

An Evaluation of Factors Affecting Creel Clerk Performance

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Abstract: Roving creel surveys were conducted on 2 Southeastern reservoirs from March 1980 to February 1981. Two creel clerks performed the field work. Evaluation of creel clerk performance descriptors (number of missing questionnaire entries and interview length) documented a clerk break-in period. Variation in fishing effort affected clerk data gathering efficiency (percent of fishermen sampled). Clerks differed in administering a modified Likert response format on 12 of 17 attitudinal questions posed to fishermen. Clerks did not differ in their sampling of fishermen types or total number of fish observed at each reservoir. These data indicate that effective structuring of creel surveys must address interview methodology as well as traditional design considerations.

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Creel surveys have traditionally concentrated on gathering catch and effort data through short interviews with fishermen. In recent years, however, interview complexity has increased as fishery biologists endeavor to incorporate aspects of several disciplines into recreational fishery management (Gordon et al. 1973, Powers and Lackey 1976, Weithman and Anderson 1978). The fields of survey and interview methodology provide a wealth of information on questionnaire design and interviewer performance to assist fishery biologists who are not trained in these sociological methods (Babbie 1973, Cannell et al. 1977, Miller 1977, Bailey 1978, Backstrom and Hursh-Cesar 1981).

Interview research indicates that it is standard procedure to pretest the questionnaire and train individuals for interview proficiency. Researchers in survey methodology gather data during trial interviews (in the classroom or field) to evaluate questionnaire presentation and clarity, and interviewer per-

formance (Cannell et al. 1977). Babbie (1973) discusses the "neutral" role interviewers must play in the interview process they initiate and how neutrality can be designed into the survey methods before implementation of a study. Preface remarks and the set of questions posed to an individual should be worded precisely on the interview form so that interviewers will state these items in the same way. These questions should be followed with neutral verbal probes if the initial response is not appropriate. The intended meanings of questions can be changed with only a slight deviation from the prescribed wording, or with a probe that leads the respondent astray. Therefore, the interviewer's complete understanding of the meaning and purpose of each question must be addressed before and during a study to insure consistent presentation. If data is collected by more than one interviewer, field days should be randomly assigned to insure that clerk biases can be assessed and taken into account when pooling survey information.

The purpose of this study was to evaluate the interview performance (number of missing questionnaire entries and interview length) and the data gathering efficiency (percent of fishermen sampled) of 2 creel clerks over varying fishing intensities on 2 reservoirs. Clerks were also evaluated regarding neutrality on the response formats that were used with a series of attitudinal and judgement questions.

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Methods

Roving creel surveys were conducted on West Point and Walter F. George reservoirs over a 12-month period (March 1980 to February 1981). Both reservoirs are mainstream impoundments of the Chattahoochee River and are located on the Alabama-Georgia border. West Point Reservoir is a 10,482-hectare impoundment located north of West Point, Georgia and Walter F. George Reservoir is an 18,284-hectare impoundment situated north to south between Columbus and Fort Gaines, Georgia. Each reservoir was divided into 6 subsections and sampled 60 times during the study period.

The 12-month study period was divided into 9 1-month time blocks and 1 3-month (Winter) time block (November, December and January). Week-day and weekend strata were sampled in each of the 10 time blocks; 3 week-days and 3 weekend days were allocated to each time block at each reservoir. Each day was divided into 3 temporal sampling periods. These 4-hour periods were designated A.M., NOON, and P.M. and fell between 6 A.M. and 6 P.M. Two clerks worked on 3 randomly allocated days at each reservoir during each time block. Clerk allocations were not balanced with respect to time periods or strata within time blocks. In essence, the experimental design

can be described as a $2 \times 2 \times 2$ factorial arrangement (2 clerks, 2 reservoirs, 2 strata) replicated within each of the 10 time blocks previously defined.

A 1-year pilot study was carried out by 1 interviewer (CI) on West Point Reservoir from March 1979 to February 1980 to evaluate 9 attitudinal questions and 4 response scales. Open-ended "why" questions were employed during and after roving creel interviews to determine if additional attitudinal questions were needed for evaluation of the on-site angling experience. Based on data collected during the pilot study, a verbally administered questionnaire (interview schedule) was developed giving design consideration to intent, content, sequence and wording (Fig. 1).

