

DRAFT

AN EVALUATION OF CHUM SALMON SPAWNING HABITAT
IN THE MIDDLE SUSITNA RIVER

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Slough and side channel spawning habitats, of chum salmon (Oncorhynchus keta) in the middle reach of the Susitna River were studied to evaluate their responses to change in Susitna discharge and local flow conditions. Habitat suitability curves and hydraulic models were developed from field data. These were used to calculate indices of habitat usability (Weighted Usable Area), as a function of mainstem discharge. These data provide an overview of the expected response of currently utilized chum spawning habitat areas to incremental regulation of mainstem discharge by the proposed Susitna Hydroelectric development.

CHUM AND SOCKEYE SALMON
SPAWNING HABITAT
in the
SUSITNA RIVER

DRAFT

presented by:

ANDREW HOFFMANN

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ALASKA DEPARTMENT OF FISH AND GAME
SUSITNA HYDRO AQUATIC STUDIES

REPORT NO. 3

AQUATIC HABITAT AND INSTREAM FLOW
INVESTIGATIONS (MAY-OCTOBER 1983)

Chapter 7: An Evaluation of Chum and Sockeye
Salmon Spawning Habitat in Sloughs and
Side Channels of the Middle Susitna River

Edited by:

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Prepared for:

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ANCHORAGE, ALASKA 99501

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SPAWNING HABITAT PREFERENCE

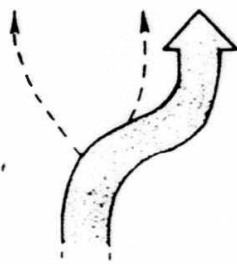
- MS - MAINSTEM
- SC - SIDE CHANNEL
- SL - UPLAND and SIDE SLOUGHS
- T - TRIBUTARIES
- ↑ - PRIMARY SPAWNING HABITAT
- ↑ - SECONDARY SPAWNING HABITAT
- ↑ - INCIDENTAL SPAWNING HABITAT

