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UMPQUA RIVER SMALLMOUTH BASS INVESTIGATION

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INTRODUCTION

A study of smallmouth bass in the Umpqua River System was initiated in 1987 and continued in 1988. Results of that work were reported in a progress report. The study was continued in 1990 after a one-year lapse. This report summarizes results of the work conducted in 1990.

Objectives of this portion of the study were:

1 Estimate exploitation of smallmouth bass in the Umpqua River.

2. Assess movement of smallmouth bass in the Umpqua River.

3. Obtain additional information about smallmouth bass predation on salmonids if the effort did not interfere with meeting objectives 1 and 2.

STUDY AREA

Work conducted under Objectives 1 and 2 was confined to the section of the Umpqua River between Kellogg (River Mile 71) and Umpqua (RM 103) (Figure 1). This stream section was selected because it is the most accessible and receives the highest intensity of use by bass anglers. Our rationale was that it would be better to concentrate our limited resources to obtain a good estimate of exploitation on the section of river where it is likely to be the highest rather than to obtain a less reliable estimate for a larger part of the stream system.

Work under objective 3 was conducted on the South Umpqua River from below Winston (RM 20) to the mouth of Cow Creek (RM 47.2) (Figure 1). Predation on juvenile fall chinook salmon is a particular concern in this area. A downstream migrant trap is operated on lower Cow Creek to monitor the magnitude and timing of the smolt migration.

MATERIALS AND METHODS

Exploitation

Stock-size smallmouth bass (7 inches and over in total length) were captured by angling, tagged with Carlin dangler tags, and released at point of capture. Tags bore a number, agency abbreviation, return address, and "$5.00 reward".

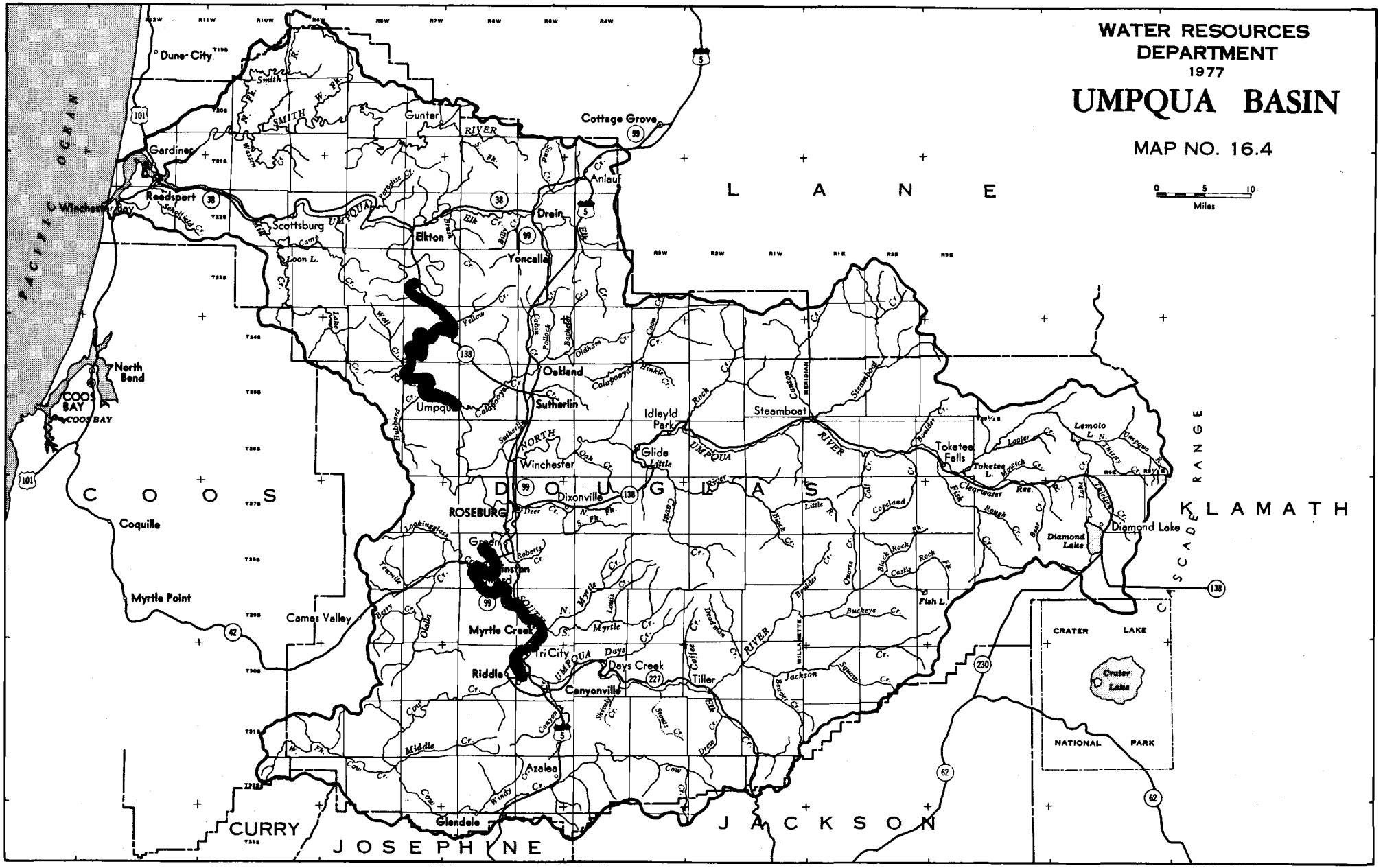


Figure 1. Study Areas on the Umpqua and South Umpqua Rivers.