Fishermen were asked exactly worded questions regarding their fishing trip and their attitudes about recreational fishing. Attitudinal questions (17 items) were presented in an order based on a fishing trip's presumed temporal progression (Bailey 1978). Fishermen were asked to respond to these questions using a modified (bi-polar) Likert response format (not at all important, not important, no opinion, slightly important, very important). A rating format (poor, fair, good, excellent) was used for the set of judgement questions (4 items). Numeric values were assigned to the Likert response categories (-2, -1, 0, +1, +2) and to the rating categories (1, 2, 3, 4) (Snedecor and Cochran 1967).

Clerks discussed the meanings of questions in the interview schedule before and during the study to insure that the intended meanings were maintained. No other attempts were made to systematize interview style between clerks; each clerk had performed roving creel surveys previous to this study and was considered to be experienced in interviewing anglers.

A simultaneous count and interview circuit was conducted within each time period/lake section sampling unit. When groups of fishermen were deemed too numerous to census, the clerk systematically skipped groups in an objective manner, e.g., every other or every second group, to insure that a complete circuit and representative sample of the lake section was made within the allotted time period (Malvestuto et al. 1978). As a clerk approached a fishing group chosen for interview, he would record data describing the fishing group and the group's location. The clerk noted the exact time that questioning began and ended; interview length did not include time spent counting and measuring the fishermen's catch or time allocated for open-ended conversation at the end of the interview. For a full description of interview methodology see Malvestuto (1983).

Chi-square analysis was performed on clerk sampling unit allocations (lake sections, time periods, strata) and on fishermen types (by target species or by bank or boat fishing location) encountered by each clerk within each reservoir to assess the consistency of samples between clerks. Clerk performance descriptors (number of interview items left blank, interview length,

Roving Creel Interview Schedule

Reservoir: WPT ___ Euf ___ T/T ___ Clerk: _____ Date _____ Sample # _____

Clients {
 Lake Sec. ___ #in Party ___ Race: B ___ W ___ O ___
 Fishing From: Bank ___ John B. ___ Bass B. ___ Rec B. ___
 Age: < 20 ___ 20/30 ___ 30/40 ___ 40/50 ___ 50/60 ___ >60 ___

Fishing Location

	Open Water	Shore Line	Tree Shelter	Rip Rap	Road Bed	Fishing Pier	Under Bridge	
Channel								Channel
Cove								Cove

Time Interview Starts _____

Clerk { " (How are you doing? or Good morning or Good afternoon) I'm doing a survey for the _____ and I'd like to ask you some questions about your fishing trip. "

Economic { County _____ Estimated Trip Expense (Gas, food, bait, lodging) Fishing for _____ -- Clients
 State _____ / \$ _____ / day #<12" LMB Rel. _____ }
 #>12" LMB Rel. _____ }
Resource- Landing/Park used _____ / Trip days _____ -- Effort

Effort { Time Started Fishing (AUBURN TIMES ONLY)
 AM _____ PM _____ Estimated Departure
 AM _____ PM _____
 Incompleted trip length _____ Completed trip length _____

Clients {
 "How many times do you fish this lake per year?" _____
 "How many times do you fish here and other places per year?" _____

Low & Program Feedback {
 "Do you feel that there is any need to change the 12" L.L. on LMB?" Yes ___ No ___
 Why? _____
 "Are you aware that the States of AL/GA have stocked a hybrid striped bass in this lake?" Yes ___ No ___ (If yes: continue)
 "Do you feel that the stocking of this fish has changed the quality of fishing in this lake?" Yes ___ No ___ How? _____
 "Do you feel that a LMB and a hybrid striped bass are of equal quality as a sports fish?" Yes ___ No ___ Why? _____

Clerk { "We are trying to find out what things influence enjoyment during a fishing trip. I'm going to name several things that could influence your enjoyment and I want you to rank them on this scale (show scale) with negative 2 being not important at all, negative 1 being not important, 0 being no opinion, positive 1 being slightly important, and positive 2 being very important. "

Figure 1A. Interview schedule (page 1) constructed for the 1980-1981 roving creel surveys on West Point and Walter F. George reservoirs.