MS SC SL T



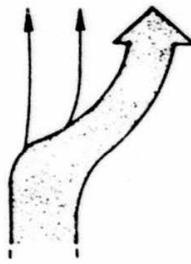
SOCKEYE

MS SC SL T



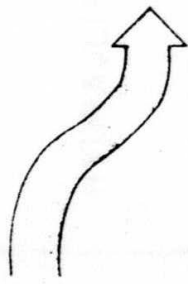
COHO

MS SC SL T



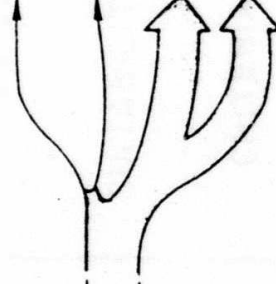
PINK

MS SC SL T



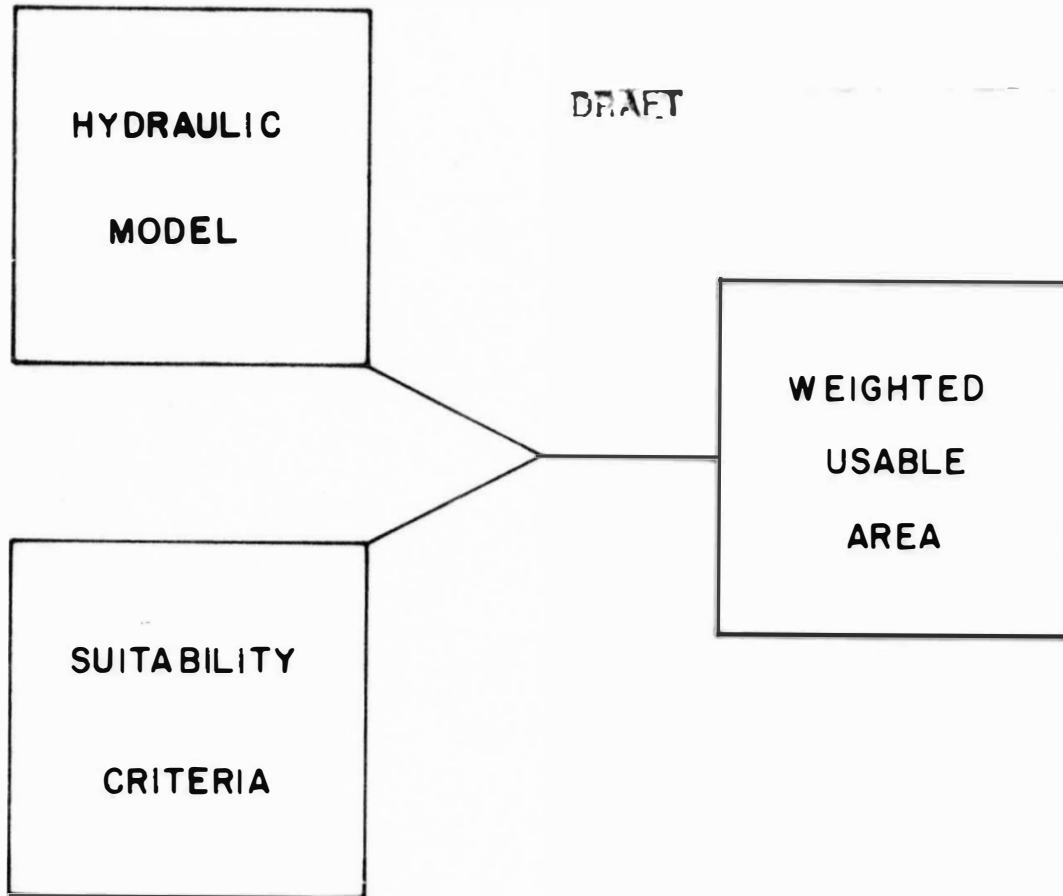
CHINOOK

MS SC SL T

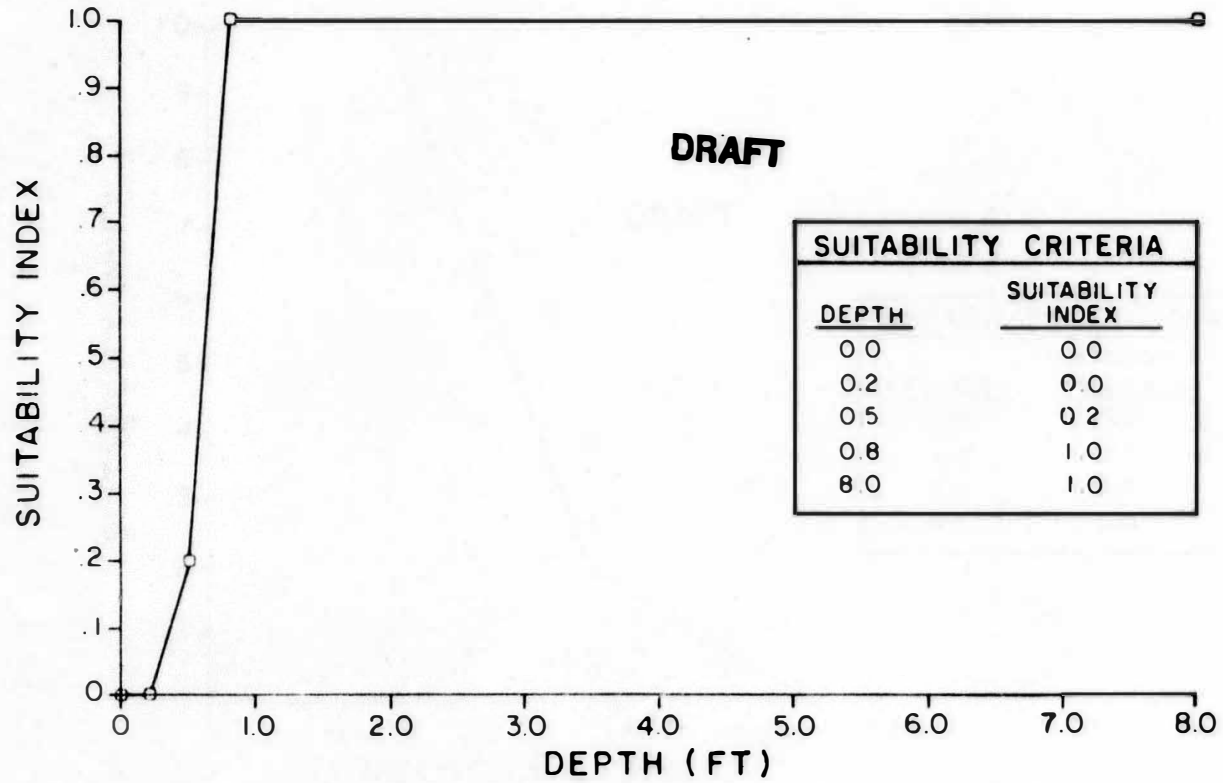


CHUM

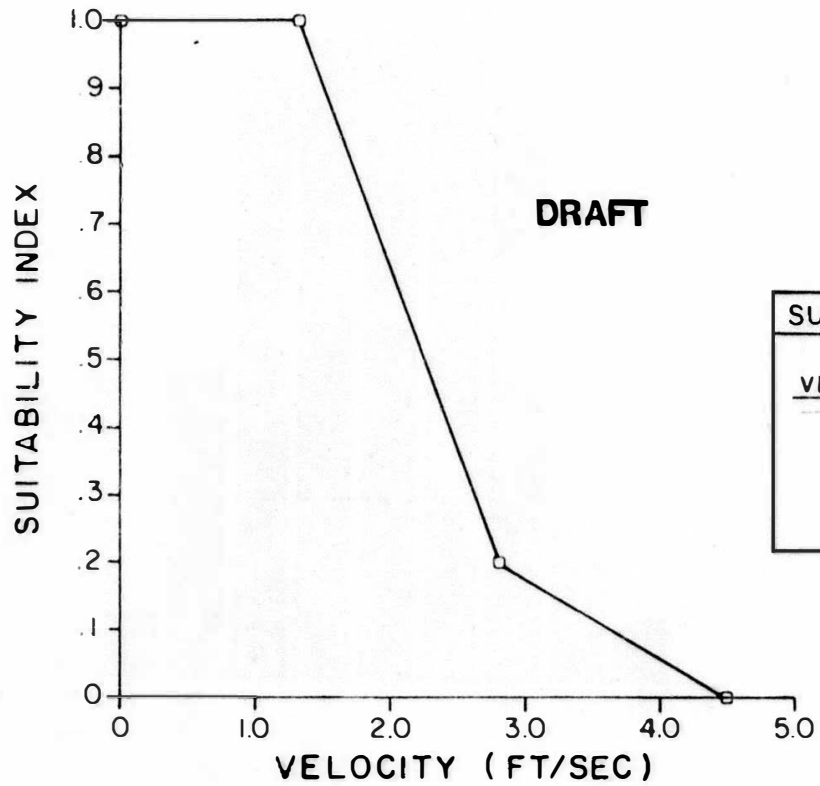
Physical HABitat SIMulation
PHABSIM



CHUM SALMON
SUITABILITY CRITERIA CURVE
DEPTH

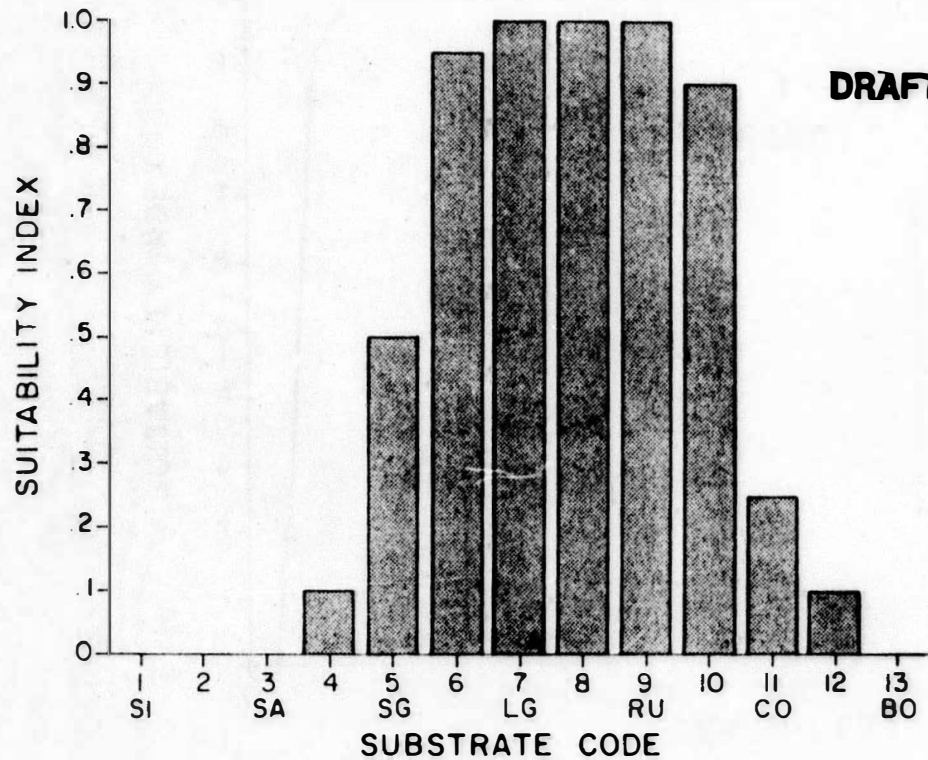


CHUM SALMON
SUITABILITY CRITERIA CURVE
VELOCITY