We recorded the date, tag number, fish length, and location for each fish tagged.

Taggers accessed the river by driftboat to tag fish throughout the study section for even distribution. A target was set that at least 25% of the tagged bass should exceed 10 inches in length to reflect the size composition of the population as observed during the 1987 snorkel survey. Tagging was terminated on June 8 so that tagged fish would be available to anglers throughout the majority of the fishery. The timing of the fishery was predicted from the 1988 creel survey.

Tag reporting instructions were posted in local businesses, at access sites, and published in the local newspaper. Anglers were asked to leave tags on fish to be released, but to record and report recovery information to still receive the reward. Tag recovery reports were received in person at the Roseburg Regional Office of the Department and by mail. Reports were logged when received. Information about the project and the individual fish was given or sent to each reporting angler. Anglers also were asked to complete a form with catch information and a map showing catch location. Postpaid envelopes were provided to mail respondents. Information requested included tag number, date caught, length, and whether the fish was kept or released.

Annual exploitation to date was estimated from the ratio of tagged bass harvested to total tagged bass in the population. We assumed that all tagged bass caught by anglers were reported.

We used the estimate of annual exploitation as an additional input to simulate the effects of potential regulation changes on the bass population and fishery. The population modeling program used was MOCPOP (Beamesderfer, 1988). Other model inputs were unchanged from what was previously reported.

Fish Movement

Recovery location for each reported bass was obtained by asking the angler to mark the point of capture on a detailed map of the river system. These locations were then converted to river mile. Tagging and recovery locations, dates, and fish lengths at time of tagging and recapture were then entered on a computer spreadsheet for analysis.

Predation on Salmonids

We attempted to capture predator-size (>7 inch) smallmouth bass from the South Umpqua River to check stomach contents for the presence of juvenile fall chinook salmon or other salmonids. The sampling effort consisted of angling for

bass below the mouth of Cow Creek during April and May when large numbers of fingerling salmon were migrating downstream through the area. Timing of the salmon migration was determined from counts at a downstream migrant trap on lower Cow Creek.

We assessed the potential for smallmouth bass to prey on salmonids from the relationship between bass feeding activity and water temperature. District fishery managers report that significant numbers of juvenile salmonids may be present in stream sections inhabited by smallmouth bass from March 1 through June 30. Mean daily water temperatures for this time period were obtained from Cow Creek, the South Umpqua River, and the Umpqua River for the years since the operation of Galesville Reservoir began affecting flows and temperatures (1986-1990). These temperatures were plotted and analyzed in relation to smallmouth bass feeding activity as reported in the literature (Coble, 1975). Water temperature records were obtained from the Douglas County Water Resources Department and the U.S. Geological Survey.

RESULTS

Exploitation

We tagged a total of 287 smallmouth bass (Table 1). Of these, 75 were reported caught by anglers and 60 were kept. The estimated annual exploitation rate through the end of 1990 was 21% with a 95% confidence interval of + or - 4.7%. Lengths of bass tagged are shown in Figure 2. Forty-one percent of the bass tagged measured 10 inches or more. Fifty-three percent of the bass reported by anglers were fish that measured 10 inches or more when tagged.

Model outputs from simulations of the effects of possible angling regulations on population structure and harvest are shown in Figures 3 and 4. They indicate that at the current exploitation rate, more restrictive bag and length limits would have little effect on population size, but could affect numbers harvested, yield in weight, and population size structure.

Fish Movement

We were able to obtain location of catch for all 75 tagged bass that were reported (Table 2). Of these 15 (20%) were reported caught 1 mile or less from where they were tagged. These fish were considered stationary because of potential error in accurately locating catch location. The remaining 60 bass (80%) were reported caught more than 1 mile from the location where they were tagged. The mean distance moved was 7.2 miles. Forty-two percent moved upstream and 58%

TABLE 1
RESULTS FROM THE TAGGING OF SMALLMOUTH BASS
ON THE UMPQUA RIVER, 1990

LOCATION	-	KELLOGG TO UMPQUA (RM 71-103)
DATES	-	APRIL 21 TO JUNE 8
TYPE OF TAG	-	CARLIN DANGLER
INFORMATION ON TAG	-	AGENCY; RETURN ADDRESS; TAG NUMBER; $5.00 REWARD
NUMBER TAGGED	-	287
SIZE RANGE OF BASS TAGGED	-	7 TO 16 INCHES
NUMBER REPORTED CAUGHT (TO DECEMBER 18)	-	75 (26%)
FISH KEPT	-	60 (80%)
FISH RELEASED	-	15 (20%)
ESTIMATE OF EXPLOITATION	=	60/287 = 21%
95% CONFIDENCE LIMITS	=	+ OR - 4.7%

