

# ESTIMATION OF WILLIAMS CREEK - 1953, from tagging

- Purpose: To estimate run from tagging data.  
To relate estimate to known fence count.

## I. Relation of survey counts to fence count.

Tagging data (see File Rep.) indicate life span of fish in creek = 15 days.

∴ On each creek survey, should observe run passing through fence 15 days prior to survey.

DATE	RUN 15 DAYS PRIOR.	OBSERVED COUNT (-ELIZA)	Efficiency				
AUG 10	2907	2679	0.92	.38	.86	.56	.11
AUG 17	6612	4882	0.74	.21	.37	.31	.19
AUG 26	4667	3939	0.84	.39	.67		
SEPT 3	1072	1181	1.10	.40	1.00		
OCT 1	**	125	?				
TOTAL 1953	15,258	12,681	0.83				

Suggest that in 1953 about 80% of spawners seen on a creek survey - compares with estimated 60% for 1952.

DAILY POPULATION ESTIMATES; using 1952 formula. - refining to make daily estimates.

$$P = P_0 \cdot C_1 \cdot C_2$$

here  $P_0$  = no. fish seen on a single day.

$$C_1 = \frac{t_a}{t_b}$$

$$C_2 = \frac{t_o/s_o}{t_e/s_e} \quad \left. \begin{array}{l} \text{using fence data} \\ \text{only for the rise} \end{array} \right\} P$$

Aug 10<sup>th</sup>, Pwxw only.

$$C_1 = \frac{52}{29} = 1.79$$

$$C_2 = \frac{1018}{1023} = 0.78 \quad 2339 \times 1.79 \times 0.78 = 3260$$

Aug 17<sup>th</sup> Pwxw + Shwxw

$$C_1 = \frac{172}{51} = 3.38$$

$$C_2 = \frac{10105}{1024} = 0.438 \quad 4474 \times 3.38 \times 0.438 = 6650$$

Aug 26<sup>th</sup> Shwxw + Bwxw

$$C_1 = \frac{229}{96} = 2.38$$

$$C_2 = \frac{10151}{1025} = 0.603 \quad 3832 \times 2.38 \times 0.603 = 5500$$

(R x W)

Sept 3<sup>rd</sup>  $C_1 = \frac{38}{14} = 2.71$

$$C_2 = \frac{0.0120}{0.0316} = 0.380 \quad 1166 \times 2.71 \times 0.380 = 1200$$

# POPULATION ESTIMATE.

Using tagging data, the number of fish present on the spawning ground can be estimated, using the 1952 method

1) I Actual proportion of River tags in population.  $\left(\frac{RW + WW}{\text{TOTAL FENCE CT}}\right)$

Live fence count TO Aug 10 <sup>th</sup> - $\frac{53+15}{2907} = \frac{68}{2907} = .023$	} $\frac{159}{6612} = 0.0241$	} $\frac{197}{7545} = 0.0259$
Aug 10 <sup>th</sup> TO Aug 17 <sup>th</sup> - $\frac{71+20}{3705} = \frac{91}{3705} = .0245$		
Aug 17 <sup>th</sup> to Aug. 26 <sup>th</sup> = $\frac{29+3}{962} = \frac{32}{962} = .0332$		
Aug 26 <sup>th</sup> to Sept. 3 <sup>rd</sup> = $\frac{6+0}{238} = \frac{6}{238} = .0252$		

$\frac{123}{4667} = 0.0254$   
 $\frac{38}{1250} = 0.0316$   
Total =  $\frac{197}{7812} = .0252$

With exception of period Aug 26<sup>th</sup> to Sept 3<sup>rd</sup> ratio quite constant between 0.23 & 0.25

2) Observed ratios among dead fish

a) Dead on Fence.

Ratio total dead ex = 678

R x W = 8

W x W = 2

Ratio =  $\frac{10}{678} = 0.0148$ , lower than ratio among live fish.

b) Dead on spawning grounds

Total Observed	R x W	W x W
Aug. 10	1	0
17	43	1
26	116	1
Sept 3	105	6
265	8	0

Total dead = 559  
(examined + unexamined)

Ratio  $\frac{8}{265} = 0.030$   
(of examined fish only)

Ratio:  $\frac{8}{559} = 0.0143$   
(all dead fish)

∴ Combining dead recoveries (carefully examined)

$$\frac{10 + 8}{678 + 265} = \frac{18}{943} = 0.0191, \text{ lower than the fence ratio.}$$

$$\text{Fiducial limits} = \frac{11}{943} = 0.0117$$

$$\frac{28}{943} = 0.0297$$

Most accurate might be total average:

$$\frac{18 + 191}{7545 + 943} = \frac{209}{8488} = 0.0246$$

$$\text{fiducial limits} = \frac{236}{8488} = 0.0278$$

$$\frac{182}{8488} = 0.0215$$

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Average on spawning grounds. (to Aug 26<sup>th</sup> - see next p for breakdown.)