SUITABILITY CRITERIA	
<u>VELOCITY</u>	<u>SUITABILITY INDEX</u>
0.0	1.0
1.3	1.0
2.8	0.2
4.5	0.0

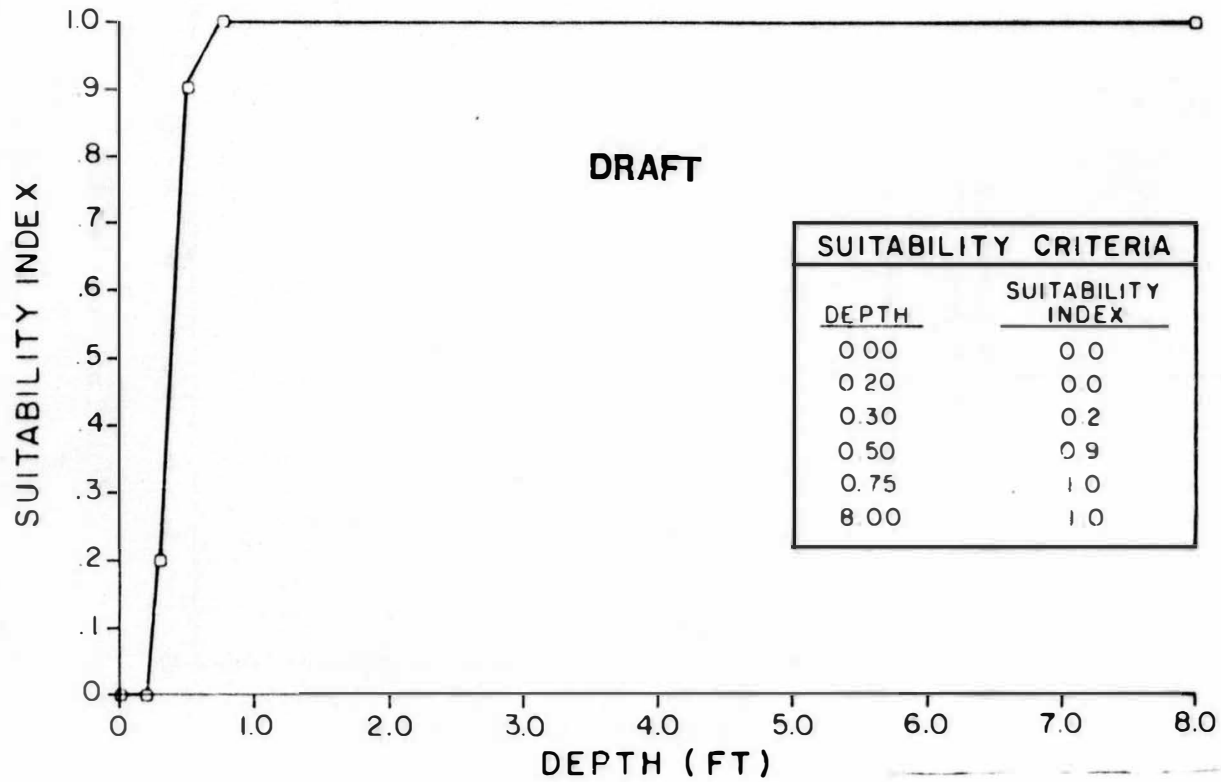
**SOCKEYE SALMON
SUITABILITY CRITERIA CURVE
SUBSTRATE**



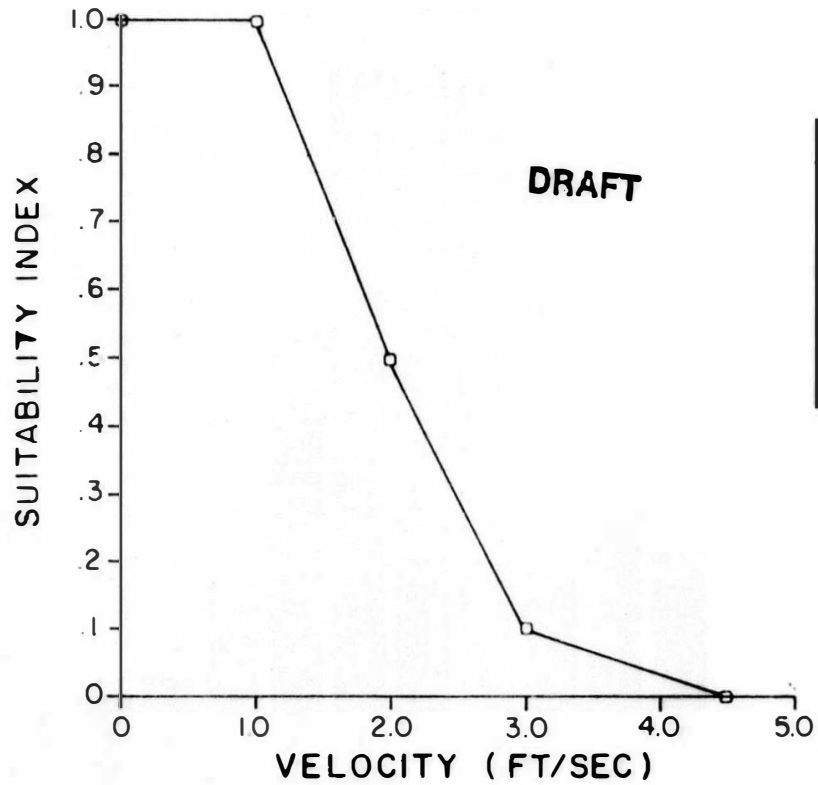
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SUITABILITY CRITERIA			
SUBSTRATE CODE	PARTICLE SIZE	SUITABILITY INDEX	
1	SI	SILT	0.00
2			0.00
3	SA	SAND	0.00
4			0.10
5	SG	1/8 - 1"	0.50
6			0.95
7	LG	1 - 3"	1.00
8			1.00
9	RU	3 - 9"	1.00
10			0.90
11	CO	5 - 10"	0.25
12			0.10
13	BO	>10"	0.00