FIGURE 2. LENGTHS OF SMALLMOUTH BASS TAGGED IN THE UMPQUA RIVER - 1990

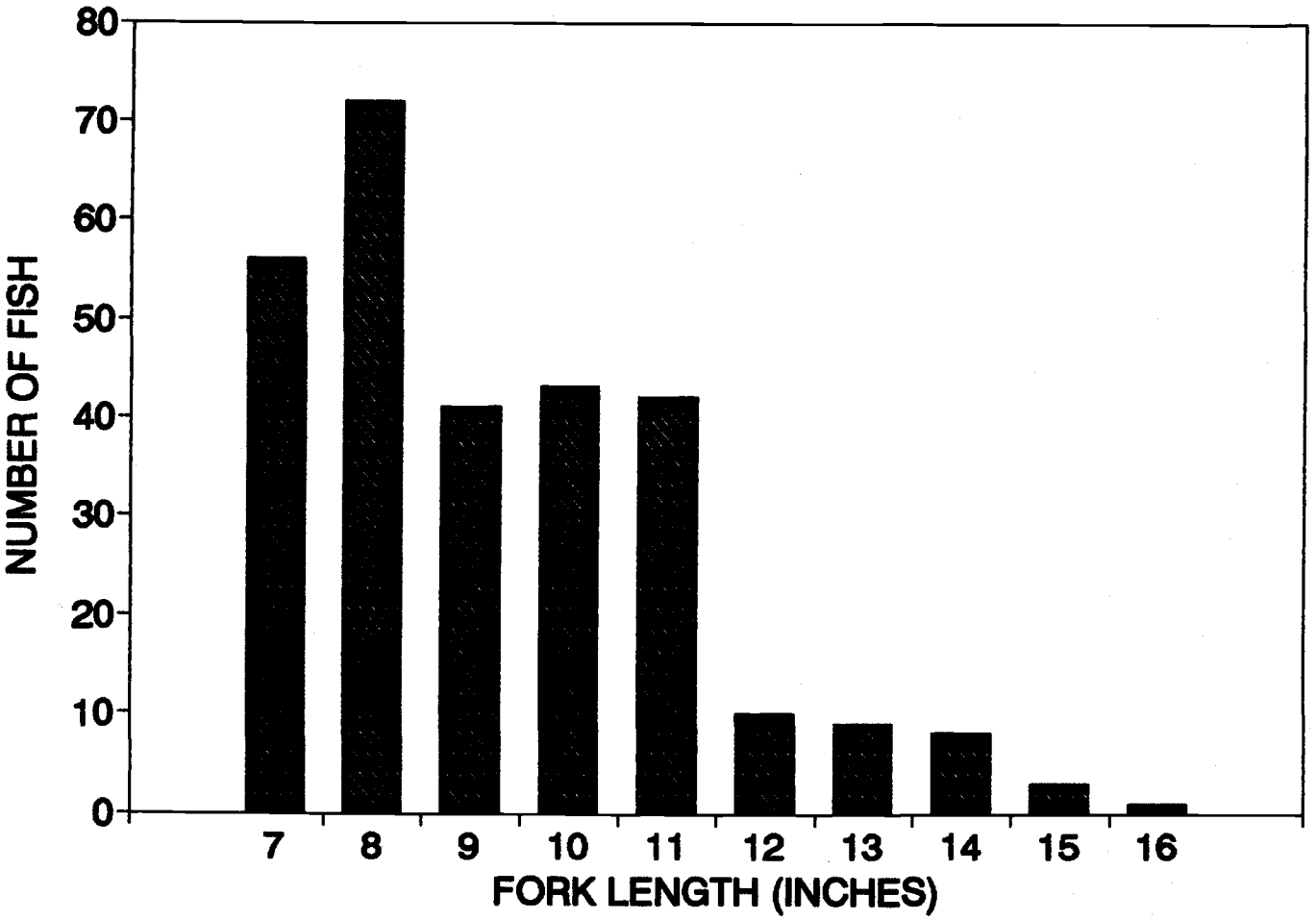
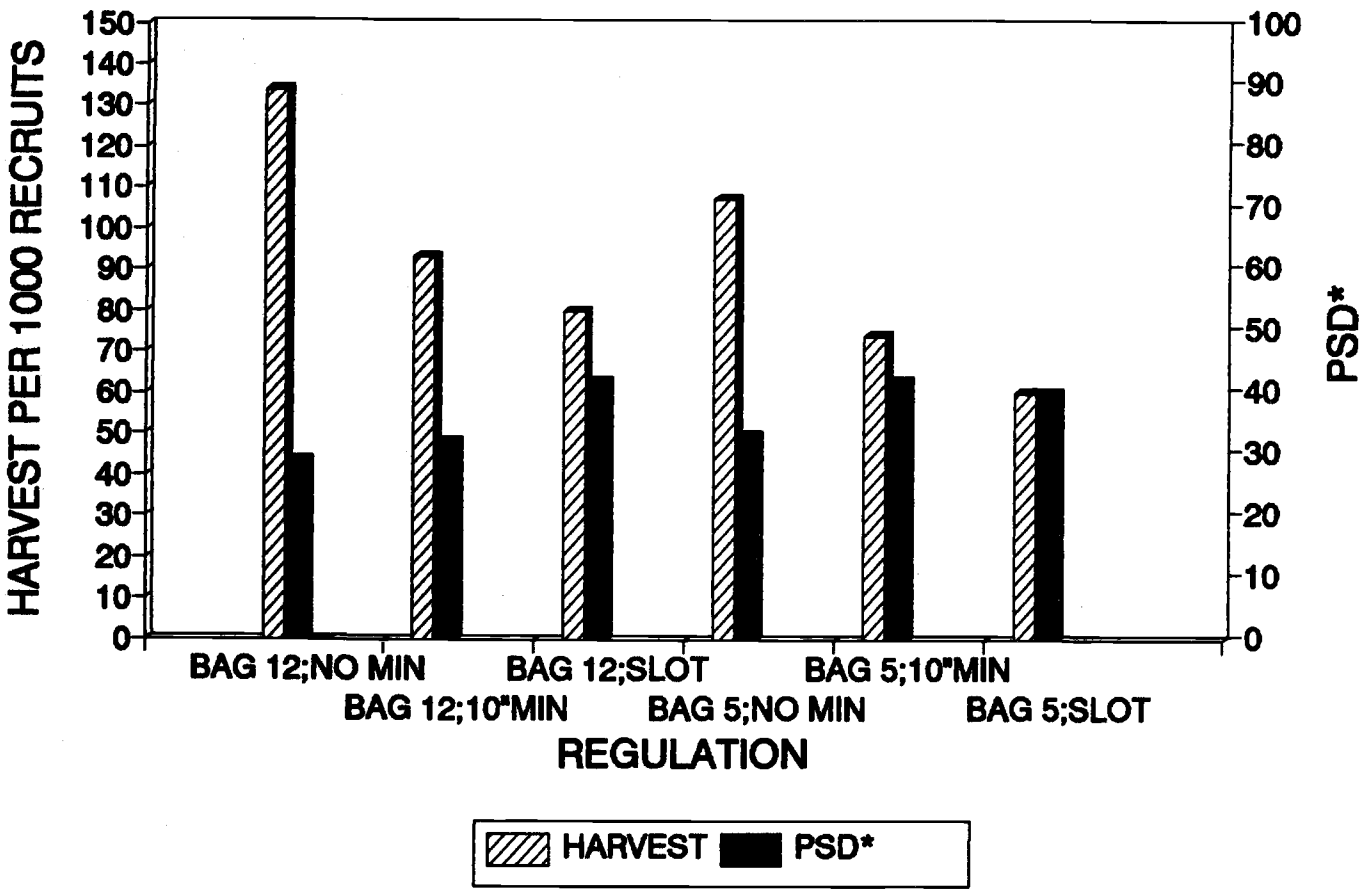