Personal	1. Escape from daily routine _____	9. No. of strikes _____	
	2. Today's weather _____	10. Catching fish _____	
Resource Facilities	3. Facilities available _____ (such as picnic/camping area toilets)	11. Size of fish _____	} Fishing
	4. Natural beauty of the area _____	12. No. of fish _____	
	5. Beauty of the landing _____	13. Fish to eat _____	
	6. Water quality _____	14. Trophy fish _____	
	7. Ease of access to the water _____	15. Outdoor exploration _____	} Personal
	8. Variety of fishing locations _____	16. Relaxation _____	
Clerk	"Now I'd like for you to respond to these last 4 items on this scale (show scale) of poor, fair, good, and excellent and briefly tell me why you answered the way you did."		
	1. How do you feel today? _____	Personal	
	Why? _____		
	2. How would you rank the natural beauty of the lake? _____	Resource	
	Why? _____		
	3. How would you rate your fishing success today? _____	Fishing	
	Why? _____		
	4. How do you rate your total trip quality today? _____	Total Experience	
	Why? _____		
	Time Interview Ends _____	Interview length _____	} Clerk
<u>LENGTH CLASS (SPECIFY)</u>			
Harvest	CODE NO.	SPECIES CAUGHT	TOTAL
		No	
		Wt	
		No	
		Wt	
		No	
		Wt	
		No	
		Wt	
		No	
		Wt	
	Σ		

Figure 1B. Interview schedule (page 2) constructed for the 1980-1981 roving creel surveys on West Point and Walter F. George reservoirs.

percent of fishermen interviewed and response format neutrality) were evaluated using an analysis of variance (Helwig and Council 1979); clerks, reservoirs, strata, time blocks and the 2-way interactions between these factors were employed to explain variability in clerk performance. Results of the tests were evaluated using an alpha level of 0.05.

Results and Discussion

Chi-square analysis indicated that clerks did not differ with respect to random allocation to strata or time periods over the study. Within each reservoir, clerks did not differ with respect to lake section allocation or fishermen types encountered. Also, total numbers of fish measured by each clerk at each lake were not significantly different. These results indicate that randomization supplied clerks with consistent samples of each reservoir (sampling theory's expected outcome).

Factorial analysis of number of items left blank on the questionnaire (missing data) and interview length indicated a significant clerk/time block interaction on both descriptors. Clerk 1 constructed the interview schedule; his familiarity with the items on the form explains initial differences (mean difference = 0.23 items per interview) in missing data between clerks (Fig. 2). Clerks did not differ with respect to missing data after the second time block. The decline in missing data that occurred over time for both clerks indicates increased presentation efficiency.

Differential knowledge and understanding of each question's intent and meaning by the clerks influenced interview length (Fig. 3). The additional interview time (mean = 2 minutes) associated with clerk 2 during the first half of the study was due to his lack of familiarity with the questions (relative to clerk 1) and his additional probing for responses during interviews. Delivery and response time for a question averaged 15 seconds across clerks. The depression of interview length in time blocks 2, 3 and 4 was weakly correlated ($r = -0.36$) with increased fishing effort in those time blocks (Fig. 4). Increased effort on weekend days also shortened interview length (Fig. 5). These data indicate that clerks adjusted interview length in response to familiarity with the questionnaire and fishing effort.

Analysis of percent of fishermen interviewed indicated significant clerk, strata and time block main effects. Mean percents for clerks 1 and 2 were 51.9 and 45.8, respectively. Observed daily effort (Fig. 4) and differential weekday and weekend effort (Fig. 5) both affected the outcome of percent of fishermen interviewed (Figs. 6, 7). The heavy pressure in the first few time blocks (Fig. 4) depressed sampling percentages, but the total number of fishermen interviewed per time block remained more or less constant (Malvestuto 1983); clerks observed less than, or equal to, 32 people on 62 percent of the field days across reservoirs. As fishing pressure decreased (by strata and time