SOCKEYE SALMON
SUITABILITY CRITERIA CURVE
DEPTH

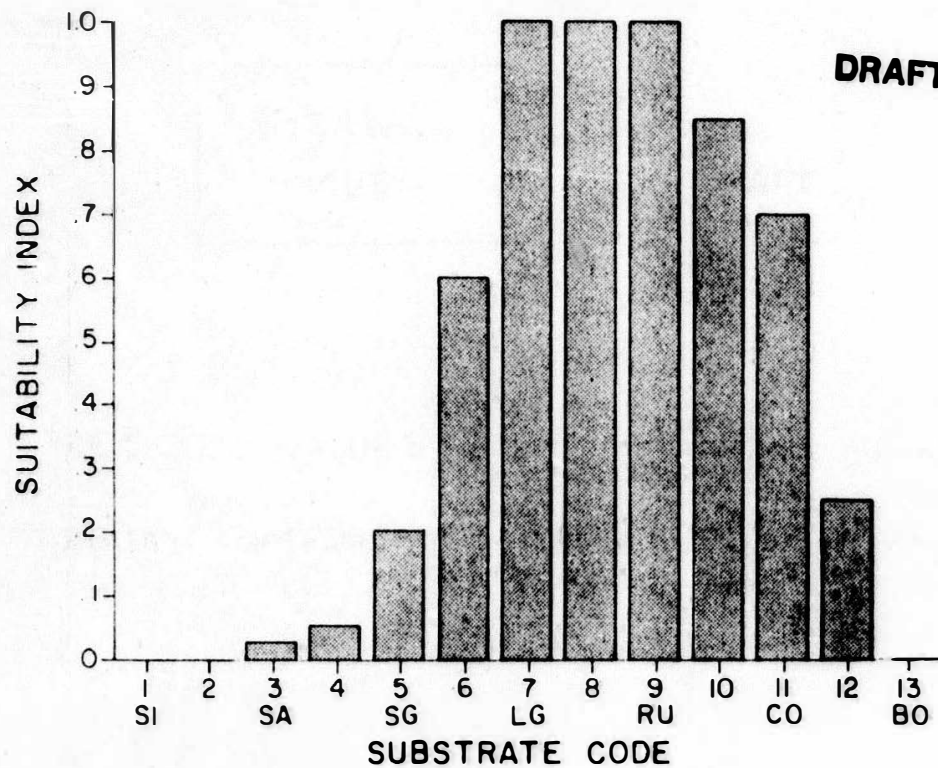


SOCKEYE SALMON
SUITABILITY CRITERIA CURVE
VELOCITY

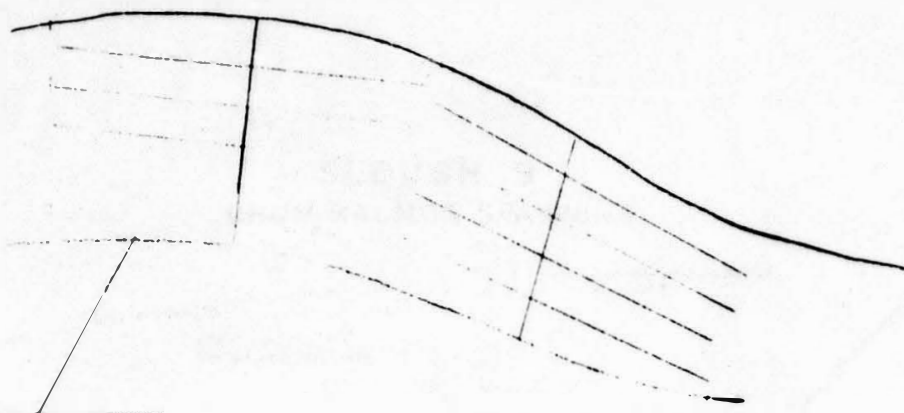


SUITABILITY CRITERIA	
<u>VELOCITY</u>	<u>SUITABILITY INDEX</u>
0.0	1.0
1.0	1.0
2.0	0.5
3.0	0.1
4.5	0.0

**CHUM SALMON
SUITABILITY CRITERIA CURVE
SUBSTRATE**



SUITABILITY CRITERIA		
SUBSTRATE CODE	PARTICLE SIZE	SUITABILITY INDEX
1	SI	0.00
2		0.00
3	SA	0.025
4		0.05
5	SG	0.20
6		0.60
7	LG	1.00
8		1.00
9	RU	1.00
10		0.85
11	CO	0.70
12		0.25
13	BO	0.00



HYDRAULIC
MODEL

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PREDICTED VALUES
for
HABITAT COMPONENTS
in each cell