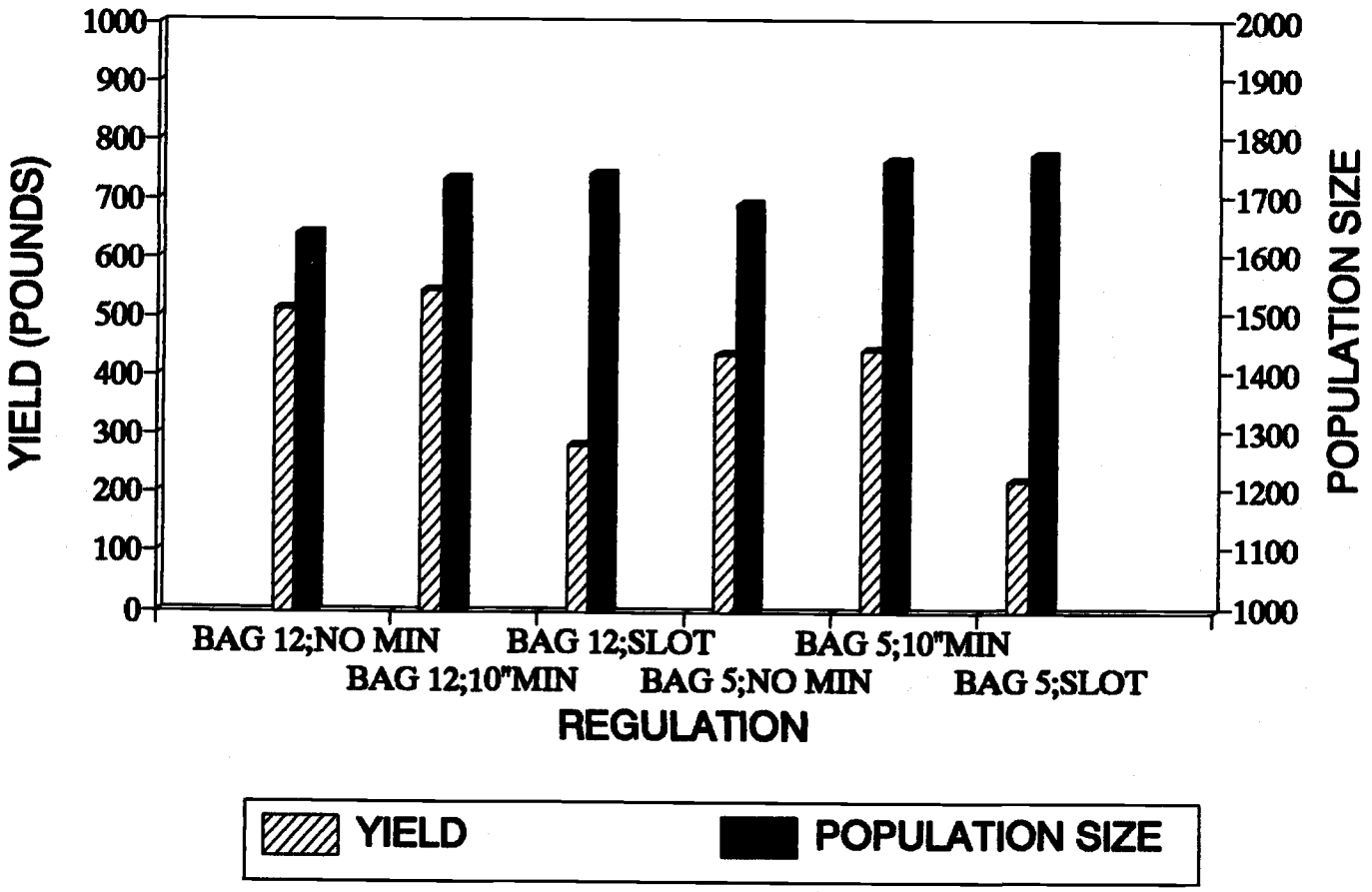
FIGURE 3. EFFECTS OF BAG AND SIZE RESTRICTIONS ON HARVEST AND PSD*



Notes: PSD or Proportional Stock Density is the percentage of stock-length bass (7 inches and over) that equal or exceed 11 inches in length.

These slot limits would require anglers to release bass measuring 10 to 14 inches in length.

FIGURE 4. EFFECTS OF BAG AND SIZE RESTRICTIONS ON YIELD AND POPULATION



Note: These slot limits would require anglers to release bass measuring 10 to 14 inches in length.

TABLE 2
MOVEMENT OF TAGGED SMALLMOUTH BASS
IN THE UMPQUA RIVER, 1990

AREA OF TAGGING - KELLOGG TO UMPQUA (RM 71-103)

NUMBER OF BASS TAGGED = 287

NUMBER RECOVERED = 75

DAYS AT LARGE

MINIMUM = 3

MAXIMUM = 125

MEAN = 55

BASS MOVEMENT

	NO. FISH	%	MILES MOVED MAX.	MILES MOVED MEAN
NO MOVEMENT*	15	20	-	-
MOVEMENT	60	80	32.7	7.20
UPSTREAM	25	42	26.0	5.44
DOWNSTREAM	35	58	32.7	8.45
TOTAL OR AVERAGE	75	100	-	5.85

RATE OF MOVEMENT

	MILES PER DAY MAX.	MILES PER DAY MEAN
UPSTREAM	.50	.12
DOWNSTREAM	.61	.17
ALL FISH	.61	.15

* ANY MOVEMENT OF LESS THAN 1 MILE WAS DISREGARDED

moved downstream. The maximum distance moved upstream was 26.0 miles with a mean of 5.4 miles. The maximum distance moved downstream was 32.7 miles with a mean of 8.5 miles. There were no correlations between size of bass and direction or distances moved.

Tagged bass that were reported caught were at large for from 3 to 125 days. The mean time at large was 55 days. Maximum rate of movement, calculated for the entire time at large, was 0.50 miles per day upstream and 0.61 miles per day downstream. Mean rate of movement was 0.12 miles per day upstream, 0.17 miles per day downstream and 0.15 miles per day for all bass that moved.

Predation on Salmonids

Efforts to capture predator-size smallmouth bass from the South Umpqua River when juvenile salmonids were migrating were unsuccessful.

The plots of mean daily water temperatures in relation to smallmouth bass feeding activity show that bass are actively feeding during about one-half of the three month time period that juvenile salmonids may be present (Figures 5, 6 and 7).

