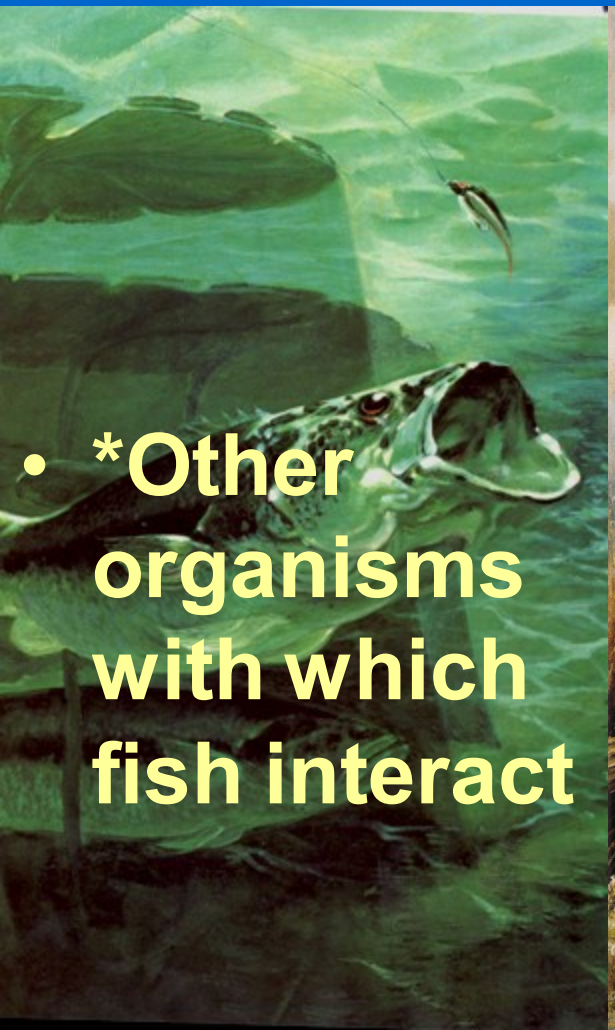
Chapter 20

Sampling the Recreational Creel

20.1 Introduction - Creel Surveys

- Management requires information
  - Environment in which fish lives

Management requires information (cont.)



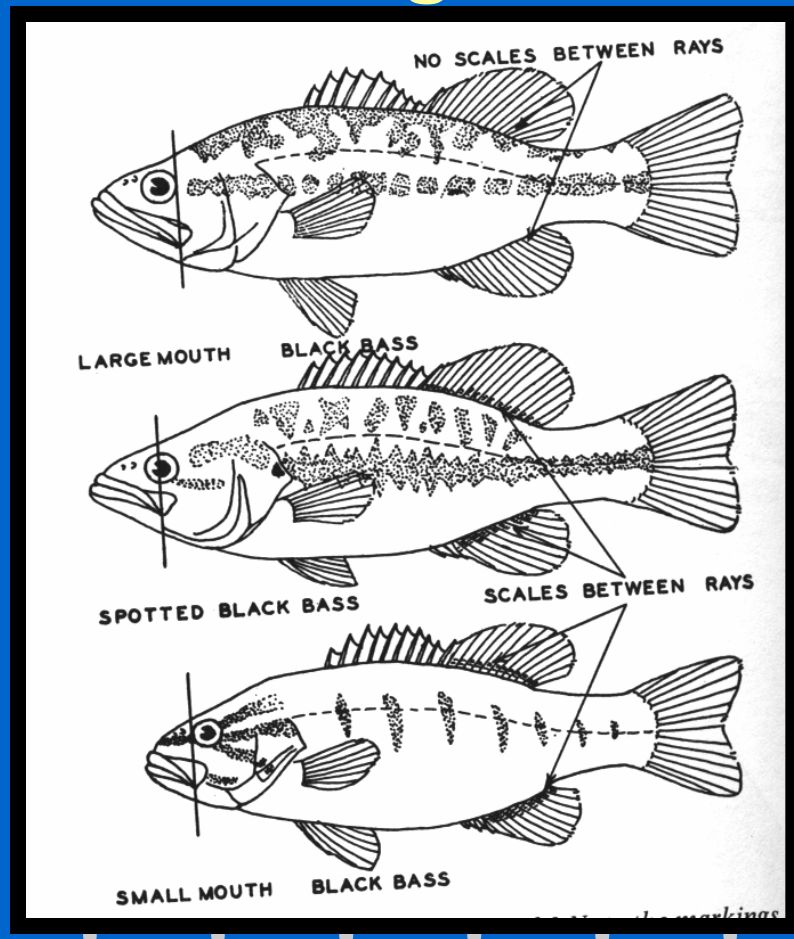
- *Other organisms with which fish interact

Management requires information (cont.)

- *Biology of fish species to be managed

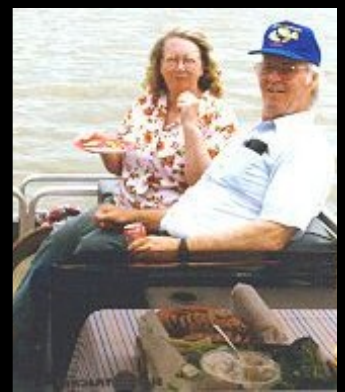
Black Crappie

White Crappie



Management requires information (cont.)

- * People who use fish stocks for food and recreation



Management requires information (cont.)

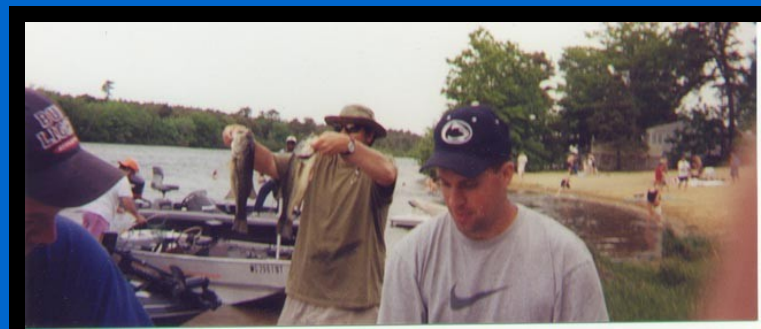
- The last two can be collected using a creel survey.
- [Note: A creel is the woven basket in which harvested fish are stored.]