SUITABILITY
CRITERIA

SUITABILITY FACTOR
for each
Predicted value
in cells

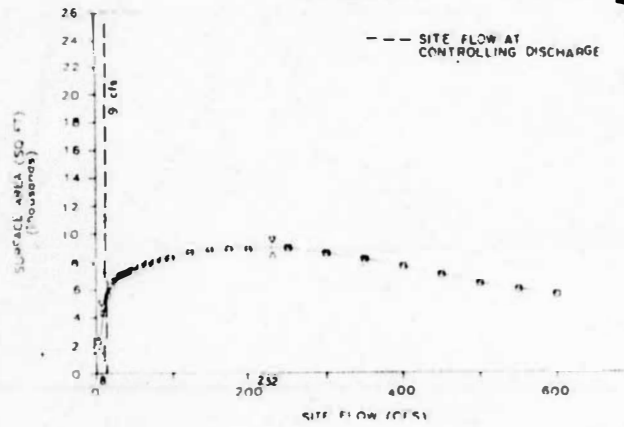
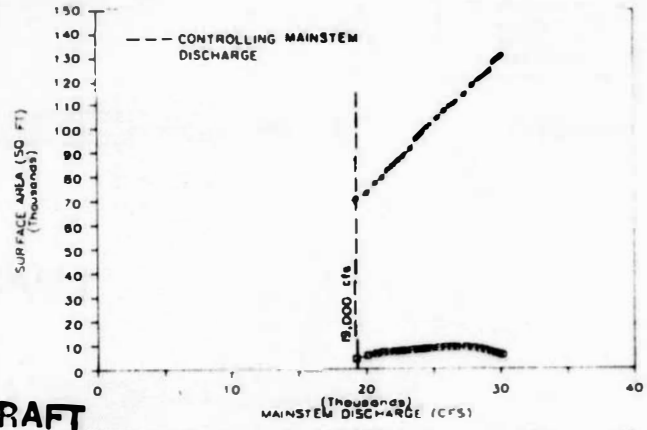
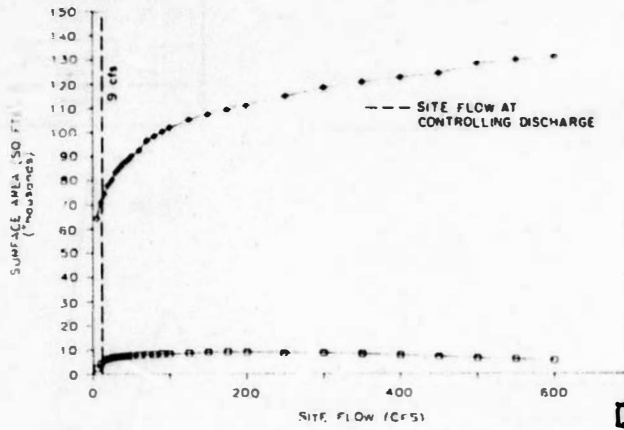
Joint
Factor

