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Sexual Maturation in Kokanee *Oncorhynchus nerka*

Abstract

is initiated, and 2) the influence of age specific 22 mm (stretch mesh) at the and observations from the present study. A detailed

[redacted]

description of the characteristics of each stage is provided in Patterson (1998).

[redacted]

the remaining 62 d. The medium fish were reared

[redacted]

in two groups at Clark Fork Hatchery on natural water temperatures (5° C in March, increasing to 12° C in mid-July) and fed to satiation. The fast

[redacted]

ing practices were resumed. The two groups of

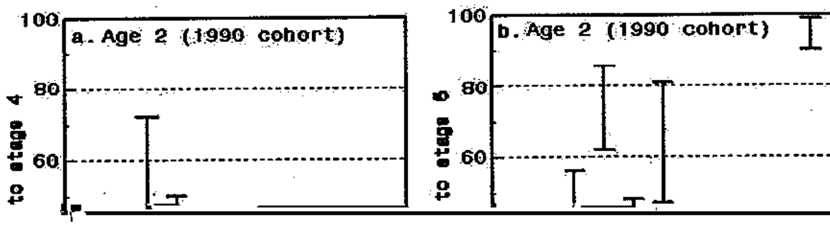
and counted to estimate the number of eggs/g. Fe-

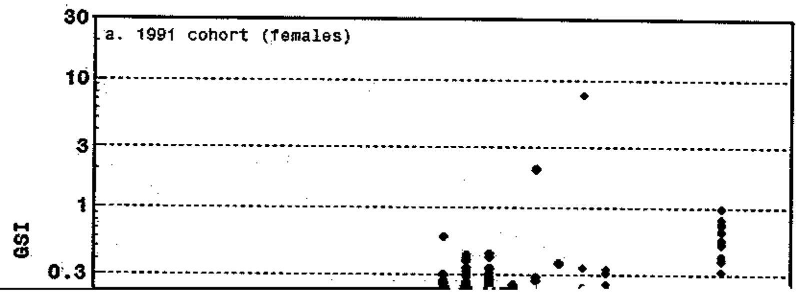
TABLE 3. Mean fork lengths (and standard deviation) and

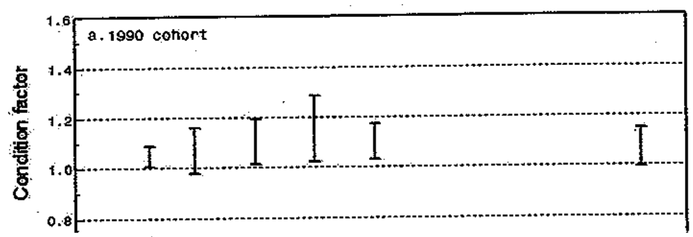
100

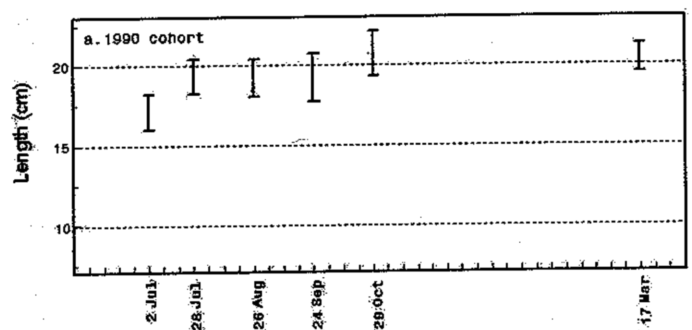
TABLE 4. Mean fork lengths (and standard deviation) and ovarian stages for ages one, two, and three female kokanee sampled from Coeur d'Alene Lake in 1992 and 1993. An asterisk * indicates that one fish was in Stage 2.

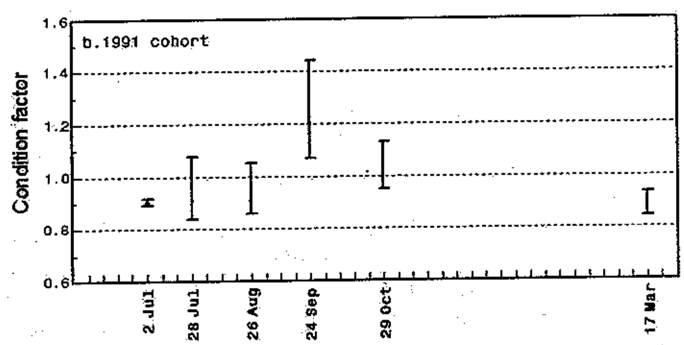
Year	Age	Date	Number of fish	Mean fork length (mm)	Ovarian stage 3	4	5	6	7
	1	29 Oct	8	113 (6)	8				
	2	27 May	10	155 (8)	10				
	2	2 Jul	7	169 (5)	5	2			
	2	28 Jul	11	193 (11)	3	3	4		1
	2	26 Aug	12	191 (11)	3	1	8		
	2	24 Se[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]		


a. Age 2 (1990 cohort)
b. Age 2 (1990 cohort)
to stage 4
to stage 5
100
80
60


30
a. 1991 cohort (females)
10
3
1
GSI
0.3


a.1990 cohort
Condition factor
1.6
1.4
1.2
1.0
0.8


1992
1993
a.1990 cohort
Length (cm)
20
15
10
2 Jul
28 Jul
26 Aug
24 Sep
29 Oct
17 Mar
1992
1993


b.1991 cohort
Condition factor
1.6
1.4
1.2
1.0
0.8
0.6
2 Jul
28 Jul
26 Aug
24 Sep
29 Oct
17 Mar
1992
1993