A creel survey involves

- Counting anglers
- Sampling anglers creels at particular recreational sites

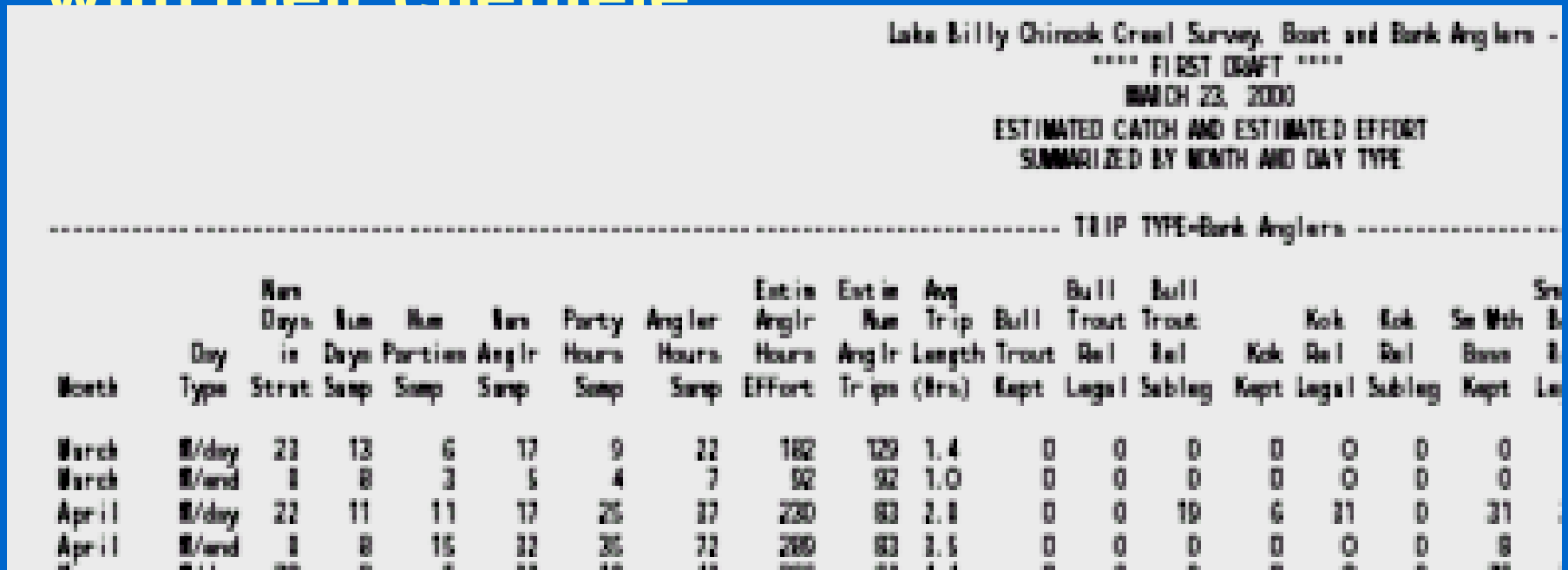
In the field...

- Creel survey biologists are responsible for
  - Correctly applying statistical sampling designs
  - Properly conducting field protocol
  - Obtaining accurate counts of anglers
  - Conducting interviews with anglers



Creel surveys important because...

- They are the only commonly applied sampling technique
- Biologists/management personnel interact with their clientele



Lake Billy Chinook Creel Survey. Boat and Bank Anglers -
***** FIRST DRAFT *****
MARCH 23, 2000
ESTIMATED CATCH AND ESTIMATED EFFORT
SUMMARIZED BY MONTH AND DAY TYPE

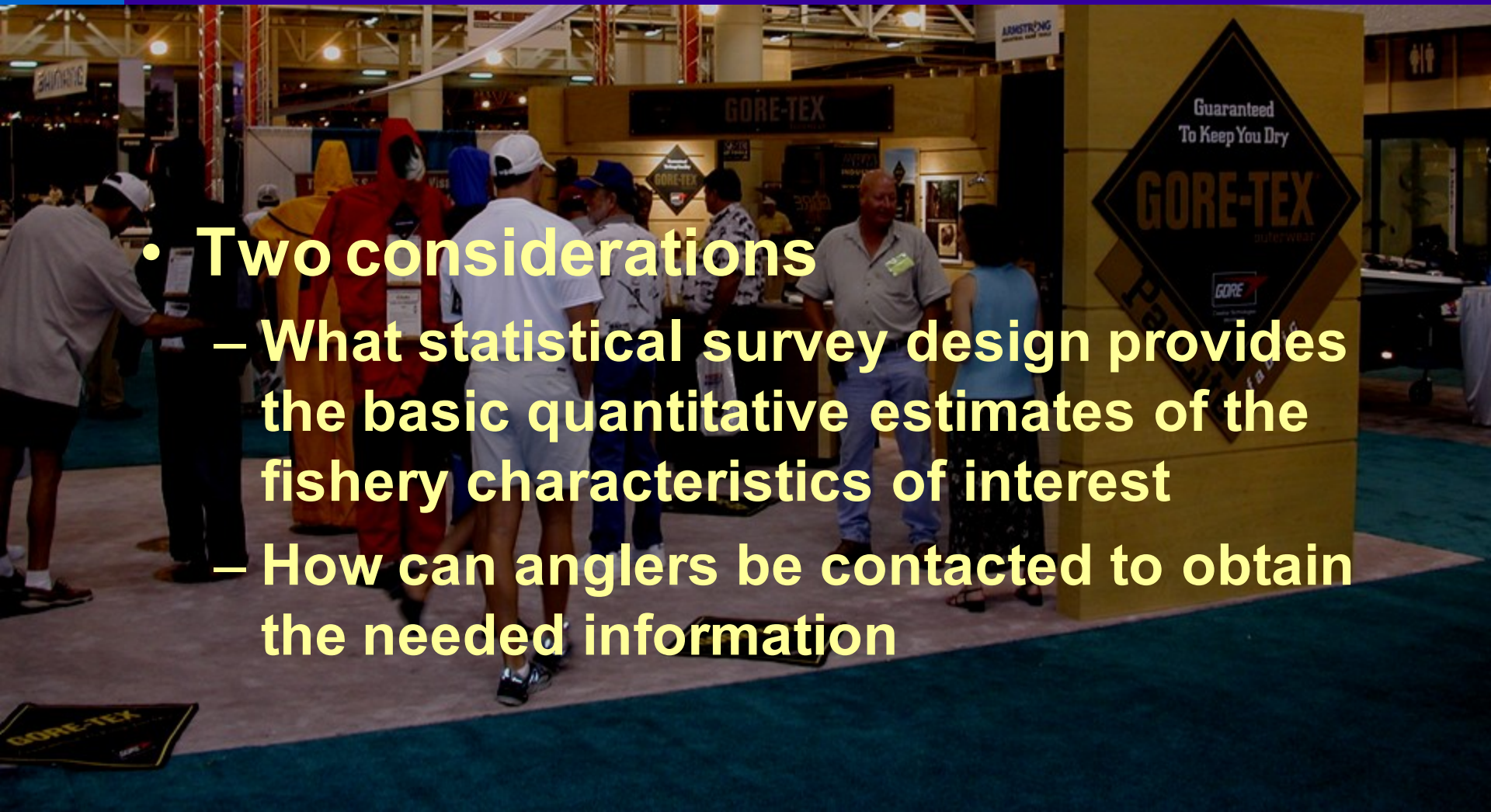
TRIP TYPE=Bank Anglers

Month	Day Type	Num Days in Strat	Num Days Samp	Num Parties Samp	Num Angl r Samp	Party Hours Samp	Angler Hours Samp	Estim Angl r Hours Effort	Estim Num Angl r Trips	Avg Trip Length (Hrs)	Bull Trout Kept	Bull Trout Rel Legal	Bull Trout Rel Subleg	Kok Kept	Kok Rel Legal	Kok Rel Subleg	Sm Mth Bass Kept	Sm Mth Bass Rel Le
March	M/day	23	13	6	17	9	22	182	129	1.4	0	0	0	0	0	0	0	
March	M/wend	8	8	3	6	4	7	92	92	1.0	0	0	0	0	0	0	0	
April	M/day	22	11	11	17	25	37	220	83	2.8	0	0	19	6	31	0	31	
April	M/wend	8	8	15	22	35	72	280	83	3.5	0	0	0	0	0	0	8	