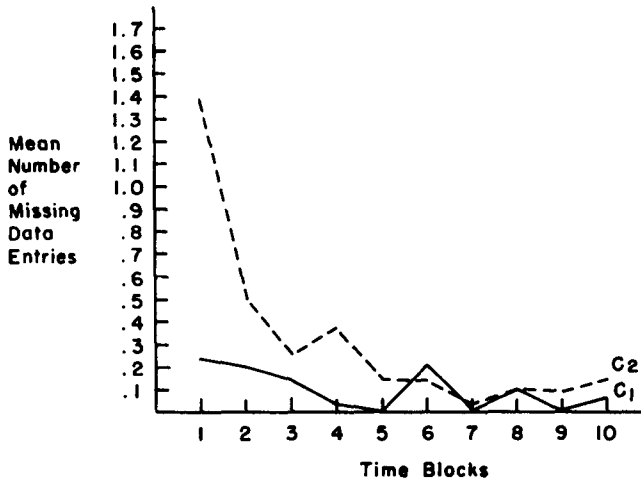


Figure 2. Mean number of missing entries per time block for 2 clerks (C1, C2) who performed roving creel surveys on West Point and Walter F. George reservoirs during 1980-1981.

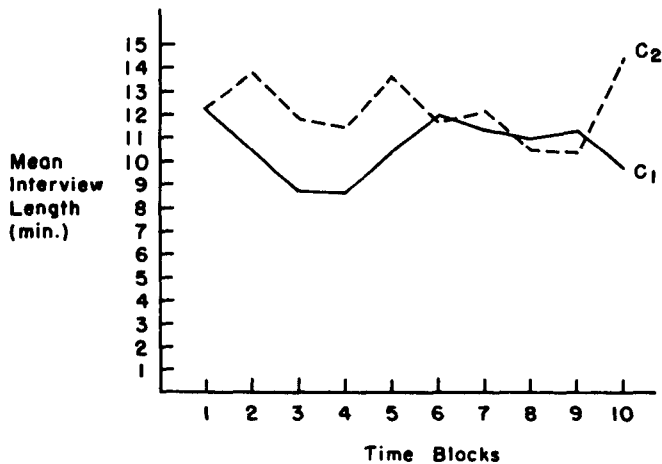


Figure 3. Mean interview length per time block for 2 clerks (C1, C2) who performed roving creel surveys on West Point and Walter F. George reservoirs during 1980-1981.

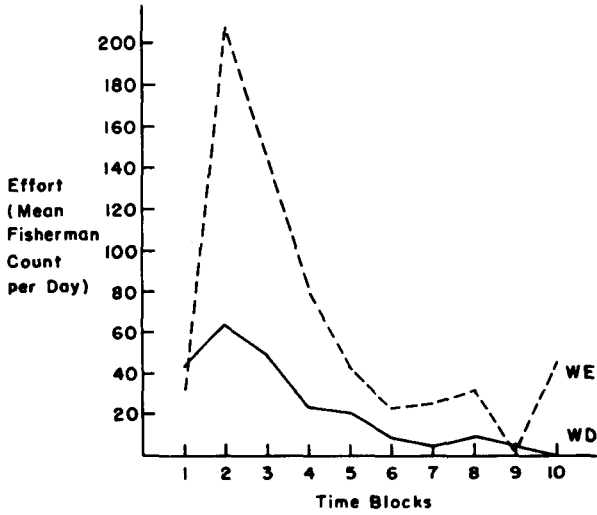


Figure 4. Mean number of fishermen counted per time block for weekday (WD) and weekend (WE) strata sampled during roving creel surveys on West Point and Walter F. George reservoirs during 1980–1981.

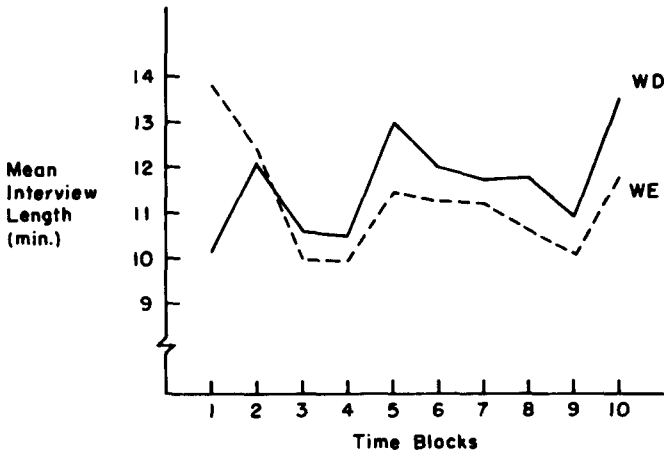


Figure 5. Mean interview length per time block for weekday (WD) and weekend (WE) strata sampled during roving creel surveys on West Point and Walter F. George reservoirs during 1980–1981.