DISCUSSION

The estimate of annual exploitation will probably not increase significantly from tag reports that come in through the end of the study year. The estimate of 21% is for the stream section which receives the heaviest use. Therefore it should represent the high end of what is occurring on the Umpqua River as a whole. It may not represent exploitation on the South Umpqua River because of major differences between the two streams and their fisheries.

The exploitation rate of 21% is low compared to rates of 26% to 45% reported for John Day and Brownlee Reservoirs (Beamesderfer, et al, 1987, and Rohrer, 1984 and 1985). We have no estimates for streams in the northwest for comparison.

Two opposing factors could bias the estimate. One is non-reporting of tagged fish, which would cause exploitation to be underestimated. The other is retention of tagged bass which would not otherwise be kept. This would cause exploitation to be overestimated. There is some evidence of this latter source of bias because anglers interviewed in 1988 reported releasing 46% of the bass caught, whereas they released only 20% of the tagged bass reported in this study.

FIGURE 5. MEAN WATER TEMPERATURES COW CREEK NEAR RIDDLE (1986-1990)

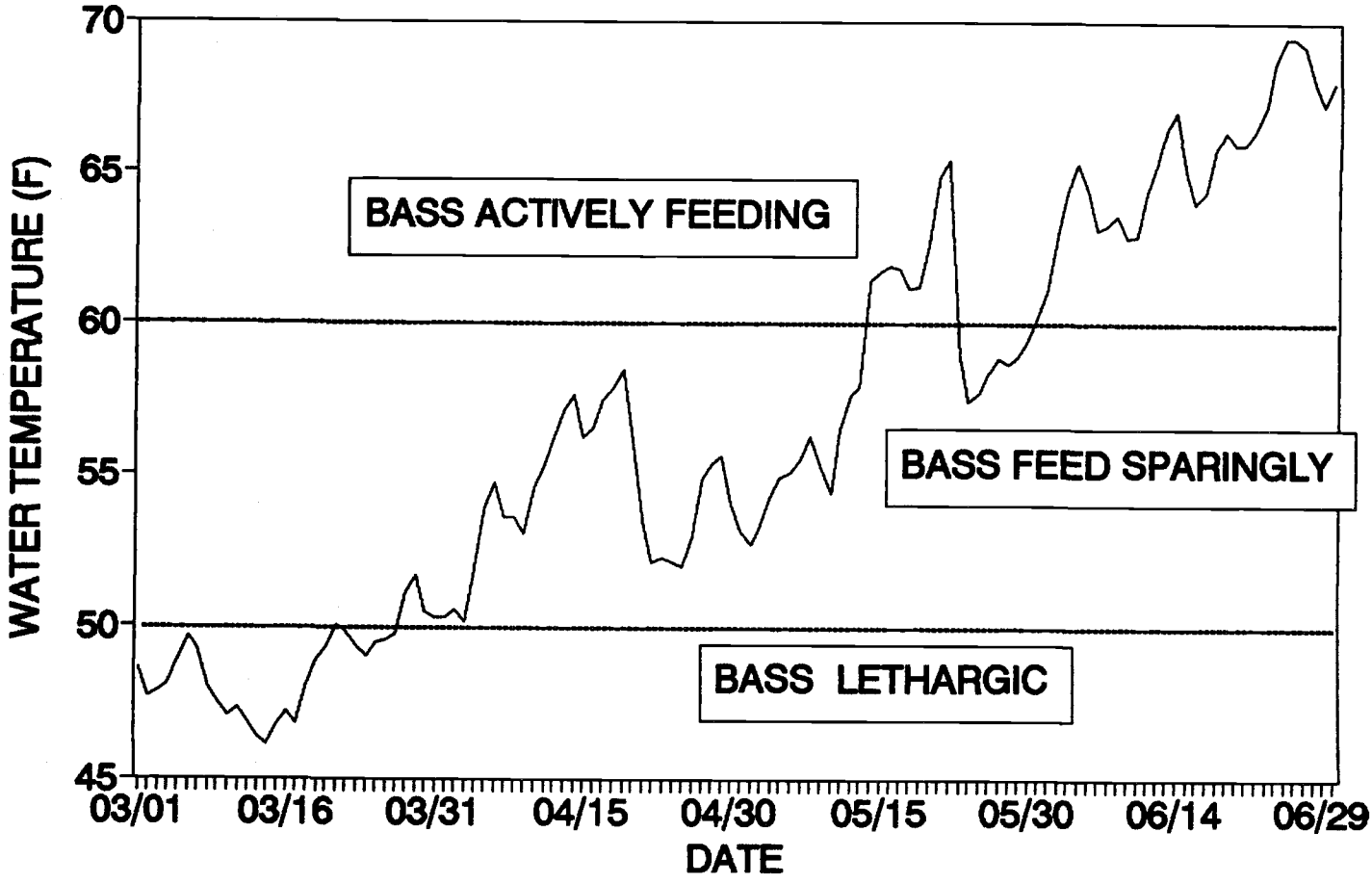


FIGURE 6. MEAN WATER TEMPERATURES SOUTH UMPQUA R. NEAR ROSEBURG (1986-90)