Interaction provides opportunity to

- Obtain data
- Gain public support for agency activities
- Educate anglers concerning ecology, resource conservation and fishing

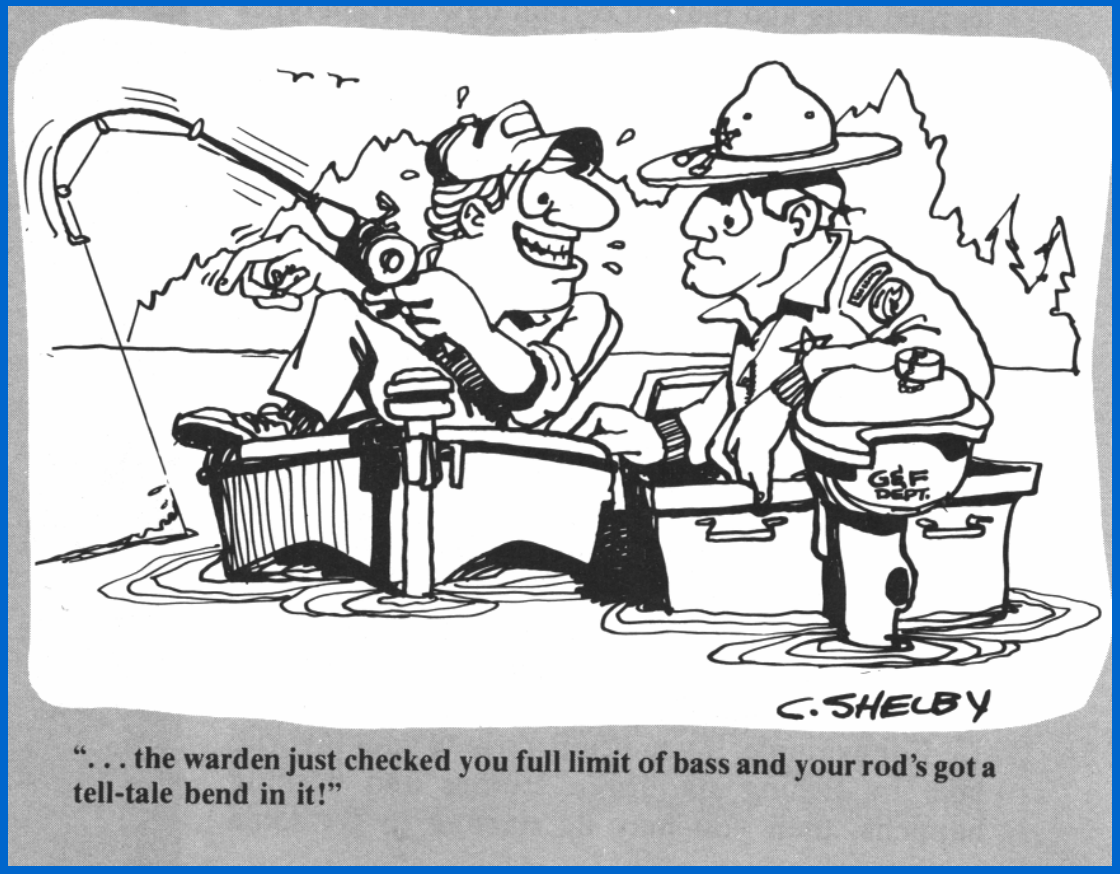
20.2 Theory: sampling the angling population



- Two considerations
  - What statistical survey design provides the basic quantitative estimates of the fishery characteristics of interest
  - How can anglers be contacted to obtain the needed information

Survey sampling planning process

- Set objectives
- Collect information
- Synthesize data
- Evaluate response
- Note: see Box 20.1 Pg. 593



"... the warden just checked you full limit of bass and your rod's got a tell-tale bend in it!"

Simple random sampling

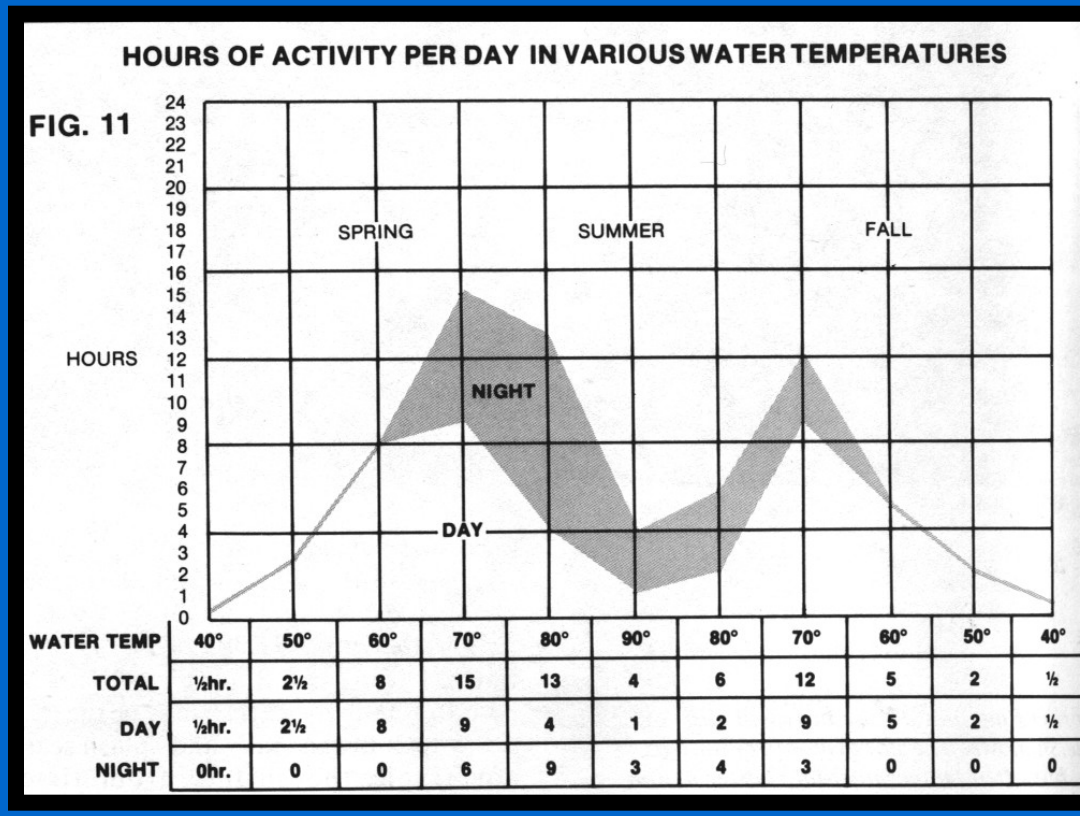
- Scientists dream sampling design.
- Each day/habitat has an equal chance of getting sampled.
- Refer to Box 20.2 Pg.