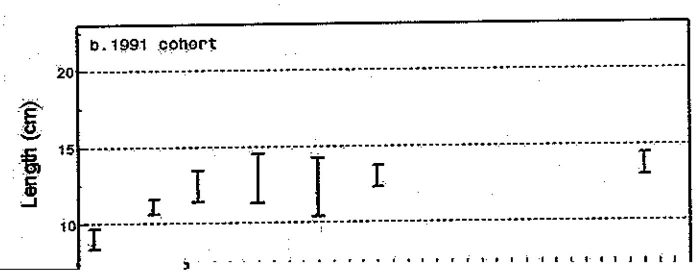

b.1991 cohort
Length (cm)
20
15
10

TABLE 5. Mean fork lengths (and standard deviation) and fat index for ages one, two, and three kokanee (both sex) sampled from Coeur d'Alene Lake in 1993.

Year	Age	Date	Number of fish	Mean fork length (mm)	Fat Index 1	2	3	4
1993	1	17 Mar	21	73 (5)	21			
	1	23 Apr	24	74 (4)	24			
	1	27 May	26	89 (6)	25	1		
	1	1 Jul	19	109 (6)	3	16		
	2	23 Apr	35	139 (9)	24	8	2	1
	2	27 May	34	138 (7)	30	4		
	2	1 Jul	29	152 (7)		28	1	
	2	16 Jul	32	165 (12)		29	3	
	2	26 Aug	30	176 (5)			25	5
	2	20 Sep	33	184 (15)		3	7	23
	2	15 Oct	33	179 (6)				33
	3	23 Apr	10	204 (13)				10
	3	27 May	25	209 (9)			6	19
	3	1 Jul	12	217 (4)			5	7
	3	16 Jul	24	208 (17)		6	10	8
	3	26 Aug	1	215			1	
	3	20 Sep	25	239 (12)	3	20		2
	3	15 Oct	4	238 (10)	4			

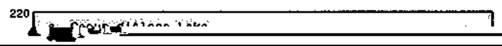
Ovarian development —All age-1 and age-2 fish sampled in September were S3. At age 3, 26.3% (5 of 19) of the 1989 cohort were in S3, 68.4%

Growth (CDA, LPO and DWOR stocks)

Instantaneous growth rates were highest in sum-

TABLE 6. Back calculated lengths (and standard deviation) at age for kokanee from Coeur d'Alene Lake (CDA), Lake Pend Oreille (LPO) and Dworshak Reservoir (DWOR). An asterisk* denotes an immature fish sampled at that age.

Lake/Reservoir	Cohort	Number of fish	Age at maturity	Length (mm) at age 1	2	3	4
CDA	1989	105	3	79 (11)	170 (15)	223 (10)	
		8	4	76 (9)	152 (13)	192 (15)	
	1990	7	2	76 (10)	169 (19)		
		117	3	75 (9)	156 (16)	205 (14)	
		17	3*	75 (7)	144 (12)	186 (12)	
	1991	5	2	90 (13)	167 (9)		
		28	3	73 (8)	146 (7)	183 (8)	
		[illegible]	3*	[illegible]	[illegible]	[illegible]	
LPO	1988	20	4	74 (15)	131 (25)	172 (21)	204 (14)
		3	4*	79 (26)	141 (13)	171 (8)	196 (8)
	1989	4	3	96 (23)	164 (7)	204 (4)	
		23	4	87 (25)	150 (18)	185 (13)	212 (8)
		2	4*	79 (7)	130 (15)	161 (11)	186 (10)
	1990	11	3	118 (16)	169 (12)	196 (12)	
		33	3*	84 (19)	138 (15)	170 (10)	
DWOR	1990	7	2	109 (10)	212 (19)		
		4	2*	98 (18)	203 (2)		
	1991	26	2	124 (13)	214 (14)		
	1992	2	1	143 (na)			
		27	1*	122 (11)			



The DWOR stock had mean BC lengths over

[illegible]

A significant difference ($P<0.001$) was found, between the two groups of fast fish, nor between the two groups of slow fish ($P>0.10$). We also from S1 to S2 was characterized by an increase in the GSI due to testicular enlargement, organization

and deposited inside the ova for the construction of the zona radiata or eggshell (Oppen-Berntsen these changes. These results on maturation are consistent with general results from other studies indicating that maturation decisions are not made early in life (e.g., age 0), but later (Peterman 1985; Scarnecchia et al. 1989; 1991).

There was no evidence that growth during the last year of life (i.e., the spawning year) influenced the decision to mature. Experimental fish growing relatively slowly at age 2 matured at the same rate as fish growing relatively rapidly. In addition, no significant differences were found in the percentages of maturing fish (S5 and S6) in mid-May compared to the percentages of mature

threshold hypothesis (Saunders et al. 1982). In this study, however, late-summer size was a better indicator of maturation than instantaneous growth rates during summer.

Instantaneous growth rate was not a reliable indicator of maturation in all cases. For example, in the experiment of differential growth at age 0, instantaneous growth rates for age-1 fish were about 1.0 in June, July, and August, and 91% of the males and 49% of the females spawned the following year. In contrast, few (no females and <10% of males) wild age-1 fish from CDA with instantaneous growth rates of about 1.0

differential growth at age 2, fast fish weighed more than twice as much (400g) as slow fish (178g) at spawning, although the incidence of maturation

and kokanee were influenced by genetic factors. Idaho kokanee stocks vary greatly in mean age at maturity (Tables 2),

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salmon (*Salmo salar L.*) parr. Journal of Fish Biology 36:643-658.

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