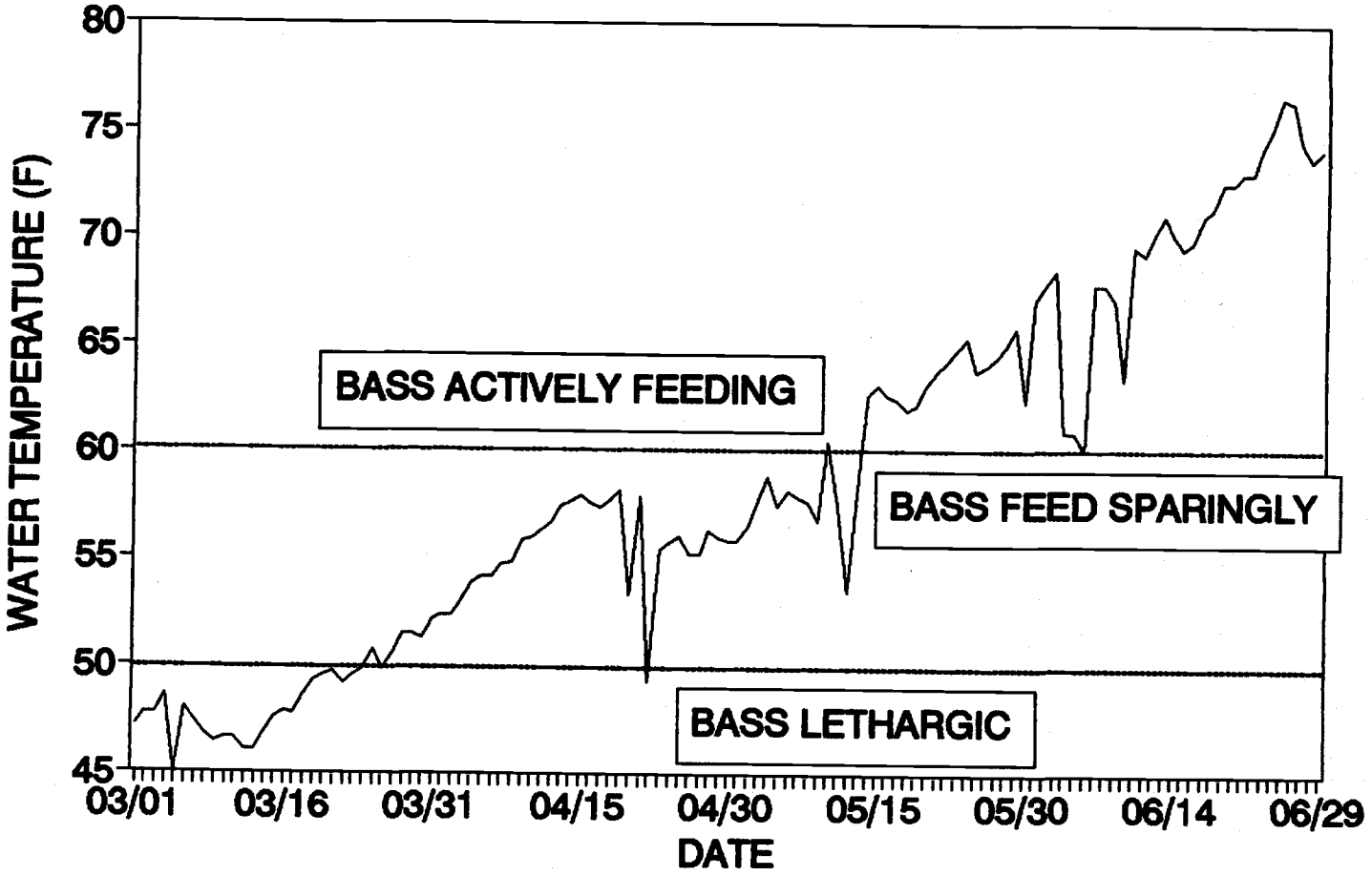
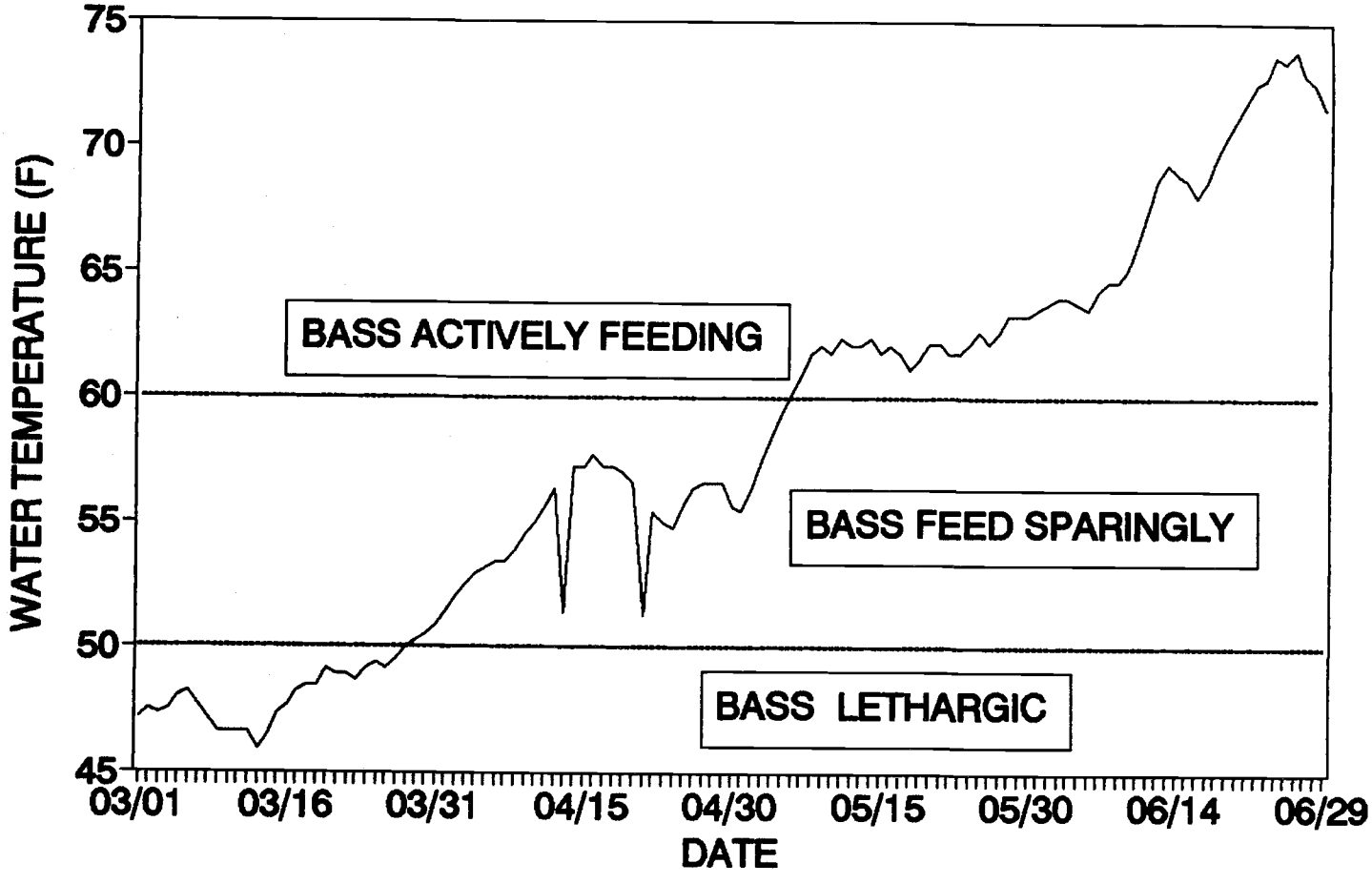