Stratified Random Sampling

- Stratification is the division of populations into sub-populations
- Sub-populations are then sampled in a simple random fashion
- Stratification may be necessary for
  - Administrative reasons
  - Logistical reasons

More samples should be taken within a stratum if

- The stratum is larger than others being sampled
- The characteristic being measured is more variable within the stratum
- The stratum costs less to sample

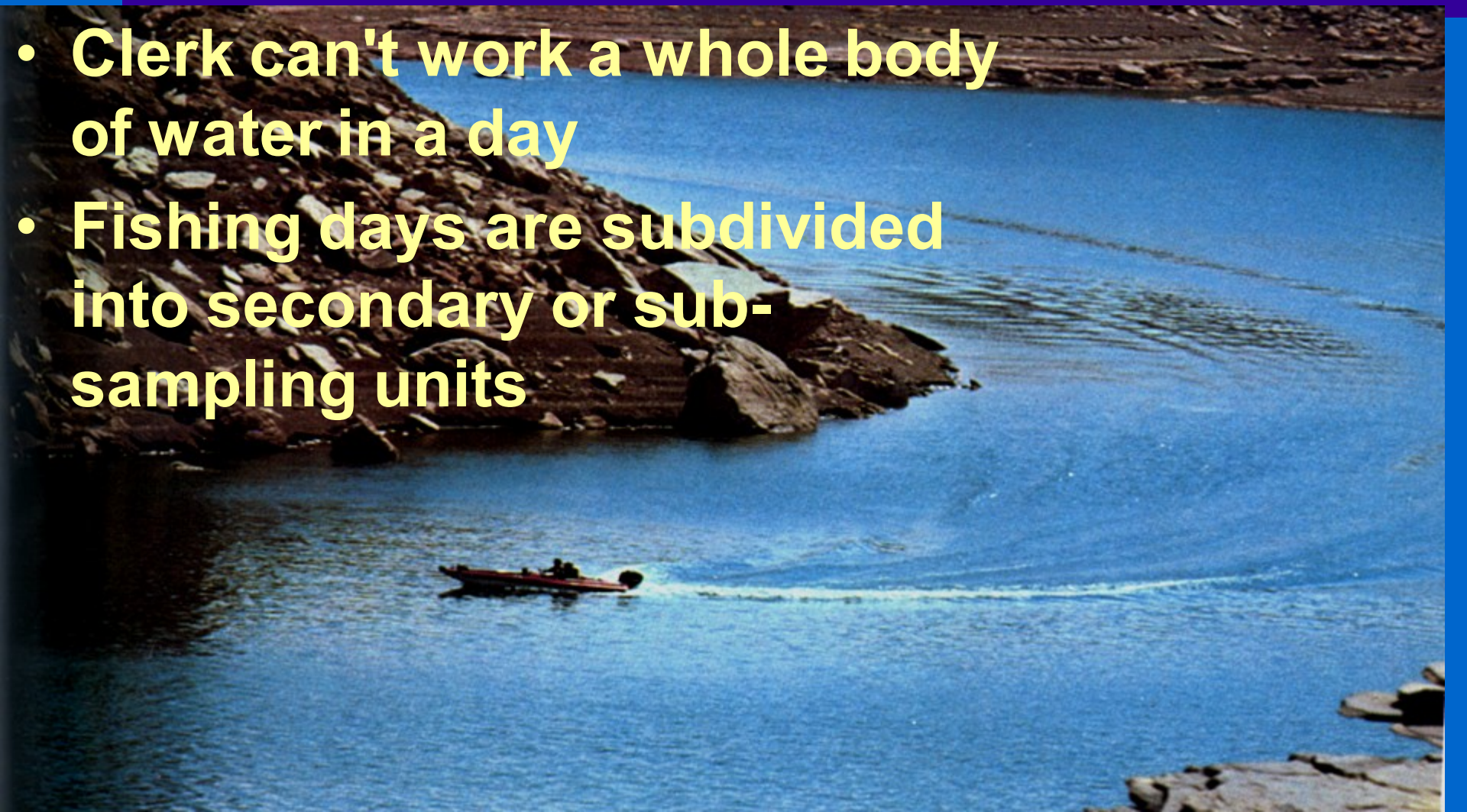


WATER TEMP	40°	50°	60°	70°	80°	90°	80°	70°	60°	50°	40°
TOTAL	½hr.	2½	8	15	13	4	6	12	5	2	½
DAY	½hr.	2½	8	9	4	1	2	9	5	2	½
NIGHT	0hr.	0	0	6	9	3	4	3	0	0	0

Stratified two stage probability sampling

- Fisheries may be divided into smaller units because of
  - Time
  - Cost
  - Logistical constraints

Example:



- Clerk can't work a whole body of water in a day
- Fishing days are subdivided into secondary or sub-sampling units

Example(cont.):

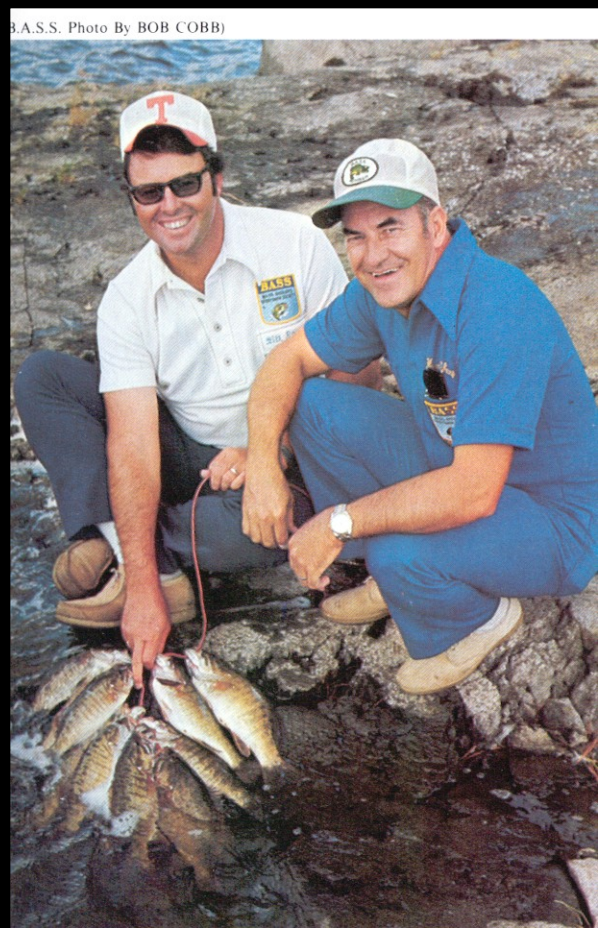
- Sampling is then done in two stages
  - Fishing days/primary sampling units
  - Within primary sampling unit, one or more secondary sampling units are randomly chosen
- (Refer to Box 20.4 Page 598)