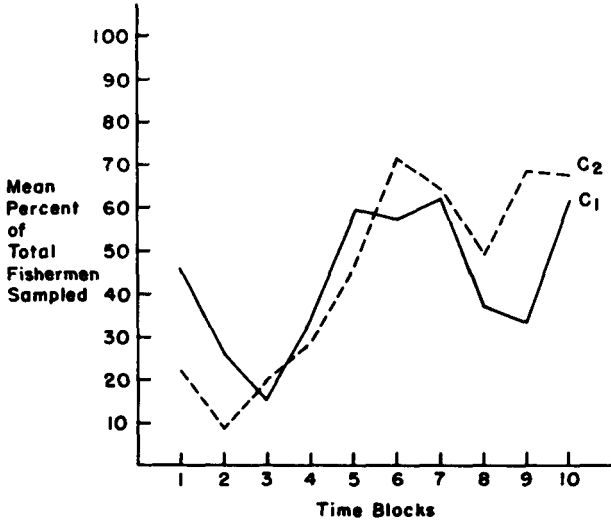


Figure 6. Mean percent of total fishermen sampled per time block for 2 clerks (C1, C2) who performed roving creel surveys on West Point and Walter F. George reservoirs during 1980-1981.

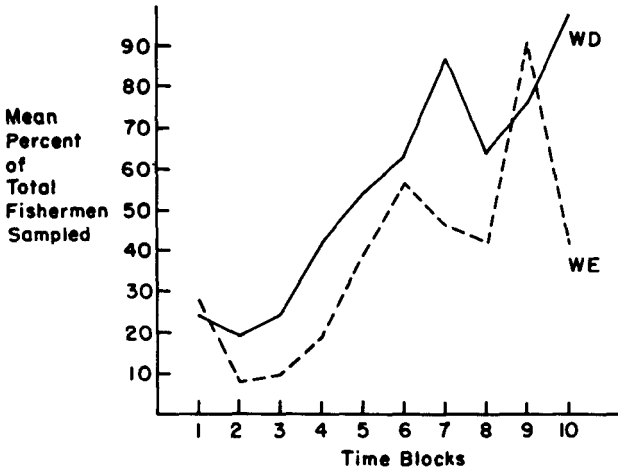


Figure 7. Mean percent of total fishermen sampled per time block for weekday (WD) and weekend (WE) strata sampled during roving creel surveys on West Point and Walter F. George reservoirs during 1980-1981.

block), the percent of fishermen sampled increased. The inconsistency in this inverse trend exhibited in time block 9 (Winter) is presumed to be an artifact of the reduced sampling intensity (6 days) during that 3-month period. These results indicate that data gathering efficiency (percent of fishermen interviewed) was significantly affected by fluctuations in fishing effort (strata and time block).

Factorial analysis of the attitudinal and judgement questions (17 items + 4 items) indicated significant clerk main effects on 12 of the questions employing the modified Likert response format (Table 1). Clerk 1 elicited more positive responses on each of the 12 questions (a systematic bias) and averaged 0.23 scale units higher than clerk 2 across these questions. This discrepancy between clerks probably involved the handling of follow-up probing when respondents were not sure of their answers. The bi-polar structure of the modified Likert response format may have contributed to variation in responses since clerks did not differ in their use of the poor, fair, good or excellent rating format. Clerks were significantly different on only 5 questions when Likert responses were combined to form a -1, 0, +1 format (Table 1). The high variability in responses to these 5 questions indicated that question intent was obscure. Also, with regard to variability in responses, 8 of the 17 Likert format questions had significant time block effects. This indicates that certain attitudes changed over the fishing season (probably due to changes in the presence of different sub-populations of fishermen). The implication is that short-term attitude surveys (<1 year) may not document the full range of angler attitudes at a particular resource.

Table 1. List of Attitudinal Questions (as per Figure 1B) that Showed Significant Clerk Differences ($P < 0.05$) Using the Modified Likert Response format (-2, -1, 0, +1, +2). Asterisks Denote Questions which Maintained a Significant Clerk Effect when the Response Format Was Compressed to -1, 0, +1.