Σ

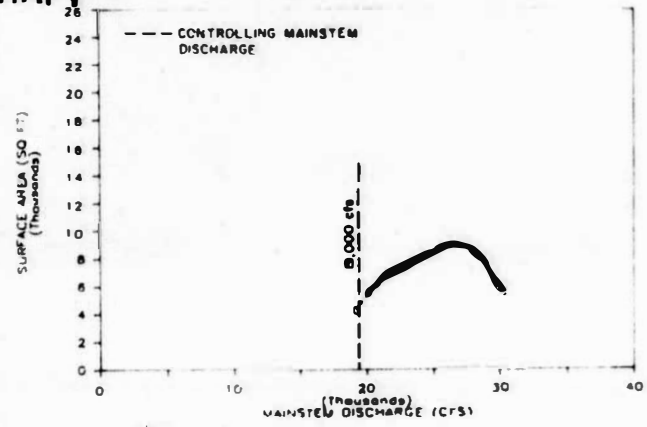
WUA

$$WUA = \Sigma \text{ Area } (D \times V \times S \times U)$$

SLOUGH 9 CHUM SALMON SPAWNING

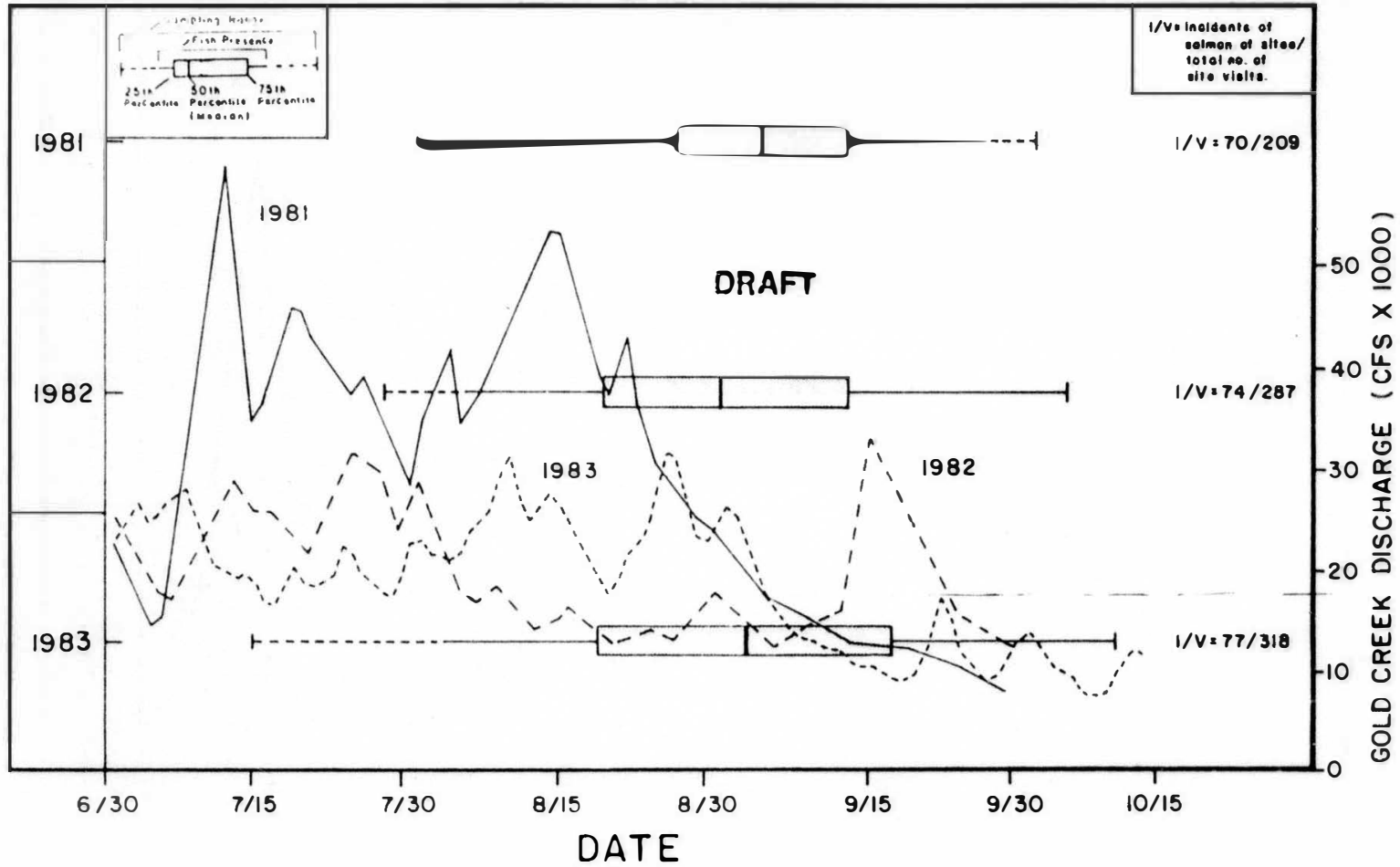


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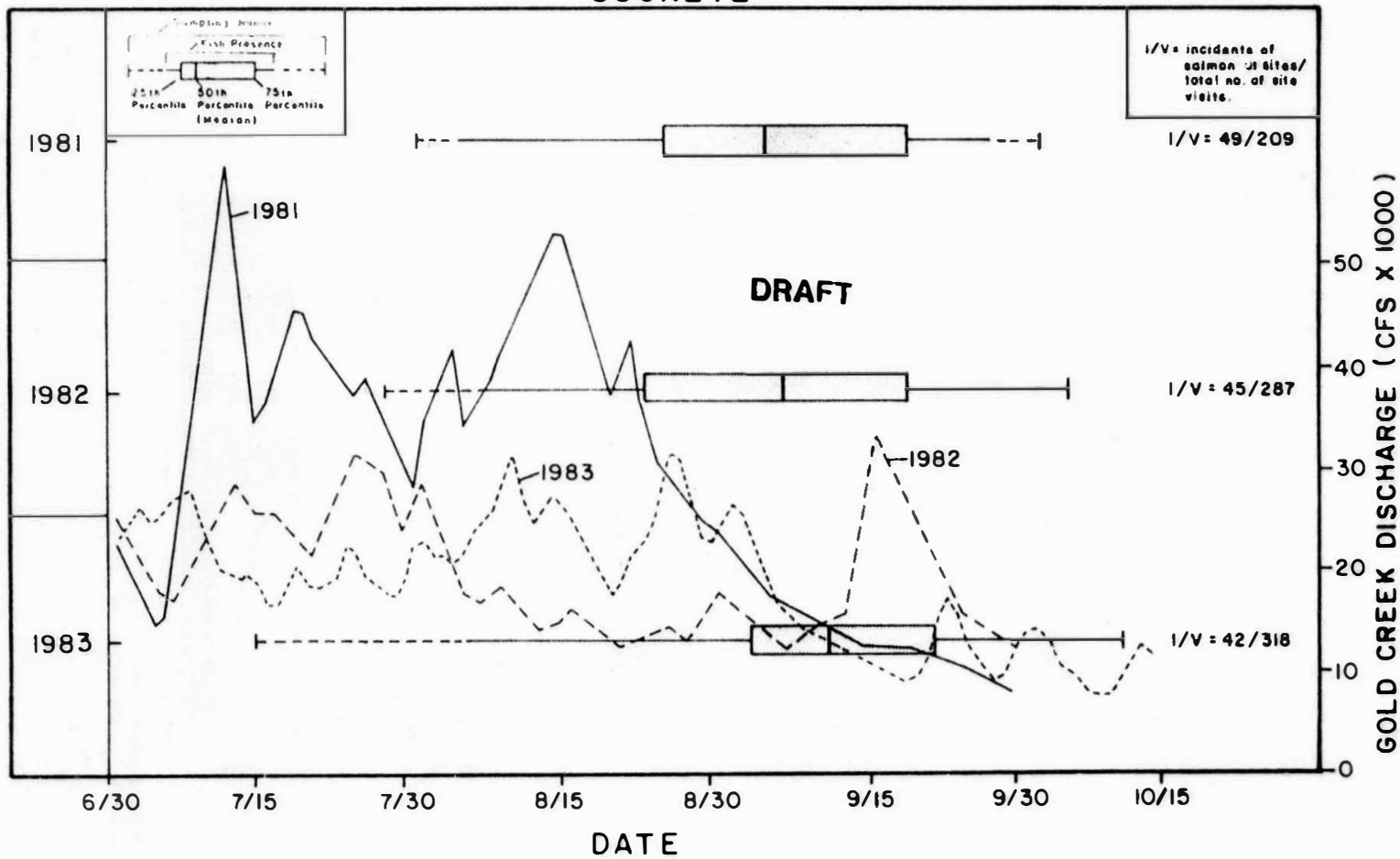


○ GROSS SURFACE AREA ○ WUA (STD COMBINED) ○ CALIBRATION FLOWS (MIN. & MAX.)

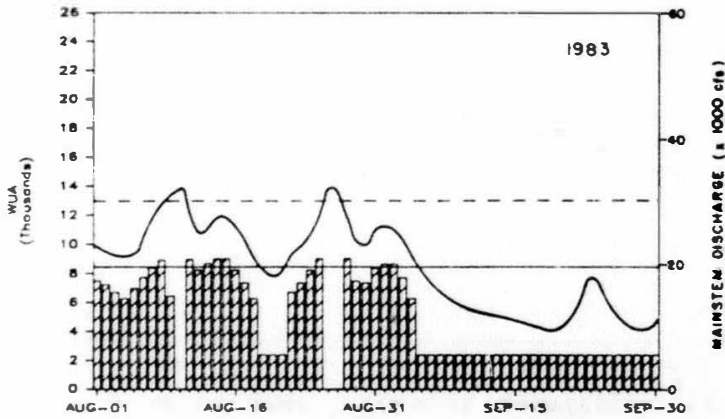
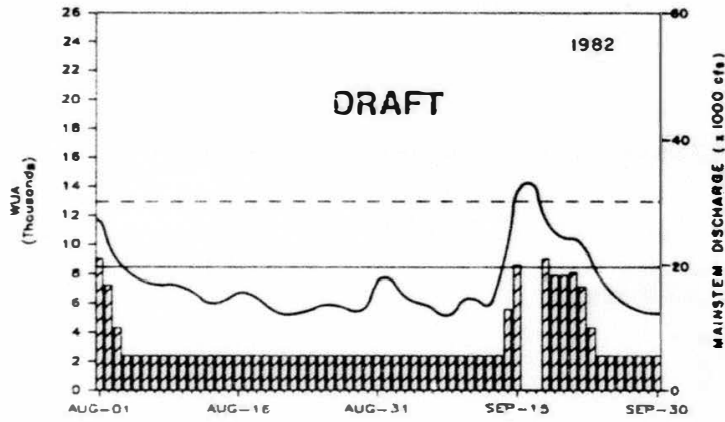
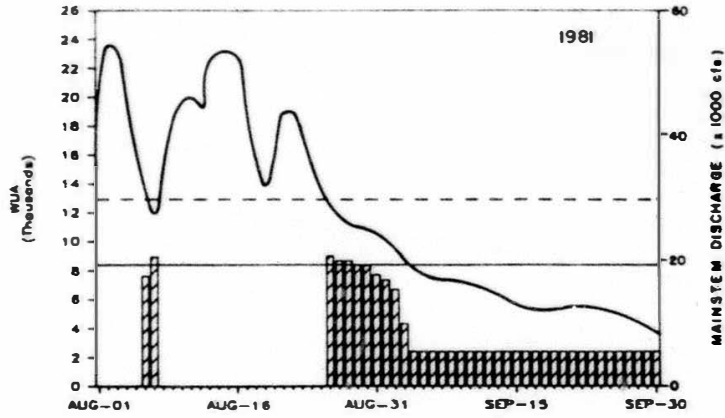
CHUM