FIGURE 7. MEAN WATER TEMPERATURES UMPQUA RIVER NEAR ELKTON (1986-1990)



The results of population modeling shows a range of regulation options, depending upon management objectives (Table 3). Adoption of the standard statewide daily bag limit of 5 fish, not more than 3 of which exceed 15 inches, has been proposed. Model output indicates that this would reduce the number of bass harvested by 20% but increase the percentage of bass over 11 inches by 14%.

Tag recovery locations showed that most bass moved significant distances during the summer. More bass moved downstream than upstream, but there was considerable movement in both directions. Tag returns to date have been too few to provide reliable information on movement during fall and winter.

The management implication of the information on bass movement is that bass have the capability to rapidly repopulate localized areas from which they might be depleted.

The work on smallmouth bass predation on salmonids was inconclusive. It did show that bass are not actively feeding during the early part of the juvenile salmonid migration. This presents the opportunity to minimize bass predation by releasing hatchery smolts before bass become active.

TABLE 3. SIMULATED RESULTS OF REGULATION CHANGES
(PRESENT BAG LIMIT 12; NO MINIMUM LENGTH)

	HARVEST	YIELD	PSD	CATCHABLE POPULATION
BAG 12; 10" MINIMUM LN	DOWN 31%	UP 6%	UP 10%	UP 6%
BAG 12; 12" MINIMUM LN	DOWN 53%	DOWN 5%	UP 34%	UP 9%
BAG 12; 10-14" SLOT	DOWN 40%	DOWN 45%	UP 34%	UP 6%
BAG 5; NO MINIMUM LN	DOWN 20%	DOWN 15%	UP 14%	UP 3%
BAG 5; 10" MINIMUM LN	DOWN 45%	DOWN 13%	UP 21%	UP 8%
BAG 5: 12" MINIMUM LN	DOWN 63%	DOWN 25%	UP 34%	UP 11%
BAG 5; 10-14" SLOT	DOWN 55%	DOWN 57%	UP 38%	UP 8%

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