Item #	Question	Item #	Question
2	*Today's Weather	8	Variety of Fishing Locations
3	*Facilities Available	11	Size of Fish
4	Natural Beauty of the Area	13	*Fish to Eat
5	*Beauty of the Landing	15	Outdoor Exploration
6	Water Quality	16	Relaxation
7	Ease of Access to the Water	17	*Privacy

Conclusions

Both clerks exhibited a break-in period, during which time, the number of missing data entries and interview length decreased as interviewers perfected their presentations of the interview schedule. Training clerks through

trial interviews (in the classroom or field) before a study begins can reduce this break-in period; however, these data indicate that the break-in period exceeds the time normally devoted to interviewer training (usually <1 week).

Roving creel survey methodology dictates that a clerk make a complete circuit of a lake section during the allotted time period. This study documented reduced data gathering efficiency (percent of fishermen sampled) during high levels of effort; it is obvious that more time must be spent counting fishermen while moving through the sampling area under these crowded conditions. If higher sample sizes are desired during high levels of effort, short interview schedules (Malvestuto 1983) should be alternated with more detailed forms (Fig. 1). This study suggests that if interview length (as defined earlier) averages 10 minutes, roving creel clerks should be able to minimally interview 32 anglers (approximately 16 fishing groups) in a 4-hour sampling period.

Attitudinal response formats should be chosen with the public in mind. A format with 4 categories, e.g., not important, slightly important, moderately important, very important, probably should be employed. The format should be understood immediately by the respondent if interviewer effects are to be minimized. Intensive training regarding neutral probing for attitudinal data is strongly advised and would have reduced interviewer discrepancies in this study. Also, when attitudinal data is to be gathered by >1 person, randomization of field assignments to clerks (both spatially and temporally) will allow unexpected interviewer biases to be assessed before the data is pooled.

In the future, multi-disciplinary creel surveys will be employed to gather information for resource specific management strategies. Reliable information regarding effort, catch, economics and attitudes can be gathered if creel surveys are structured appropriately. The results of this study indicate that effective creel survey techniques must address interview methodology as well as traditional design considerations.

Literature Cited

- Babbie, E. R. 1973. Survey research methods. Wadsworth Pub. Co., Inc., Belmont, Calif. 384pp.
- Bailey, K. D. 1978. Methods of social research. The Free Press, New York. 478pp.
- Backstrom, C. H., and G. Hursh-Cesar. 1981. Survey research. 2nd ed. John Wiley and Sons, New York. 436pp.
- Cannell, C. F., K. H. Marquis, and A. Laurent. 1977. A summary of studies of interviewing methodology. U.S. Dept. of Health, Education, and Welfare, Vital and Health Statistics, Series 2, No. 69, Pub. No. (HRA) 77-1343, Nat. Center for Health Stat., Rockville, Md. 78pp.

- Gordon, D., D. W. Chapman, and T. C. Bjornn. 1973. Economic evaluation of sport fisheries—what do they mean? *Trans. Am. Fish. Soc.* 102:293-311.
- Helwig, J. T., and K. A. Council, editors. 1979. Statistical analysis system user's guide. SAS Inst. Inc., Raleigh, N.C. 494pp.
- Malvestuto, S. P. 1983. Sampling the recreational fishery. Pages 397-430 in L. A. Nielson and D. R. Johnson, eds. *Fisheries Techniques*. Am. Fish. Soc., Bethesda, Md.
- Malvestuto, S. P., W. D. Davies, and W. L. Shelton. 1978. An evaluation of the roving creel survey with non-uniform probability sampling. *Trans. Am. Fish. Soc.* 107:255-262.
- Miller, D. C. 1977. *Handbook of research design and social measurement*. David McKay Co., Inc., New York. 518pp.
- Powers, J. E., and R. T. Lackey. 1976. A multiattribute utility function for management of a recreational resource. *Va. J. Sci.* 27:191-198.
- Snedecor, G. W., and W. G. Cochran. 1967. *Statistical methods*. 6th ed. The Iowa State Univ. Press, Ames. 593pp.
- Weithman, A. S., and R. O. Anderson. 1978. A method of evaluating fishing quality. *Fisheries* 3:6-10.