Stratified sampling: conducted in two stages

- Fishing days or primary sampling units PSU's are chosen
- In each PSU, one or more secondary sampling units are chosen randomly

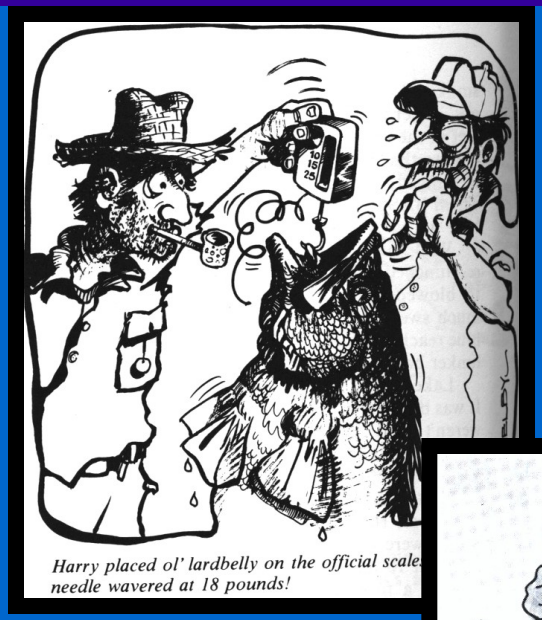
20.3 Angler contact methods

- On site (i.e. at time of fishing trips)
- Mail
- Telephone
- Door-to-door
- Interaction with anglers provides means of collecting a variety of information



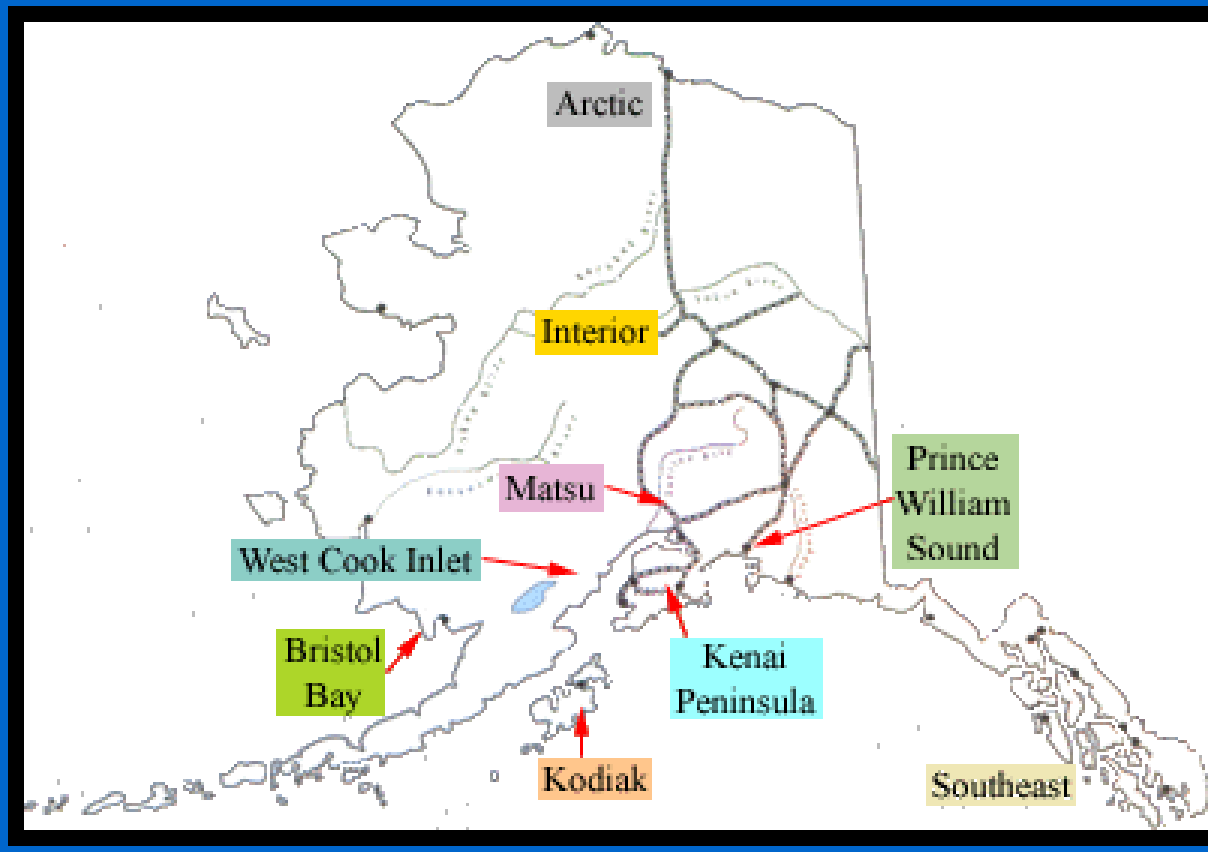
Onsite angler contact methods

- advantages
  - Maximize response rates
  - Memory recall biases are minimized
  - Creel clerks are there to identify fish species by direct observation