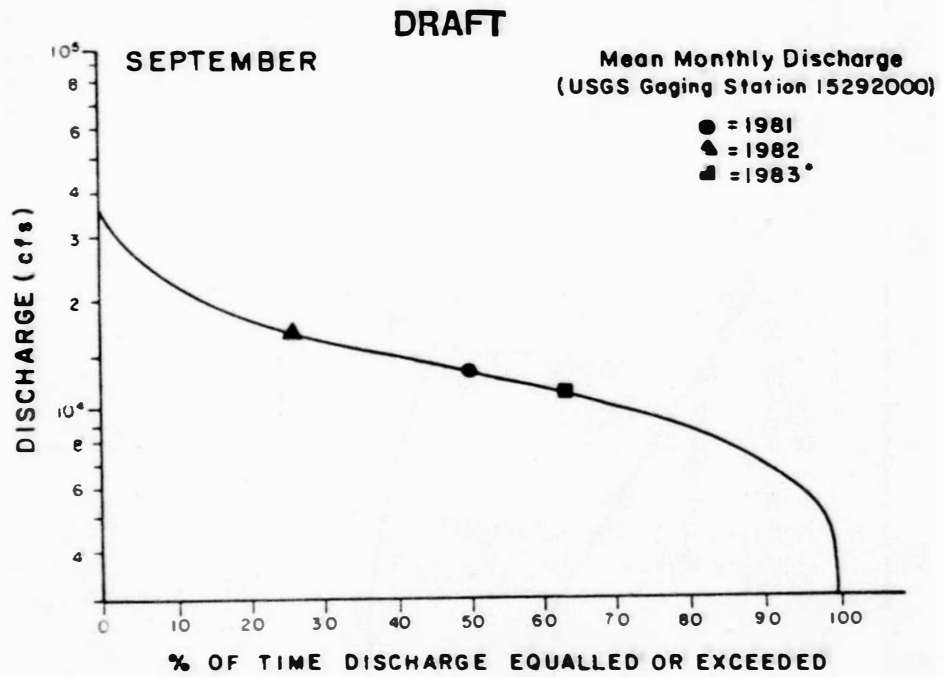
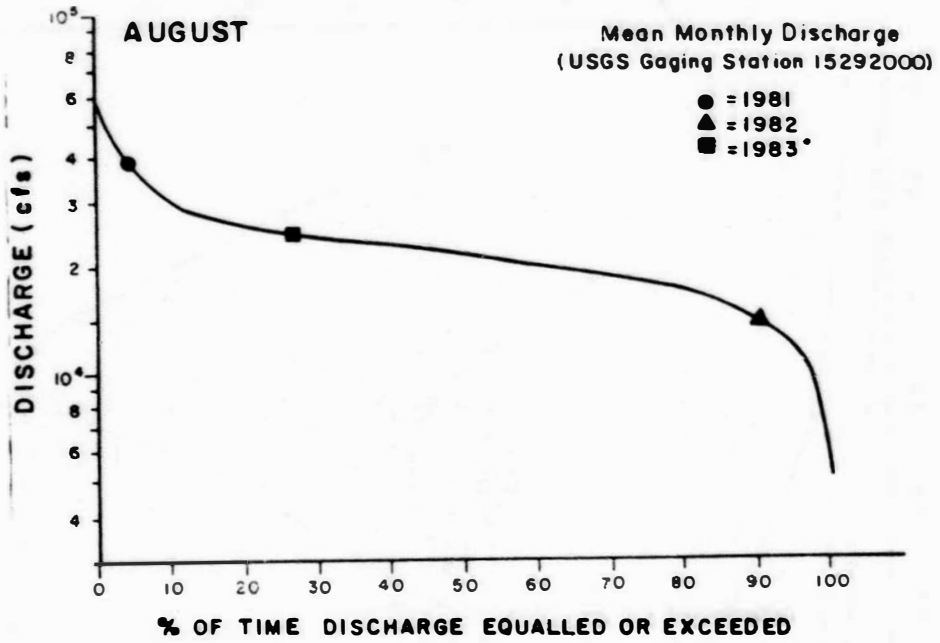
SOCKEYE



