus non-boating days, so that we can subtract the redundancy between the responses from the anglers and boaters and arrive at total activity days for the combined activities. This is something we seriously considered previously. Unfortunately, we ended up deciding against this because of the inappropriateness of combining information from two very different data sets; a point that I will explain further.

Combining the two data sets requires making some grand assumptions about the relationships between the various activities, about how people participate in the various activities, and about the nature of the responses people gave. First, let us consider the three potential sources of overlap between the two groups. The first source of overlap is where the respondents (from either survey) are fishing from a boat; the second is where boaters fish from the shore; and the third is where anglers go boating without fishing (from the boat).

Next, we consider what assumption to make about the overlap between the two groups (licensed anglers and registered boat owners) when individuals from either group participate in the other group's activities (i.e., when boaters fish, or anglers go boating). The two possible extreme assumptions are: 1) the two groups are independent and there is no overlap; and 2) every time an individual in one group participates in the other group's activity, there is overlap. Since there is no way to arrive at an intermediate estimate of overlap from the available data, let us be conservative and make the latter assumption – that there is total overlap between the two groups when they participate in similar activities (hereafter referred to as Assumption One).

Now we must make an assumption about the possible overlap between the responses that individual anglers or boat-owners give to the three possible sources of overlaps that we are concerned about. Again in the tradition of estimating conservatively, it may seem reasonable to assume that when boat owners report days fishing from a boat, this does not overlap with the days they report fishing from shore (there is no basis in the available data for assuming anything in between the extreme assumptions of total or zero overlap). Similarly, we will assume that the days anglers report fishing from a boat do not overlap with the days they report going boating without fishing. This assumption of independence between alternatives is hereafter referred to as Assumption Two.

Together, these two assumptions allow us to estimate combined boating and fishing activities. We can add the participation rates for the three areas of potential overlap, and subtract this from the combined activities of the two groups. From the data, we have 6.2 million activity days for boaters who fished from boats (from Table 5, p. 16 of the Survey Report), 2.3 million activity days for boaters who fished from shore (from Table 46, p.40), and 3.7 million activity days for anglers who boated without fishing from the boat (from Table 134, p. 93, weighted by the 1.9 overlap factor for angler responses estimated in the change above – i.e., $7.1/1.9=3.7$ million activity days). This implies a total of 12.2 million activity days of overlap between the two groups. However this overlap is greater than the total activity days estimated in the angler group! One might conclude from this exercise that all of the fishing activities in the Delta are done by boaters, so that estimating angler participation is redundant once you have the results from the boater survey.

We suggest that the final statement in the previous paragraph is false – as a minimum, at least *some* licensed anglers take trips to the Delta without boating! The problem lies in the two assumptions that were required for estimating redundancy. Assumption One (the overlap

between anglers and registered boat owners is 100% when they are doing similar activities) is wrong because:

- 1) When anglers go boating (to fish or otherwise) , they may be doing so on an unregistered rowboat or canoe, or may be renting the boat (i.e., they are not on their own registered boat, as is required for overlap).
- 2) When registered boaters go fishing (on or off the boat), they may be doing so without a licensed angler in the group (another requirement for overlap). And
- 3) it is even possible that some boat owners took trips to the Delta without being in their boat (and that some anglers visited the Delta without fishing). While total angler and boater participation in their respective activities is estimated properly (using questions #15 in the Boater Survey, p. 147, and #7 in the Fishing Survey, p. 152), the wording for the additional activities is such that some boat-owners (anglers) *may* have included participation in those activities for times that the boat-owners (anglers) did not use their boat (go fishing) on the trip. In this case, Assumption One fails (although Assumption Two would hold).

Assumption Two (total independence between the possible sources of overlap) is also wrong because:

- 1) One participant from a specific trip may be doing one activity (e.g., an angler fishing from a boat) while another group member is doing another activity (e.g., watching the view from the boat). Assumption Two will assign all members of the group to both activities, and therefore double-count them. And,
- 2) the respondents may have participated in both activities on a particular day (e.g., spend half of the day fishing from the boat and spend the other half not fishing in the boat), so again assigning both activities independently to the group will lead to double-counting.

The above discussion suggests that we can not infer *any* kind of relationship between the responses from the two surveys. In fact, it suggests that boating done with registered boaters is only a subgroup of the total boaters in the Delta, and that fishing done with registered anglers is only a subgroup of the total fishing done in the Delta. To this extent, our estimates of boating and fishing participation and impacts in the Delta are themselves lower bounds for the actual levels since they reflect only activities associated with *registered boaters* and *licensed anglers*.

I appreciate the reviewers' discussions of our study. I hope we have addressed their concerns sufficiently. If you have further questions or points, please feel free to call or write me.

Sincerely,



Bruce McWilliams
Visiting Economist