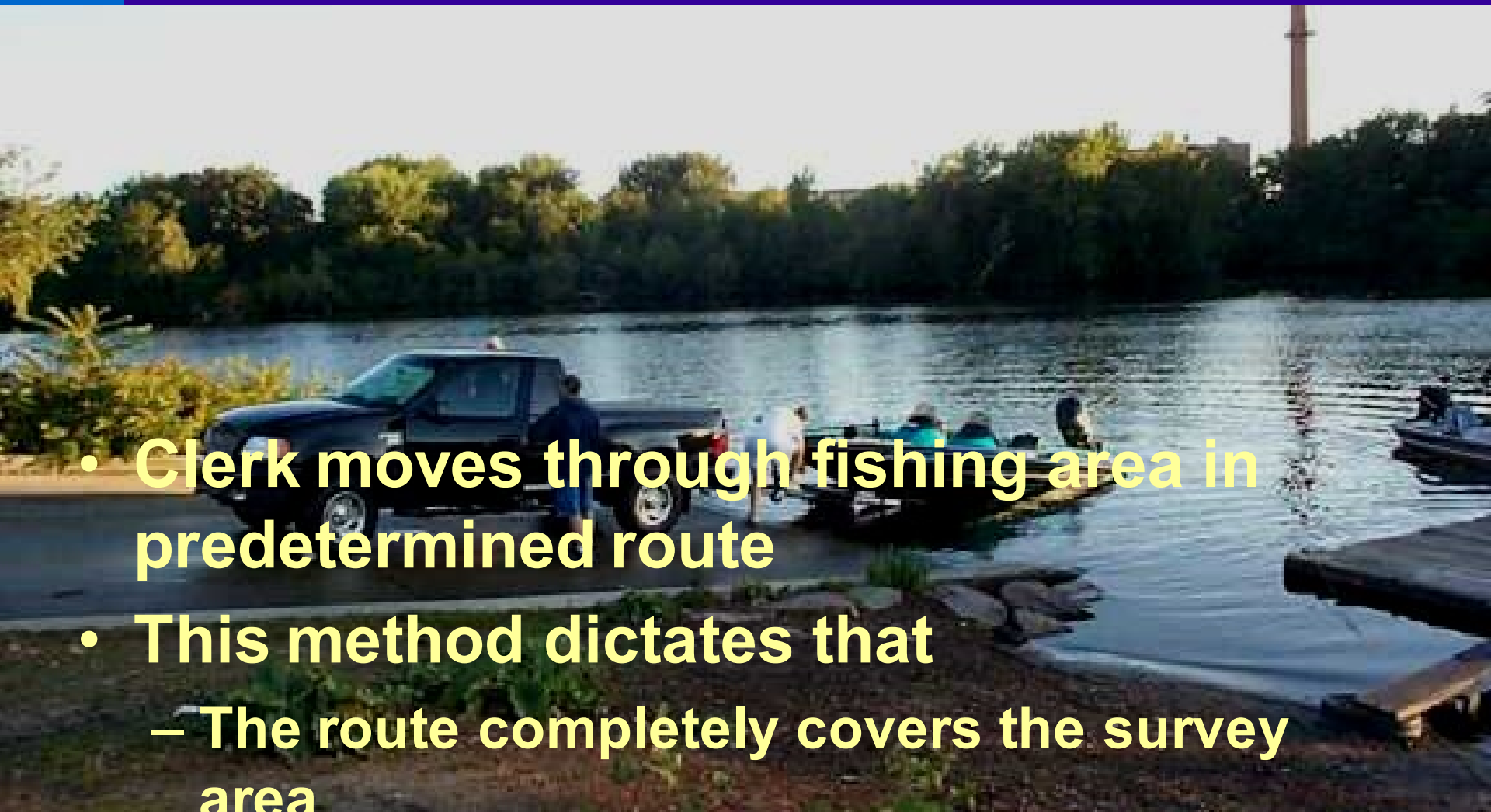


Onsite angler contact methods (cont.)

- Disadvantages
  - High cost per interview
  - Difficulty of relating results to the population
  - Logistical problems



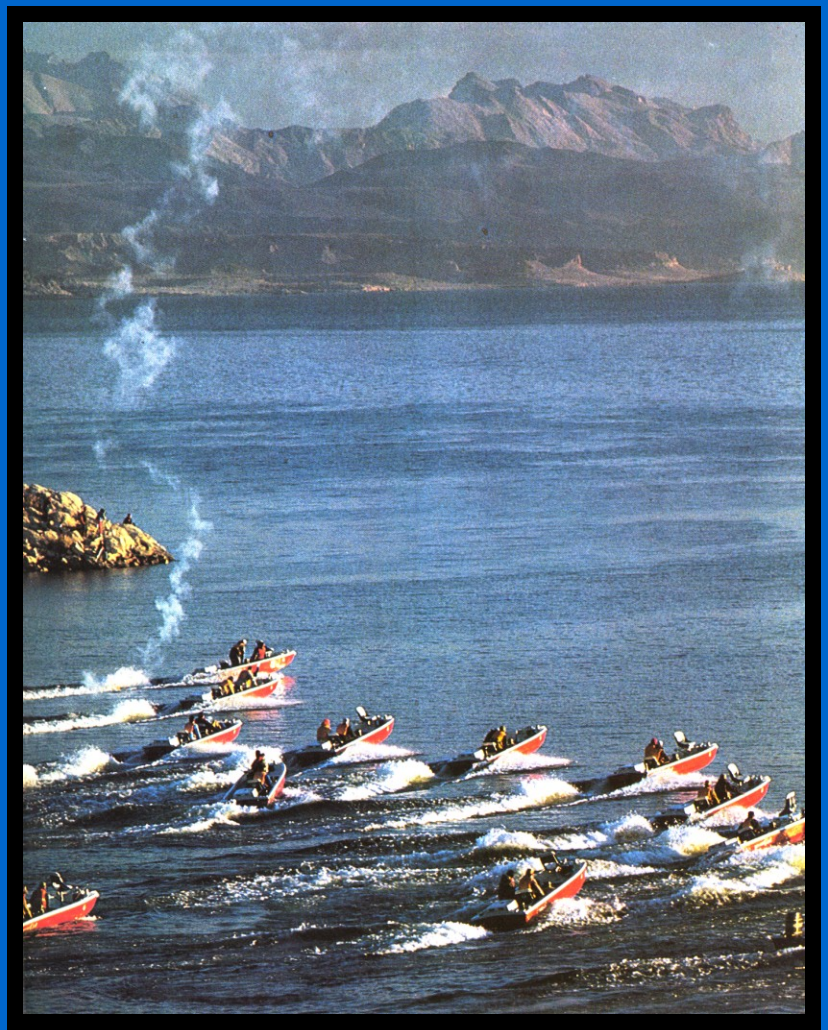
Roving surveys



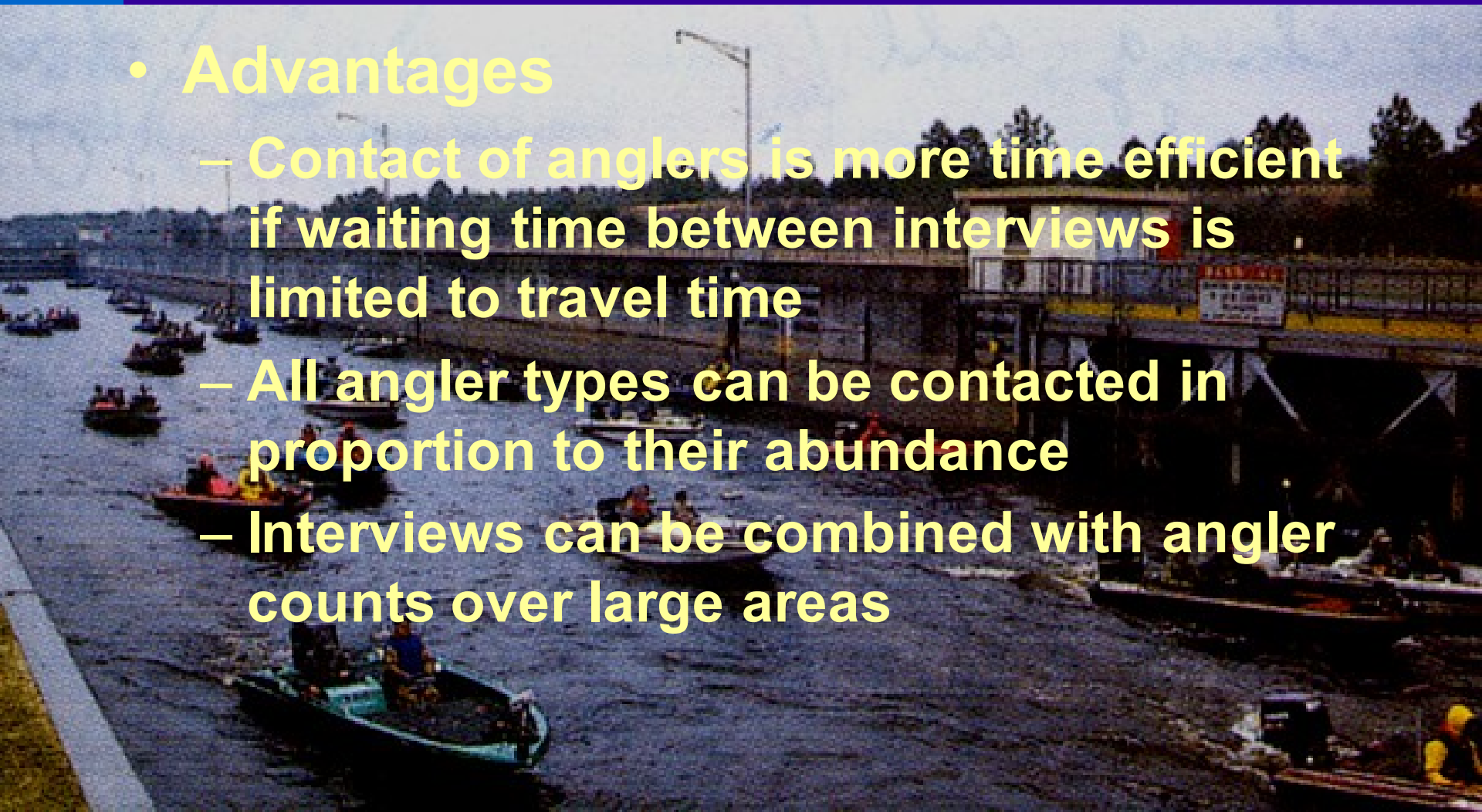
- Clerk moves through fishing area in predetermined route
- This method dictates that
  - The route completely covers the survey area