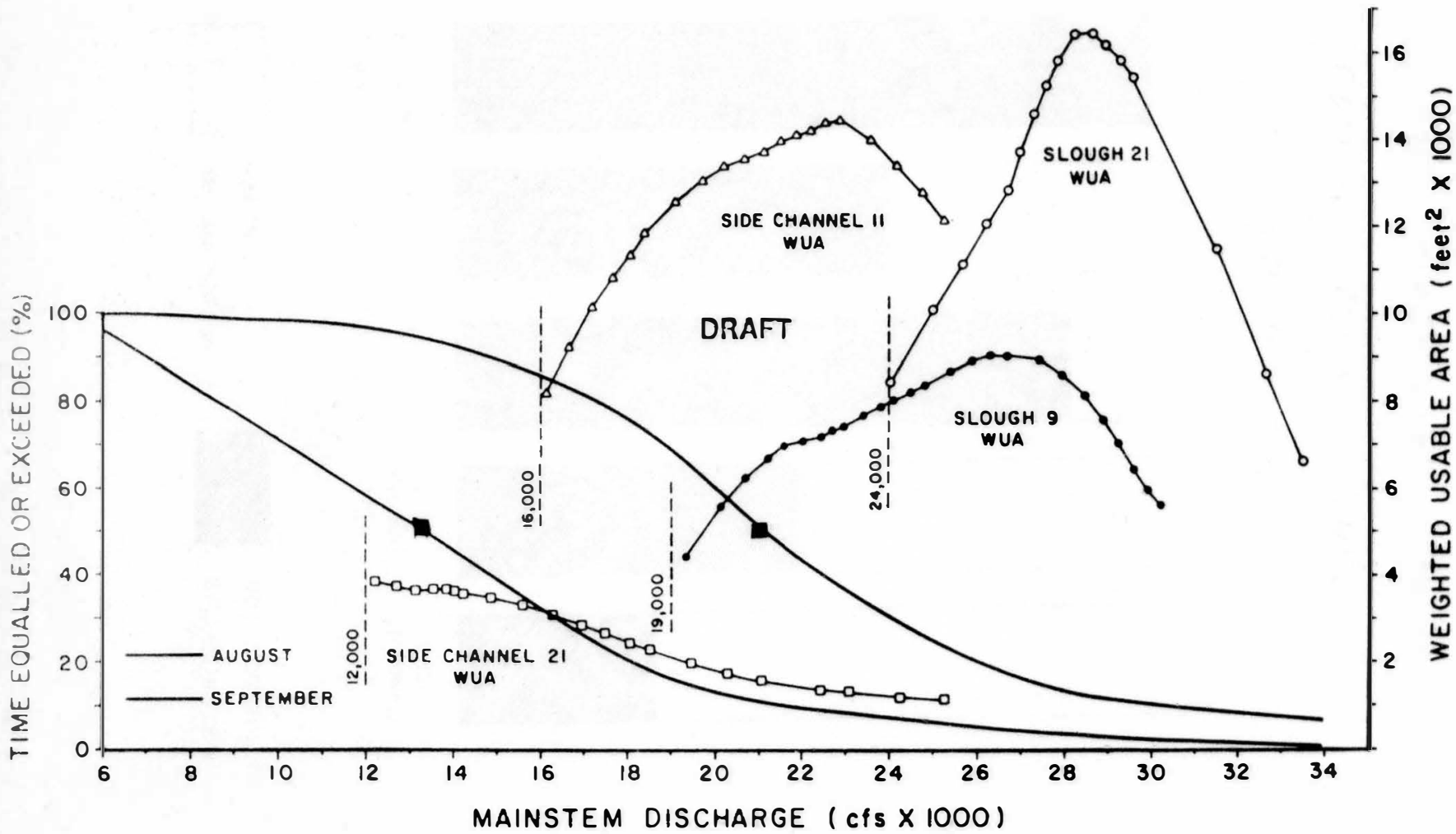
SI. LOUGH 9
CHUM



--- UPPER MODEL EXTRAPOLATION LIMIT
— CONTROLLING BREACHING DISCHARGE

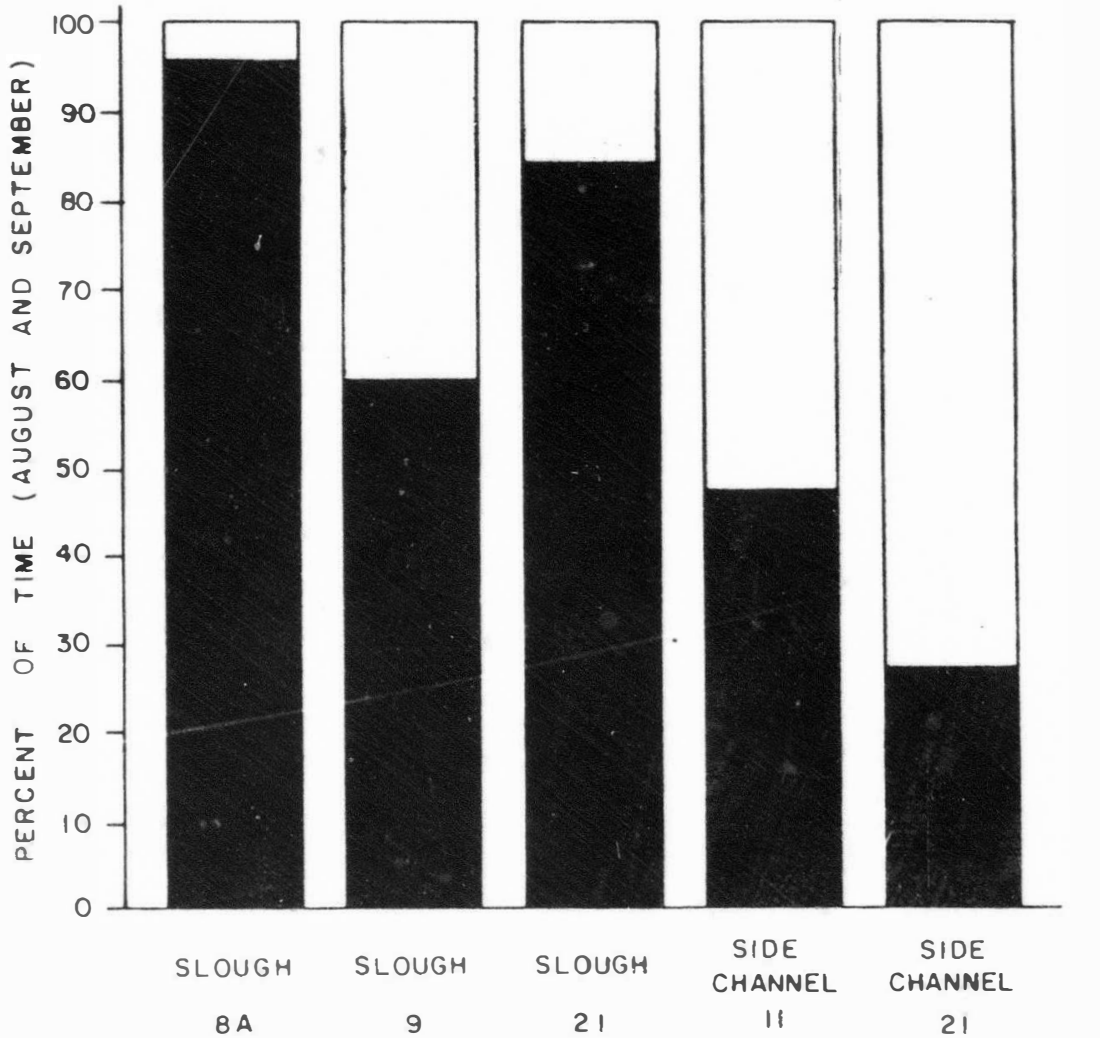


*Provisional Data

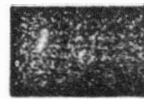


PERCENT CONTROLLED UNDER
NATURAL FLOW REGIMES

(30 Year record)
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CONTROLLED
BY MAINSTEM



NOT CONTROLLED
BY MAINSTEM

INFLUENCE OF MAINSTEM DISCHARGE ON ACCESS TO HABITAT AREAS IN SLOUGHS