$$\frac{147}{11,500} = 0.0128$$

fiducial limits

$$\frac{170}{11,500} = 0.0148$$

$$\frac{123}{11,500} = 0.0107$$

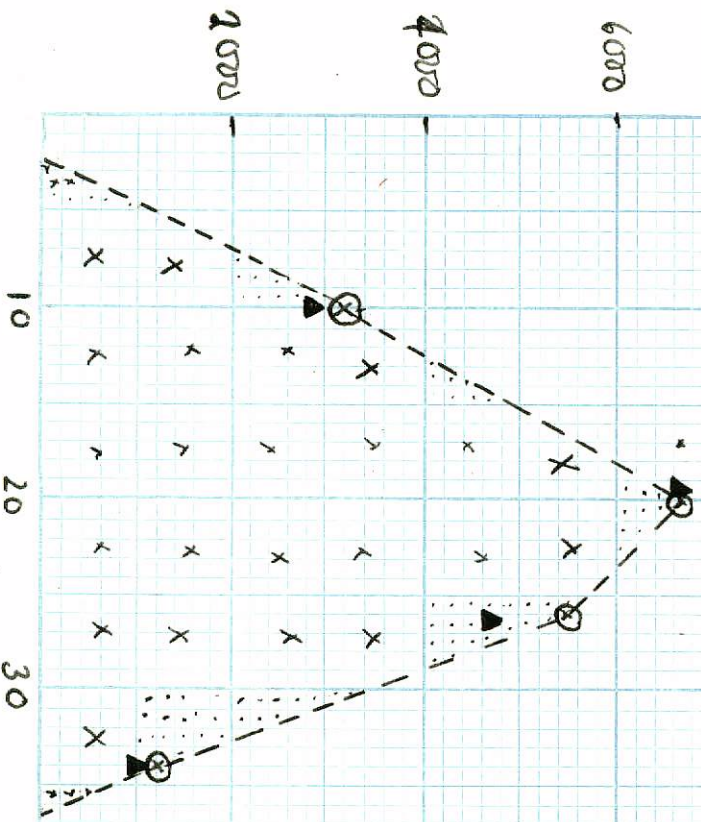
Thus grouping data indicates definitely that tags not as visible on grounds as in samples.

## OBSERVED ON SPAWNING GROUNDS.

	NOTAGS I	NO OBSD II	NO EXAMINED FOR MARKS III	I/III	I/III
Aug 10	42	2679	2339	0.018	<del>0.018</del>
17	47	4882	4474	0.0105	<del>0.0105</del>
26	58	3939	3832	0.0151	<del>0.0151</del>
Sept 3	14	1181	1166	0.0120	<del>0.0120</del>

WILLIAMS CR-1953  
 ESTIMATED NO FISH ON SP GEODS.

Daily population estimates plotted.



COMPARISON OF  
 WHAT IS ESTIMATED  
 AND WHAT IS PRESENT  
 x = estimate  
 Δ = fence estimate.  
 (Fence count 15 days  
 prior to survey.)

No squares =  
 $20 \times 25 = 500$

$$\begin{array}{r} 50 \\ 75 \\ 10 \\ \hline .635 \end{array}$$

each sq = 200 fish days

∴ Total fish days  
 $= 635 \times 200$   
 $127,000$

Average life span of fish  
 approx. 15 days  
 ∴ population = 8,450.

# COMPARISON OF VISIBILITY OF TAGS.

Are all types of tags equally visible on stream surveys.

- compare % recoveries of different tags

Comparison of RXW & WXW.

1) On Aug. 10<sup>th</sup>, 53 RXW, 15 WXW tags present on the stream

% recovs on survey

$$RXW \quad \frac{20}{53} = 0.38$$

$$WXW \quad \frac{13}{15} = 0.86$$

also 9 WX? tags seen

assuming all were RXW (at least 7 must have been). Then adjusted RXW =  $\frac{29}{53} = 0.55$

$$\text{Relative Ratio} = \frac{RXW\%}{WXW\%} = \frac{0.38}{0.86} = ~~0.64~~ 1.56$$

2) On Aug 17<sup>th</sup>, RXW =  $\frac{26}{124} = 0.21$ , corrected  $\frac{34}{124} = 0.27$

$$WXW = \frac{13}{35} = 0.37$$

$$\text{Relative Ratio} = \frac{.37}{.27} = ~~0.73~~ 1.37$$

3) On Aug 26<sup>th</sup> assuming that tags available = no. tags through fence 15 days prior to observations

$$RXW = \frac{39}{100} = .39$$

$$\text{corrected} = \frac{42}{100} = 0.42$$

$$WXW = \frac{16}{24} = .67$$

$$\text{Relative Ratio} = \frac{0.42 \cdot 0.67}{0.67 \cdot 0.42} = ~~0.63~~ 1.60$$

∴ Relative Ratio's range from ~~0.55 to 0.73~~  
average = ~~0.64~~ 1.51

## OTHER TAGS.

AUG 10  $R_{xw} = 0.55$

$$P_{wxw} = \frac{29}{52} = 0.56$$

relative ratio = ~~0.98~~  $\frac{0.56}{0.55} = 1.02$

AUG 17<sup>th</sup>.  $R_{xw} = 0.27$

$$P_{wxw} = \frac{16}{52} = 0.31$$

relative ratio =  $\frac{0.31}{0.27} = 1.15$

$$P_{oxo} = \frac{10}{53} = 0.19$$

relative ratio =  $\frac{0.19}{0.27} = 0.70$

$$sh_{wxw} = \frac{35}{120} = 0.29$$

relative ratio =  $\frac{0.29}{0.27} = 1.07$

AUG 26<sup>th</sup>  $R_{xw} = 0.39$

$$sh_{wxw} = \frac{42}{102} = 0.41$$

relative ratio =  $\frac{0.41}{0.39} = 1.05$

$$B_{wxw} = \frac{54}{127} = 0.43$$

relative ratio =  $\frac{0.43}{0.39} = 1.10$

Sept 3  $R_{xw} = 0.40$

$B_{wxw}$  = Impossible to calculate ratio due to speeded mortality of fish rear end of run.

Thus compared to  $R_{xw} = 1.0$

$w_{xw} = 1.51$  This ratio is high considering the  $P_{wxw}$ ,  $B_{wxw}$ ,  $sh_{wxw}$  show ratios close to  $R_{xw}$ .  $\therefore$  it is possible that  $w_{xw}$  were wrongly classified and must have been overestimated. All other tags, excepting  $P_{oxo}$  &  $P_{wxw}$  were in vicinity of 1.0