Roving surveys (cont.)

- Method also dictates that
  - Clerk begins route at a randomly chosen area
  - Clerk randomly chooses one of the two alternative directions of travel
  - Clerk travels at constant speed



Roving surveys (cont.)

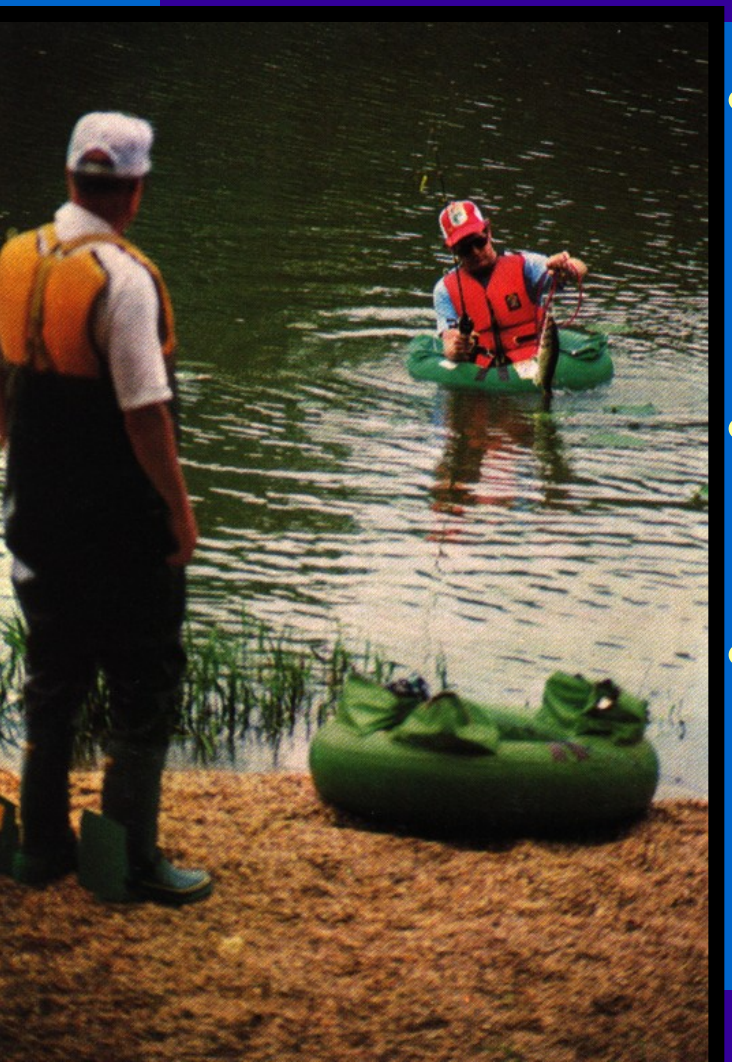


- Advantages
  - Contact of anglers is more time efficient if waiting time between interviews is limited to travel time
  - All angler types can be contacted in proportion to their abundance
  - Interviews can be combined with angler counts over large areas

Roving surveys (cont.)

- Disadvantages
  - Catch and information is based on uncompleted (still fishing) fishing trips
  - Probability of contacting anglers is proportional to trip length
  - Night surveys are generally impossible
  - Cannot conduct lengthy interviews (public relation problems)

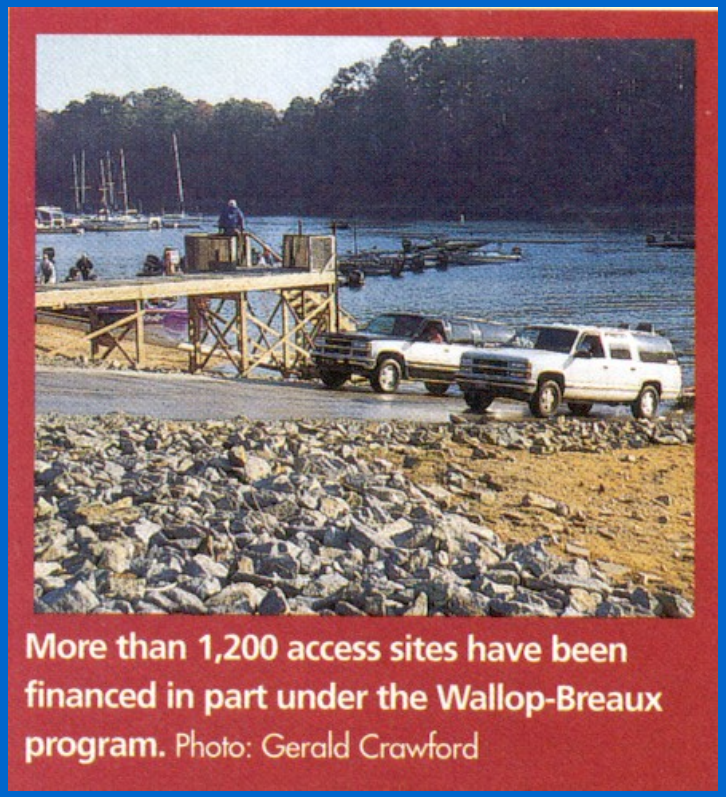
On- water roving count, clerk should consider only



- Those fishing on the shore or between shore and center of fishing area
- Those fishing actively as anglers
- Angler - someone with line in water, changing gear or walking towards a fishing location

Access point surveys

- Represents onsite method where creel clerk contacts anglers at the end of their fishing trips
- Shares the same advantages and disadvantages as roving surveys
- Access points are randomly chosen



More than 1,200 access sites have been financed in part under the Wallop-Breaux program. Photo: Gerald Crawford

Access point surveys (cont.)

- Advantages
  - Information based on completed trips rather than uncompleted ones

Access point surveys (cont.)

- Disadvantages
  - If anglers are numerous
  - Contact rates are low
  - Clerk time is used inefficiently
  - It is impossible to sample all angler types proportional to their level of effort

Access point surveys (cont.)

- The method is only efficient when
  - Anglers must leave from a small number of points
  - Anglers must report their catches at a central point

'Bus Route" method

- Combines roving intercept and access point
- Information gathered via access points
- Several points sampled by roving by means of a vehicle
- Travel routes are predetermined

'Bus Route" method (cont.)

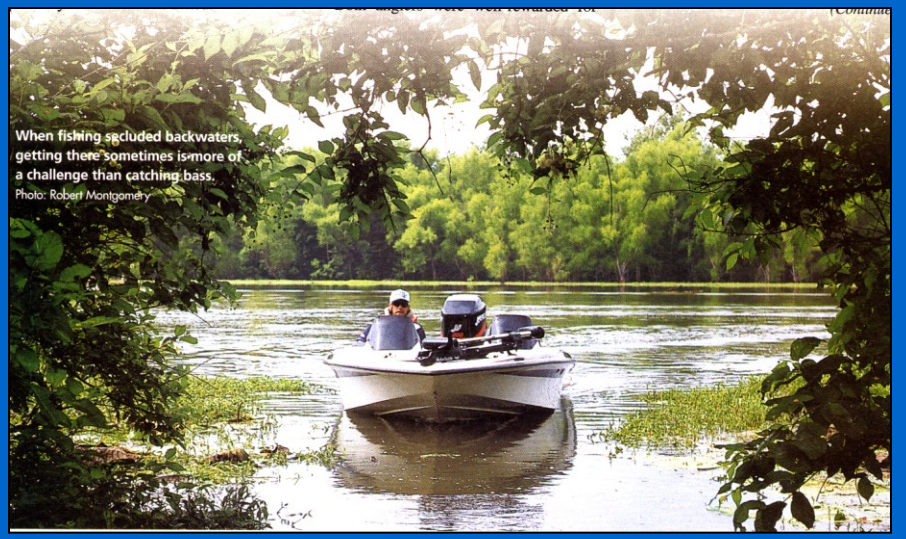
- Time spent at access points is precisely scheduled
- Precision better for bus route method than access point
- It is difficult to obtain interviews when wait time at access points is short

Aerial Surveys

- Made from airplane flying low enough to count the anglers
- Are a type of roving surveys

Aerial Surveys (cont.)

- Disadvantages
  - Plane rental costs are high
  - Inclement weather
  - Accurate counts are difficult if shoreline is irregular or heavily wooded
  - Biases occur if portions of the population are not counted



Aerial Surveys (cont.)

- Advantages
  - Large areas can be covered in short periods of time
  - Total enumeration is possible

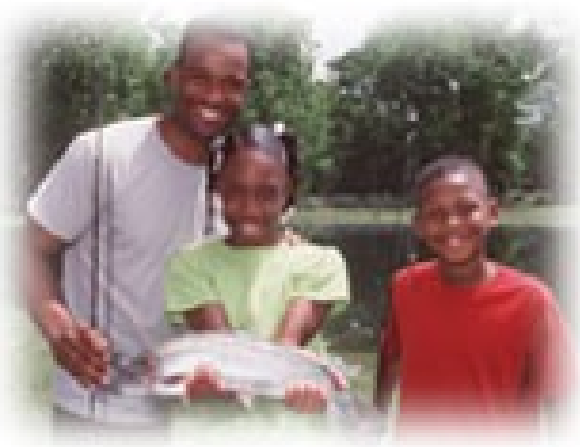
Household survey methods

- Sample drawn from a list of names (sampling frame)
  - License receipts
  - Boat registration
  - Telephone directory

Household survey methods (cont.)

- Anglers are the sampling units
- Simple random, Stratified random or systematic random sampling are used to choose samples

Household survey methods (cont.)



- There are biases in this method
  - Not all anglers have licenses
  - Not all anglers have telephones
  - Boat registrations allow only boat anglers to be sampled

Household survey methods (cont.)

- Advantages
  - Data can be related to entire population
  - Response rates are high for telephone and door to door
  - Cost per interview is low for mail and telephone surveys

Household survey methods (cont.)

- Disadvantages
  - Recall biases that can affect data quality
  - Telescoping; including outside events or omitting events within recall period
  - Digit bias; exaggerating good events and under reporting bad events to boost self esteem
  - Inflation bias; unintentionally over reporting memorable events

Mail Surveys

- Useful when describing characteristics of anglers relative to entire population of people
- Have been used successfully to develop social and economic profiles of anglers

Mail Surveys (cont.)

- Avoid bias of face to face and telephone surveys
- Respondents are not pressured for immediate responses

Mail Surveys (cont.)

- Disadvantages
  - Less serious anglers will be less likely to return questionnaire
  - See chapter 22 for further information on designing mail surveys

Telephone surveys

- Generally more expensive than mail and on-site surveys
- Not efficient for collection of site specific information

Telephone surveys (cont.)

- Responses are subject to recall biases
- Sampling frames for telephone surveys are based on random digit dialing directions and boat registration lists

Complemented Surveys

- Method in which more than one survey method is used
- Makes it easy to occur all anglers if they cannot be covered using just one method

20.4 The interview process

- Verbal interview is a behavioral interaction between an interview and respondent
- Questionnaire (previously worded document) is used
  - Should be clear and precise questions

Behavioral Protocol

- Interviewer must realize that interviewee's personal time is being taken to give information
- Contact should be established in courteous manner
- Stop far enough away from boat not to interfere with anglers progress

Behavioral Protocol (cont.)

- Gain trust from beginning. Dress appropriately and be officially identifiable
- Greet respondent
- Give brief explanation of survey
- Ask if they are willing to respond

Behavioral Protocol (cont.)

- If unresponsive, do not pressure them to respond
- Measure fish at the end of interview (Fig 20.1)
- Do not pressure anglers to allow their fish to be measured, just let them know its important for management

Questionnaire design and presentation

- Design refers to
  - Intent
  - Sequence
  - Wording

Presentation refers to

- Interviewers demeanor
- Knowledge of question intent
- Phrasing of questions
- Use of verbal probes and visual prompts

Include questions relevant to objectives of survey

- Avoid
  - Two- part questions
  - Ambiguous questions
  - Negatively phrased questions
  - Biased terms or phrases

Schedule

- Should be well organized
- Questions should be placed in logical order

General rules for questions

- Ask easy to answer questions
- Put sensitive and open ended questions late in the questionnaire
- Vary the questions in type and length to keep the interest of respondents

20.5 Overview of quantitative procedures

- Fishing effort estimates
  - Creel clerks should strive to count all anglers operating within the specified sampling area
  - Counts should be converted to angler hours by multiplying the number of anglers by the number of hours in the sampling period